Determinants of Banks Liquidity: Empirical Evidence on Ethiopian Commercial Banks

A Thesis Submitted In Partial Fulfillment of the Requirements for the Degree of Master of Science in Accounting and Finance

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Declaration

This is to certify that the thesis prepared by Nigist Melese, entitled: "*Determinants of Banks Liquidity: Empirical Evidence on Ethiopian Commercial Banks"* and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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Abstract

Liquidity creation is the main concerns of commercial banks since it is crucial for its existence; hence the main objective of this study was to identify the determinants of commercial banks liquidity in Ethiopia. The data covered the period from 2007-2013 for the sample of ten commercial banks in Ethiopia and used secondary data. Both bank specific and macroeconomic variables were analyzed by employing the balanced panel fixed effect regression model and the result of the study revealed that capital adequacy, profitability, and real GDP growth rate have negative and statistically significant impacts on liquidity of Ethiopian commercial banks while bank size has positive and statistically significant impact on liquidity. Whereas nonperforming loan, loan growth, inflation rate, and interest rate margin were found to be statistically insignificant/ has no any impact on liquidity of Ethiopian commercial banks for the tested period.

Keyterms: *Liquidity, Ethiopian commercial banks, liquidity determinants, balanced panel data*

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List of Abbreviation and acronyms

AB: Abbay Bank

AIB: Addis International Bank

AIB: Awash International Bank

BG: Breusch-Godfrey

BIB: Berhan International Bank

BOA: Bank of Abyssinia

BUIB: Buna International Bank

CAP: Capital adequacy

CBB: Construction and Business Bank

CBE: Commercial Bank of Ethiopia

CBO: Cooperative Bank of Oromia

CLRM: Classical linear regression model

CPI: Consumer price index

DB: Dashen Bank

DEP: Dependency on external funds

DGB: Debub Global Bank

DW: Durbin-watson

ENTB: Innat Bank

GDP: Gross Domestic Product

INF: Inflation rate

IRM: Interest rate margin

LG: Loan growth

LIB: Lion International Bank

LIQ: Liquidity

LnTOA: Natural logarithm of total asset

MFI: Microfinance Institution

MoFED: Ministry of Finance Economic Development

NBE: National Bank of Ethiopia

NIB: Nib International Bank

NPL: Nonperforming loan

OLS: Ordinary least square

PROF: Profitability

ROA: Return on asset

ROE: Return on equity

UB: United Bank

USD: US Dollar

WB: Wugagen Bank

ZB: Zemen Bank

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CHAPTER ONE

INTRODUCTION

This chapter provides the general overview of the study; therefore it included the following sections: back ground of the study, history of banking system in Ethiopia, statements of the problems, Objectives of the study, research hypotheses, Research methodology, Scope of the study, significance of the study and organization of the study.

1.1Back ground of the study

Banks are financial institutions that play intermediary function in the economy through channeling financial resources from surplus (depositors) economic units to deficit (borrowers) economic unit; hence it remained and will continue to be an important institution for any economy as they play the most fundamental role in the payments system. Since the role of capital market in most developing countries is minimal, commercial banks become the most dominant financial institutions. Of the main functions of commercial banks is the availing of funds (monetary) to its customers; for a bank to be in a position to do so, it must be in a healthy liquidity position (Litter et al. 2004).

The banking system aids in allocation of resources from those surplus depositors to those deficit borrowers by transforming relatively small liquid deposits in to large illiquid loans (Allen et al. 2010). Bank for International Settlements (2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Also Yeager and Seitz (1989) define Liquidity as the ability of a financial institution to meet all legitimate demands for funds. Thus, 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.

Over the past years, the subject of bank liquidity creation has become more and more in focus of research in financial intermediation. The widely accepted view today is that banks create liquidity on both the asset and liability side of their balance sheets by transforming maturities of 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 sides of the balance sheet by offering access to long term loans and contemporaneous access to short term deposits (Berger and Bouwman 2006).

As was pointed out by Diamond and Dybvig (1983), one of the key reasons why banks are fragile is their role in transforming maturity and providing insurance as regards depositors‟ potential liquidity needs. Also Gennaioli et al. (2012) argued by linking financial innovation with financial fragility in that neglect of risks can lead to over issuance of innovative securities.

Since the Ethiopian financial sector comprised of mainly banks which accounts for about 94% of the total assets with remaining held by insurance companies and micro finance institutions (MFIs) with 3% each (Pfister et al. 2008). Hence, the process of financial intermediation in the country depends heavily on banks. With the absence of secondary market the banking sector in Ethiopia currently acts as the link that holds the country‟s economy together. Thus, keeping their optimal liquidity for banks in Ethiopia is not only important for the banking sector but also for the economy as a whole. However, on the area of factors affecting commercial banks liquidity is unexplored part in Ethiopia. Therefore, empirical studies are essential to identify the determinants of liquidity in Ethiopian commercial banks.

1.2History of banking system in Ethiopia

The introduction of modern banking were traced back to 1905 with the agreement held between Emperor Minilik II and Mr.Ma Gillivray, representative of the British owned National Bank of Egypt. Following the agreement the first bank called Bank of Abyssinia was inaugurated in Feb. 16, 1906 by the Emperor and the bank was totally managed by the Egyptian National Bank, besides it was a private bank whose shares was sold in Addis Ababa, New York, Paris, London, Vienna (Mauri 2010).

In 1931, Emperor Haile Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government owned bank providing central and commercial banking services until the Italian invasion of 1936; then after Bank of Italy was formed a legal tender in Ethiopia. After Ethiopia regains its independence from fascist Italy in 1943, 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. Up to the period of 1974, several other financial institutions emerged including the state owned as well as private financial institution. Following the declaration of command economy by Dergue regime in 1974 the government extended its control and nationalized all of previously established private banks and merged into one bank. After nationalization the Dergue regime leave only three government banks; the National Bank of Ethiopia, the Commercial Bank of Ethiopia and agricultural and Industrial Development Bank (Mauri 2010).

This situation was reversed when the socialist regime was overthrown in 1991. Subsequently, the licensing and supervision of Banking Business Proclamation No. 84/1994 was issued in 1994 which led to the beginning of a new era for Ethiopia banking sector. Following the enactment of the banking legislations in the country in the 1990s, a fairly good number of private banks have been established. To this end, by the fiscal year 2013/14, the total number of banks already operational in the country reached nineteen. Of these, three were government owned while the remaining sixteen‟s were privately owned commercial banks. As it is known Commercial banks work for profit and the NBE controls and gives license for commercial banks (National Bank of Ethiopia Quarterly Bulletin; September 2010).

1.3Statement of the problem

It is known that the banking sector is the main actor and plays an important role in the economic growth of a country. This is done through facilitating payments and the smooth transfer of goods and services and they match savers (surplus economic units) with borrowers (deficit economic units). However, this fundamental role of banks in the „maturity transformation‟ of short term deposits into long term loans make banks inherently vulnerable to liquidity risk, both of an institution specific nature and that which affects markets as a whole. This is due to the fact that loans are regarded as the most profitable service yet the most risky service provided by banks. It is most risky due to the likeliness of credit risk which may eventually end up in liquidity shortage. This indicated by; as default risk increases, liquidity risk also increases (Ericsson & Renault 2006). This has caused banks to take measures like evaluating the type of borrowers and their creditworthiness. Also, liquidity creation is one of the pre eminent function of banks (seen as the primary source of economic welfare contribution by banks) but a major source of their vulnerability to shocks (e.g. Bryant 1980; Diamond and Dybvig 1983; Calomiris and Kahn 1991). Therefore, virtually every financial transaction or commitment has implications for a bank‟s liquidity.

Liquidity risk has become one of the main concerns of financial institutions following the financial crisis of 2007. For instance, as U.S. subprime mortgage crisis reached its peak in the years 2008/09 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). As it clearly indicated in the financial crisis, liquidity and liquidity risk is very up to date and important topic. Therefore, identifying the major determinants of banks‟ liquidity has become one of the major activities and responsibilities of all banks and their regulators so as to keep a control on liquidity risk. Depending on the sources of their liquidity; the liquidity position of banks could be affected by bank specific factors, macroeconomic factors, and government/central bank regulations (Vodová 2012). Firm specific factors consisted; capital adequacy, nonperforming loan, bank size, profitability, and loan growth while the macro economic factors were consisted; gross domestic products/ real GDP growth, inflation rate, and interest rate margin.

Hence, identifying the major determinants of commercial banks liquidity in Ethiopia is open for empirical analysis. In Ethiopia beginning from the last two decades the banking sector has been playing important role in the economic development of the country. Ethiopia‟s financial sector is largely bank based as the secondary market is still not found in the country. Banks dominate the financial sector in Ethiopia 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.

As it deeply indicated in the literature part most studies on the title of this study were done in abroad (i.e. Vodová 2012; Valla et al. 2006), with some of them in Africa (i.e Chagwiza 2011; Laurine 2013) but in Ethiopia few or possible to say finger counted studies were made related to banks liquidity but most of them overlooked studying on the determinants of banks liquidity directly and focused on to study points like the relationship between liquidity and performance of banks.

Among this efforts the studies conducted by Worku (2006) „liquidity and its impact on performance of commercial banks in Ethiopia‟ and Semu (2010) „the impact of reducing or restricting loan disbursement on the performance of banks in Ethiopia‟ are worth mentioning. In her study entitled „determinants of banks liquidity and their impact on financial performance‟ Tseganesh (2012) tried to investigate determinants of banks liquidity directly. However, the measurement used by the researcher for liquidity risk was only liquidity ratios. According to Poorman and Blake (2005) measuring liquidity risk based on the traditional liquidity ratios only was not enough. In addition, liquidity ratios lies the fact that they do not always capture all, or any of liquidity risk, this is the disadvantage of these ratio (Vodová 2013). Besides this, the

Basel Committee on Banking Supervision (2000) proposed the financing gap for banks to measure their liquidity risk. Therefore, this study designed to investigate the determinants of commercial banks liquidity in Ethiopia directly from a wide range of variables through significant measurements of liquidity risk (i.e. financing gap).

1.4 Objective of the study

Given the importance of commercial banks in Ethiopia, this paper intended to examine the factors that contribute to the bank safety and soundness in term of liquidity.

1.4.1 General objective

The main objective of this study is investigating the determinants of commercial banks liquidity in Ethiopia.

1.4.2 Specific objective

Specifically, this study intended to address the following objectives;

- Investigating the impact of bank specific factor (i.e Capital adequacy, Non-performing loan, Loan growth, bank size, and profitability) on the liquidity of commercial banks in Ethiopia.
- Identifying the impact of macroeconomic factors (i.e. GDP growth rate, Inflation rate, and interest rate margin) on liquidity of commercial banks in Ethiopia.
- At the end, it intended to know the relationship between determining variables and liquidity of commercial banks in Ethiopia.

1.5 Hypotheses of the study

In many quantitative proposals, writers used research questions. However, a more formal statement of research employs hypotheses. These hypotheses are predictions about the outcome of the results and they may be written as alternative hypotheses specifying the exact results to be expected (more or less, higher or lower of something). They also may be stated in the null form, indicating no expected difference or no relationship between groups on a dependent variable as stated by (Creswell 2009). Therefore, this study developed the following nine hypotheses:

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

H2. Nonperforming loans has negative and significant impact on banks liquidity.

H3. Bank size has positive and significant impact on banks liquidity.

H4. Profitability has negative and significant impact on banks liquidity.

H5. Loan growth has negative and significant impact on banks liquidity.

H6. GDP growth rate has negative and significant impact on banks liquidity.

H7. Inflation rate has positive and significant impact on banks liquidity.

H8. Interest rate margin has negative and significant impact on banks liquidity.

1.6 Research Methodology

Quantitative research approach was used to meet the objective of the study and to test hypotheses under it. The quantitative 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 (Creswell 2009). Hence, in this study the approach was enabled to see the impact of the main bank specific and macroeconomic determinants on banks liquidity in Ethiopia. The panel data/ multiple regression model is used for the sample of ten (10) commercial banks in Ethiopia and Commercial banks having at least seven years working experience (i.e. from 2007 to 2013) were included.

Structured document survey was made to collect the necessary data from audited financial statements of both public and privately owned commercial banks 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 economic factors. The data analysis was made by using E-view 6 soft ware econometrics package.

1.7 Scope of the study

The scope of the study was limited to see the impact of capital adequacy, nonperforming loan, bank size, profitability, loan growth, GDP growth rate, inflation rate, and interest rate margin on banks liquidity from the period 2007 to 2013 for ten commercial banks in the sample.

The rationale behind taking seven years data (i.e. started from 2007) was that to include the two recently established banks (i.e CBO which established in 2004 and LIB which established in the year 2006) this is intended to increase the sample of the study (i.e ten commercial banks were selected).

1.8 Significance of the study

The main reason for this study was that, researchers have not yet paid enough attention to the banking sector specifically to the factors that determining the liquidity of commercial banks in

Ethiopia. Therefore, this study was expected to provide empirical evidence on determinants of Ethiopian commercial banks‟ liquidity and greatly contribute to the existing knowledge in the area of this title in the context of Ethiopia. This in turn contributes to the well being of the financial sector of the economy. Hence, the major beneficiaries from this study are customers, commercial banks, the academic staff, central banks and the country as a whole.

1.9 Organization of the study

The research report was organized under five chapters. The first chapter provides the general overview of the study. The general information included in this chapter; background of the study, history of banking system in Ethiopia, statement of the problem, objective of the study, hypotheses of the study, research methodology, scope of the study and significance of the study as well as organization of the study. The second chapter reviewed the related literatures on the determinants of banks liquidity. The third chapter focuses on the methodology of the study and the fourth chapter was provided results and discussion. The final chapter included summary, conclusion, recommendations and room for further research and at the end references and appendixes were attached.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter was provides information about liquidity and its implication which was made to introduce liquidity in depth, theoretical perspective of liquidity, the concepts and measurements of liquidity risk from different literatures used by different researchers in their study, the empirical findings for the determining factors of liquidity (both bank specific and macroeconomic determinants), and finally conclusion and knowledge gap were drown.

2.1Liquidity and its implication

Liquidity can be defined as the ability of a financial institution to meet all legitimate demands for funds (Yeager and Seitz 1989). Also the Basel Committee on Banking Supervision (2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses, besides the Basel define liquidity as a bank‟s ability to accommodate decreases in its liabilities and its ability to fund increases in its assets.

Hence, bank needs to hold liquid assets to meet the cash requirements of its customers if the institution does not have the resources to satisfy its customers' demand, then it either has to borrow on the interbank 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 (Moore 2009).

As of Alger et al. (1999) the asset is liquid if it can be sold quickly without significant losses but what determine the liquidity of an asset is still a disputed issue among theorists. As of the conventional wisdom found in the bank management literature, an asset is liquid if it is widely known to have low risk (such as government debt) and if it has a short maturity this implies that asset‟s price is less sensitive to interest rate movement, making large capital losses unlikely (Garber and Weisbrod 1992 and Hempel et al. 1994). According to that definition, the typical bank liquid asset includes cash, reserves representing an excess of reserves required by law (i.e., funds held in the account at the central bank), securities (e.g., government debt, commercial paper), and interbank loans with very short maturity (one to three days).

Bordo et al. (2001), suggest two explanations on the cause of liquidity runs on deposit money banks. Their explanation indicated that runs on banks are a function of mob psychology or panic, such that if there is an expectation of financial crisis and people take panic actions in anticipation of the crisis, the financial crisis becomes inevitable. Bordo et al. (2001) also asserts that crises are an intrinsic part of the business cycle and result from shocks to economic fundamentals. When the economy goes into a recession or depression, asset returns are expected to fall. Borrowers will have difficulty in repaying loans and depositors, anticipating an increase in defaults or nonperforming loans, will try to protect their wealth by withdrawing bank deposits. Banks are caught between the illiquidity of their assets (loans) and the liquidity of their liabilities (deposits) and may become insolvent.

There is a large volume of theoretical literature dealing with bank liquidity creation (Bryant 1980; Diamond and Dybvig 1983; Holmstrom and Tirole 2010 and Kashyap et al. 2002). Most recent studies focused on measuring the amount of liquidity created in the banking sector (Deep and Schaefer 2004; Berger and Bouwman 2008); yet few studies shed light on the determinants of bank liquidity creation. Hence, this chapter focuses on the review of relevant theoretical and empirical literatures on banks liquidity and its determinants. 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 hypotheses for the study.

2.2Theoretical perspectives of Bank Liquidity

2.2.1 Bank liquidity creation and financial fragility theory;

Banks perform valuable activities on either side of their balance sheets; on the asset side, they make loans to difficult, illiquid borrowers thus enhancing the flow of credit in the economy. On the liability side, they provide liquidity on demand to depositors. As of Diamond and Rajan (1998) Depositors get better access to their funds than they would if they invested directly and earned the same expected return: this is liquidity creation. Borrowing firms too can find the bank to be a more reliable source of funding than another firm or individuals: banks insure borrowers against the liquidity risk that funding will be cut off prematurely.

Diamond and Dybvig (1983) stated that banks can transform illiquid assets into more liquid demand deposits. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Diamond and Dybvig emphasize the „preference for liquidity" under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets; however, as banks are liquidity insurers they face transformation risk and are exposed to the risk of run on deposits. Moreover, the higher is liquidity creation to the external public, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers. The practical importance of liquidity during crises is buttressed by financial intermediation theory, which indicates that the creation of liquidity is an important reason why banks exist.

The early contributions by Bryant (1980), Diamond and Dybvig (1983) argue that banks create liquidity by financing relatively illiquid assets such as business loans with relatively liquid liabilities such as transactions deposits. While the recent contributions of Holmstrom and Tirole (2010), Kashyap et al. (2002) suggests that banks also create liquidity off the balance sheet through loan commitments and similar claims to liquid funds.

A natural justification for the existence of deposit taking institutions, thereby giving also an explanation for the economically important role of banks in providing liquidity, was initially modeled by (Bryant 1980; Diamond and Dybvig 1983). The researchers showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against idiosyncratic consumption shocks. However, this structure is also the source of a potential fragility of banks since in case of an unexpected high number of depositors deciding to withdraw their funds for other reasons than liquidity needs, a bank run will result (Friedman and Schwartz 1963).

The models of Bryant-Diamond/Dybvig have been subject to a large number of follow-up papers, extending or testing the models. From these, the relevance for this study was that the papers by Calomiris and Kahn (1991), Qi (1998), and Diamond and Rajan (2001) which develop and emphasize the point that demandable debt has interesting incentive implications for disciplining the bank management.

The argument goes like this: on their asset side banks have illiquid loans whose market prices would be below their internal values in case of a fire sale. Having to sell or to call loans prematurely would involve a loss; the greater part of the activities which banks undertake and need to undertake to monitor their loans, which includes their active involvement in the governance of borrowing corporations are not really observable for outsiders. But at least a certain part of a bank‟s liability are call or sight deposits which are by definition and by law to be paid back on demand and on a first come first serve basis. This rule of distribution makes depositors wary that they might be late or stand too far behind in the waiting line in the case a bank encounters problems and it makes them even aware of what little information they may have on the monitoring activity of the bank.

This situation can lead to a bank run, and the danger of a run is what induces banks to do what their depositors want them to do, namely to be active delegated monitors in the spirit of Diamond (1984). Based on this argument, Diamond and Rajan (2001) raised the question whether or not financial fragility is a desirable state for banks. They argue that the existence of the fragility itself gives banks the right incentives to create liquidity. According to them, any kind of regulation, such as capital standards, impair this liquidity creation and should thus, be avoided.

Kashyap et.al (2002) conducted a related analysis justifying the existence of banks‟ liquidity creation. They argued that because banks carry out lending and deposit taking under the same roof, synergies must exist between these two tasks. These synergies can be found in the way deposits and loan commitments are secured through the holding of liquid assets as collateral against withdrawals. They regard these liquid assets as costly overheads. These overheads can be shared by the two separate functions, hence the synergy.

Diamond and Rajan (2005) provides a detailed analysis of the link between liquidity shortages and systemic banking crises. And it is argued that the failure of a single bank can shrink the pool of available liquidity to the extent that other banks could be affected by it, hence a contagion effect is the result. However, as solvency and liquidity effects interact it is hard to determine the root of a crisis.

Many different definitions of liquidity risks were provided in the literature sources of (Jenkinson 2008; Diamond and Rajan 2001; Chaplin, et al. 2000). Accordingly, the literature analysis showed that liquidity risk is the risk that a bank may not meet its obligations (Jenkinson 2008) as the depositors may call their funds at an inconvenient time, causing fire sale of assets (Diamond and Rajan 2001). Also a comptroller of the currency acting in USA, define liquidity risk as a risk arising from a bank‟s inability to meet its obligations when they come due without incurring unacceptable losses (Comptroller‟s Hand book 2001). According to the definition of the Basel committee on banking supervision (1997), liquidity risk arises from the inability of a bank to accommodate decreases in liabilities or to fund increases in assets.

Therefore in easier terms, liquidity risk can be defined as the risk of being unable to liquidate a position timely at a reasonable price (Muranaga and Ohsawa 2002). Generally, liquidity risk arises from the fundamental role of banks in the maturity transformation of short term deposits into long term loans. As of Basel Committee on Banking Supervision (2008), it includes two types of risk: funding liquidity risk and market liquidity risk.

Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm while market liquidity risk is the risk that a bank cannot easily offset or eliminate a position at the market price.

According to Crockett (2008), the dimension of market liquidity risk includes market depth (the ability to execute large transactions without influencing prices unduly); tightness (the gap between bid and offer prices); intermediacy (the speed with which transaction can be executed); and resilience (the speed with which underlying prices are restored after disturbance).

Market liquidity risk and funding liquidity risk tend to reinforce each other: disruptions can easily spread from funding liquidity to market liquidity or vice versa (Baranyai 2008). There is strong interaction between funding liquidity risk and market liquidity risk, especially in periods of crisis. Drehmann and Nikolau (2009) pointed to the fact that shock to funding liquidity can lead to asset sales and may lead to decrease of asset prices. Lower market liquidity leads to higher margin which increase funding liquidity risk.

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

2.2.2 Measurements of liquidity risk;

As it is known financial institutions can utilize a number of sources to meet its liquidity needs, such as accepting new deposits, maturing assets, borrowed funds and/or using the discount window (i.e. borrowing from the central bank). Given that access, measurement and management of liquidity is an important activity in most commercial banks. Before seeing the methods of measuring liquidity risk, butter to introduce the sources of liquidity risk and possible ways to overcome with it.

There are three main sources of liquidity risks; the first one is on the liability side of the balance sheet, here there is a large uncertainty on the volume of withdrawals of deposits or the renewal of rolled over interbank loans, especially when the bank is under suspicion of insolvency or when there is an aggregate liquidity shortage, the second is on the asset side of the balance sheet, here there is an uncertainty on the volume of new requests for loans that a bank will receive in the future, and the third one is off-balance sheet activities, like credit lines and other commitments, positions taken by banks on derivative markets (Rochet 2008).

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

As of the Comptroller‟s Handbook (2012) the process of liquidity risk measurement of banks‟ should be commensurate with its size, complexity, and liquidity risk profile. Similar to a bank‟s policy limits and targets; the measurement of liquidity should be comprehensive and prospective. To be comprehensive, the measurement of liquidity must incorporate all of the cash flows and liquidity implications from all material assets, liabilities, off-balance sheet positions and other activities, including the potential options embedded in the institution‟s assets and liabilities.

Hence, measurements‟ of liquidity position of banks helps to identify their real liquidity risk exposures and to implement the appropriate liquidity risk management strategies that help banks to perform properly and profitably. Liquidity risk measurement helps to present liquidity position in terms of numbers and figures. As indicated in different literatures, there were various ways of measuring liquidity risk;

There are two basic traditional methods for measuring liquidity risk; these are liquidity gap/ flow approach and liquidity ratios/ stock approach. The liquidity gap/ flow approach is expressed as the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit that has to be filled. This approach focuses on comparing the variability in bank‟s inflows and out flows to determine the amount of reserves that are needed during a period. Here flow approach treats liquid reserves as a reservoir: the bank assesses its liquidity risk by comparing the variability in inflows and outflows to determine the amount of reserves that are needed during a period.

The second approach for measuring liquidity risk is liquidity ratio/ stock approach; which focused on the asset and liability sides of the balance sheet employing ratios to identify liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time; this might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions (Moore and Bassis 2009).

However, both approach of liquidity risk measurement has their limitations. Hence, the basic limitation of liquidity gap/ flow approach is that; it is more data intensive and there is no standard technique to forecast inflows and outflows. While the liquidity ratio/ stock approach is that; even if it is possible to calculate them only on the basis of publicly available data from banks´ balance sheets and it is easy to interpret their values, the disadvantage of this ratio is the fact that they do not always capture all, or any of liquidity risk (Vodová 2013).

Liquidity measures can be also one dimensional or multi dimensional. One dimensional liquidity measures take only one variable into account whereas multi dimensional liquidity measures capture different variables in one measure. Furthermore, the measures can be subdivided into; time related, volume related and model based; also there is other ways of measuring liquidity risk, i.e. net liquidity statement, in this method the bank can assess its liquidity position by listing the sources and uses of the liquidity. Liquidity index, this measures the potential losses the institution could suffer from a sudden or fire sale disposal of assets compared with the amount it would receive under normal market conditions when the disposal can be done in an unhurried way (Vonwyss 2004).

More significantly the Basel Committee on Banking Supervision proposed the financing gap for banks to measure their liquidity risk. The financing gap is the difference between the bank"s average loans and average deposits divided by total assets" of the bank. The larger the financing gap, the more the bank needs to borrow in the money markets and the greater the liquidity problems in the future due to increased deposit withdrawals and/or increased exercise of loan commitment (Basel Committee on Banking Supervision 2000). Researchers (for instance, Rafique & Malik 2013; Vodová 2011) used financing gap for measuring of liquidity in their study. Therefore, for the purpose of this study the financing gap was used in measuring liquidity of Ethiopian commercial banks.

2.2.3 Determinants of commercial banks liquidity theory

2.2.3.1 Bank specific factors

- **Capital adequacy and bank liquidity**

Capital is one of the bank specific determinants of liquidity and could be defined as common stock plus surplus plus undivided profits plus reserves for contingencies and other capital reserves; besides a bank"s loan loss reserves also serves as a buffer for absorbing losses, a broader definition of bank capital include this account (Patheja 1994). Banks capital plays a very important role in maintaining safety and solidarity of banks and the security of banking systems in general as it represents the buffer gate that prevents any unexpected loss that banks might face, which might reach depositors funds given that banks operate in a highly uncertain environment that might lead to their exposure to various risks and losses that might result from risks facing banks (Moh"d and Fakhris 2013).

Opposing to the standard view of liquidity creation in which banks create liquidity by transforming liquid liabilities into illiquid assets, the recent theories indicate that banks can create more or less liquidity by simply changing their funding mix on the liability side (Diamond and Rajan 2000; Gorton and Winton 2000). Thakor (1996) shows that capital may also affect banks‟ asset portfolio composition, thereby affecting liquidity creation through a change in the asset mix.

In the recent theoretical literature, there are two opposing views concerning the relationship between bank capital and liquidity creation; the financial fragility-crowding out and the risk absorption. As discussed by Berger and Bouwman (2009), under the first view, bank capital tends to impede liquidity creation through two distinct effects: the financial fragility structure and the crowding-out of deposits. The financial fragility structure is characterized by lower capital, tends to favor liquidity creation (Diamond and Rajan 2000). And they model a relationship bank that raises funds from investors to provide financing to an entrepreneur. The entrepreneur may withhold effort, which reduces the amount of bank financing attainable. More importantly, the bank may also withhold effort, which limits the bank‟s ability to raise financing. A deposit contract mitigates the bank‟s holdup problem because depositors can run on the bank if the bank threatens to withhold effort and therefore maximizes liquidity creation. Providers of capital cannot run on the bank, which limits their willingness to provide funds, and hence reduces liquidity creation. Thus, the higher a bank‟s capital ratio, the less liquidity it will create.

And also Gorton and Winton (2000) show how a higher capital ratio may reduce liquidity creation through the crowding out of deposits. They argue that deposits are more effective liquidity hedges for investors than investments in equity capital. Thus, higher capital ratios shift investors‟ funds from relatively liquid deposits to relatively illiquid bank capital, reducing overall liquidity for investors.

The second view is concerned with the risk absorption hypothesis; higher capital enhances banks ability to create liquidity, this insight is based on two strands of the literature. One strand consists of papers (e.g., Diamond and Dybvig 1983, Allen and Santomero 1998, Allen and Gale 2004) argue that liquidity creation exposes banks to risk. 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 (e.g., Bhattacharya and Thakor 1993, Repullo 2004, VonThadden 2004) that posit a bank capital absorbs risk and expands banks‟ risk-bearing capacity. Combining these two strands yields the prediction that higher capital ratios may allow banks to create more liquidity. Thus, under the second view, the higher is the bank's capital ratio, the higher is its liquidity creation.

- **Non-performing loans and bank liquidity**

Nonperforming loan is a loan that is not earning income and full payment of principal and interest is no longer anticipated; principal or interest is 90 days or more delinquent; or the maturity date has passed and payment in full has not been made (Hou 2004). Also it could be a loan that is outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract. Hence, nonperforming is any loan facility that is not up to date in terms of payment of both principal and interest contrary to the terms of the loan agreement. Therefore, the amount of nonperforming loan measures the quality of bank assets; besides large amount of nonperforming loans (NPL) leads the banking sector to efficiency problem and the banking system into failure.

As 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). Bloem and Gorter (2001) indicated that, 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. Since large amount of nonperforming loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on banks, it leads to liquidity problems. Therefore, the amount of nonperforming loans has a negative impact on banks liquidity.

- **Size and bank liquidity**

As to Estrada (2011) as size grows it will help them to overwhelm the risk which is similar to economies of scale but also it should be noted that as a firm grow it may leads to failures. There was an argument concerning to the size of bank, „„too big to fail‟‟ argument which indicated that 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). Hence, "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, therefore in case of a liquidity shortage; they rely on a liquidity assistance of Lender of Last Resort (Vodová 2011).

Therefore, 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 and transformation activities (Rauch et al. 2008; Berger and Bouwman 2009) they do have small amount of liquidity. Size is measured in the natural logarithm of total assets (Poorman and Blake 2005; Shen et al. 2010). Hence, there can be negative relationship between bank size and illiquidity whereas as per this argument there was positive relationship between bank size and liquidity.

- **Profitability and bank liquidity**

Profitability is the ability of a bank to generate revenue in excess of cost in relation to the bank‟s capital base. A sound and profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system (Athanasoglou et al. 2005). However, in literature there have been varying reports on the relationship between bank liquidity and profitability. Bourke (1989) argued that banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability. On the other hand, other researchers argue that holding liquid assets imposes an opportunity cost on the bank given their low return relative to other assets which indicated the inverse relationship between liquidity of bank and profitability (Molyneux and Thornton 1992; Goddard et al. 2004). The tradeoffs 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 bank‟s return but also increases its liquidity risks and the inverse is true. Hence, a high liquidity ratio indicates a less risky and less profitable bank (Hempel et al. 1994). Thus management is faced with the dilemma of liquidity and profitability.

The adverse effect of increased liquidity for financial institutions stated that, „although more liquid assets increase the ability to raise cash on short notice, they also reduce the ability of management to commit credibly to an investment strategy that protects investors‟ which finally, can result in reduction of the firm‟s capacity to raise external finance in some cases (Myers and

Rajan 1998). Hence, there can be a negative relationship between profitability and banks liquidity.

- **Loan growth and bank liquidity**

Since lending is the principal business activity for most commercial banks the loan portfolio is typically the largest asset and the predominate source of revenue (Comptroller‟s Hand book 1998). However, it is one of the greatest sources of risk to a bank‟s safety and soundness because loans are illiquid assets; increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank.

In practice the amount of liquidity held by banks is heavily influenced by loan demand that is the base for loan growth. If the 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 (Pilbeam 2005). Hence, the growth in loans and advances has negative impact on banks liquidity.

2.2.3.2 Macro economic factors

- **Real GDP growth and bank liquidity**

As of the profile of bank liquidity, Macroeconomic context is likely to affect bank activities and investment decisions (Pana et al. 2009 and Shen et al. 2010). And hence GDP growth is one of the macroeconomic variables that could affect banks liquidity. For instance, the demand for differentiated financial products is higher during economic boom and may improve bank ability to expand its loan and securities portfolios at a higher rate. At the same time, economic downturns are exacerbated by the reduction in bank credit supply; hence on the basis of these arguments, one can expect that banks to increase their transformation activities and their illiquidity during economic booms.

As of the theory of bank liquidity and financial fragility, the relationship between banks‟ liquidity preference and the business cycle is fundamental to explain the inherent instability of the capitalist system as an endogenous market process (Minsky 1982). In periods of economic expansion which are characterized by high degree of confidence of the economic units about their profitability; there is a rise in the level of investment, so economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates (Painceira 2010).

In line with the above argument the „loan able fund theory of interest‟ states that the supply for loan (i.e. illiquid assets for banks) increases when the economy is at boom or going out of recession (Pilbeam 2005). 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 (Aspachs et al. 2005). Therefore, the growth of gross domestic product has negative relationship with liquidity of banks.

- **Inflation rate and bank liquidity**

Central banks care about the welfare effects of changing the inflation target. Existing monetary theories generally agree that inflation increases the opportunity cost of holding liquidity and thus distorts the allocation of resources which require liquidity in transaction; besides, a growing theoretical literature also describes mechanisms whereby even predictable increases in the rate of inflation interfere with the ability of the financial sector to allocate resources effectively. 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 1999).

The features of these theories indicated that there is an informational friction whose severity is endogenous and hence an increase in the rate of inflation drives down the real rate of return not just on money but on assets in general. As of Huybens and Smith (1999) the implied reduction in real returns worse the credit market frictions which leads to the rationing of credit, hence 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. Besides, the amount of liquid or short term assets held by economic agents including banks will rise with the rise in inflation. Therefore, there is a positive relationship between the increase in inflation rate and banks liquidity.

- **Interest rate margin and Banks liquidity**

Interest rate margin is the amount of interest rate paid by borrowers that force liquidity holders to part it. According to the liquidity preference theory, lenders need high interest rate which includes the interest rate margin/ liquidity premium in order to lend. The basic idea underlining this theory is that lenders of funds prefer to lend short, while borrowers generally prefer to borrow long. Hence borrowers are prepared to pay interest rate margin/ a liquidity premium to lenders to induce them to lend long (Pilbeam 2005). The size of interest rate margin/ liquidity premium increases with the time to maturity. Therefore, as they got higher premium, lenders give up their liquid money.

According to Keynes (1964) liquidity preference theory, in the general theory, consists in the statement that "the rate of interest at any time being the reward for parting with liquidity is a measure of the unwillingness of those who possess money to part with their liquid control over it; the rate of interest is the price which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash". Hence, higher interest rate margin/higher liquidity premium will force banks to lend more and reduce their holding of liquid assets. Interest rate margin is the difference between the gross cost paid by a borrower to a bank and the net return received by a depositor (Brock and Suarez 2000). Therefore, there is a negative relationship between interest rate margin and banks liquidity.

2.3 Empirical Evidence

Since liquidity is the main concerns of banks, many studies were done regarding the factors that determining the liquidity of commercial banks in different countries of the word. So that, it is quite difficult to present the results of all the studies available on the topic of this research, hence the most related studies were taken. To make it more convenient the researcher reviewed the empirical evidence from three perspectives; related empirical evidence in worldwide base, related empirical evidence in Africa and related empirical evidence in Ethiopia.

2.3.1 Determinants of banks liquidity; empirical evidence

I. Related empirical evidence on worldwide base

Vodová (2012) aimed to identify determinants of liquidity of commercial banks in Slovakia. In order to meet its objective the researcher considered both the bank specific and macro economic data over the period from 2001 to 2009. The data was analyzed with panel data regression analysis by using an econometric package Eviews7. The result of the study indicated that; bank liquidity decreases mainly as a result of financial crisis, higher bank profitability, higher capital adequacy and with the size of banks while liquidity measured by lending activity of banks increases with the growth of gross domestic product and decreases with the higher unemployment. Key interest rate, Interest rate margin, rate of inflation, and the level of non-performing loans have no statistically significant effect of the liquidity of Slovak commercial banks.

Also the study made on Bank-specific and macroeconomic determinants of liquidity of English banks studied (Valla et al. 2006). The study assumed that the liquidity ratio as a measure of the liquidity should be dependent on following factors: probability of obtaining the support from 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, 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 is ambiguous, gross domestic product growth as an indicator of business which has negative impact on liquidity and Emmons (1993) as cited by Gizycki (2001), when considering USA banking failures, concludes that increased risk-taking at individual banks alone does not fully account for the observed pattern of bank failures. Local economic conditions are also important predictors of bank failure. It is the coincidence of risky bank portfolios and difficult economic conditions that makes bank failure most likely.

Malik and Rafique (2013) examined bank specific and macroeconomic determinants of commercial banks" liquidity in Pakistan. Their study sample consist 26 Pakistani commercial banks for the period 2007 to 2011, which also covers the Asian financial crisis of 2008. The study measured in two ways; one is cash and cash equivalents to total assets (L1) and second is advances net of provisions to total assets (L2). Two models are estimated based on these measures of liquidity. The results of model L1 indicated that the bank specific fundamentals (NPL and TOA) and monetary policy interest rate positively determine the bank liquidity whereas inflation has a negative impact. Bank liquidity measured by L1 is negatively and significantly affected by the financial crisis. The results of model L2 indicate that the bank size and monetary policy interest rate positively and significantly determined the bank liquidity. Additionally there is a positive and significant impact of financial crisis on the liquidity of commercial banks measured by L2; while Gonzalez et al. (1997), as cited by Gizycki (2001) in their study of the 1994 Mexican financial crisis, refine the distinction between the effect of bank specific and economy wide factors on the likelihood of bank failure. They found that factors determining the likelihood of failure differ from those determining the timing of failure. Bank-specific variables, in combination with aggregate banking sector factors help to explain the likelihood of bank failure, while macroeconomic factors play a pivotal role in influencing the time of failure. In Mexico, high real interest rates, exchange rate depreciation and an increase in the overall gearing of the economy triggered bank failures.

The study made by Vodová (2013) with the aim of identifying determinants of liquidity of Hungarian commercial banks. The study covers the period from 2001 to 2010 and used panel data regression analysis. The result of the study showed that bank liquidity is positively related to capital adequacy of banks, interest rate on loans and bank profitability and negatively related to the size of the bank, interest margin, monetary policy interest rate and interest rate on interbank transaction. The relation between the growth rate of gross domestic product and bank liquidity is ambiguous where as Chen & Mahajan (2010) indicted those macroeconomic variables such as

GDP growth, inflation rate, real short term interest rate, private credit, and etc have a direct and indirect impact on banks liquidity.

Determinants of liquidity risk of banks from emerging economies investigated 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 and used sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis. 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, the realization of a financial crisis, which could be caused by poor bank liquidity, have negative impact on banks liquidity but 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, 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 were expected to have positive impact on banks liquidity. The results of their study revealed that; capital adequacy, the presence of prudential regulation, the share of public expenditures on gross domestic product, the rate of inflation and the exchange rate regime have positive impact on banks liquidity whereas, size of the bank, the lending interest rate, the realization of a financial crisis has negative impact on banks liquidity while Shen et al. (2010) made study on macro economic variables that affect banks liquidity and found that both annual percent change of GDP and GDP annual percent change of last year have positive effect on bank‟s liquidity risk. This provides that higher economic growth of current year and last year make banks run down their liquidity buffer and induce them to lend more. However, higher economic growth of current year and last year make banks attract less customer deposits, thus increasing their financing gap. Besides, annual percent change of inflation and inflation annual percent change of last year have significantly positive correlation with bank‟s liquidity risk.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. The study had three main goals: discussing the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; identifying the key determinants of liquidity, and; to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic fundamentals. Liquidity which was measured by loan to deposit ratio should depend on: cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio expected to have negative impact, the macroeconomic situation, where a cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity expected to have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity. The regression model was estimated using ordinary least squares. The result of the study showed that the volatility of cash to deposit ratio and money market interest rate have negative and significant effect on liquidity. Whereas, liquidity tends to be inversely related to the business cycle in half of the countries studied, suggesting that commercial banks tend to error on the side of caution by holding relatively more excess reserves during downturns. Generally, the results showed that on average, bank liquidity is about 8% less than what is consistent with economic fundamentals.

While Vodová (2011) aimed to identify important factors affecting commercial banks liquidity of Czech Republic. In order to meet its objective the researcher considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis by using Eviews 7 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 indicated as: 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 study of Vodová revealed that bank liquidity was positively related to capital adequacy, interest rates on loans, share of nonperforming 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.

In the same year, the author made other study in polish commercial banks concerning the determinants of commercial banks liquidity in Poland. The aim of his study was to identify determinants of liquidity of Polish commercial banks with the data covering the period from 2001 to 2010.The result of panel data regression analysis revealed that bank liquidity is strongly determined by overall economic conditions and dropped as a result of financial crisis, economic downturn and increase in unemployment. Bank liquidity decreases also with higher bank profitability, higher interest rate margin and bigger size of banks. On contrary, bank liquidity increases with higher capital adequacy, inflation, share of nonperforming loans and interest rates on loans and interbank transaction.

Liquidity created by Germany‟s state owned savings banks and its determinants has been analyzed by (Rauch et al. 2009). The study had two important 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.

And the study made by Subedi and Neupane (2011) on determinants of banks‟ Liquidity and their impact on financial Performance in Nepalese commercial Banks and multivariate linear regression model is used to include Liquid Assets to Total Assets Ratio, Loan to Deposit & Short Term Financing and Return on Assets for the data of six commercial banks in the sample covering the period from 2002 to 2011/12. The results of regression analysis showed that capital adequacy, share of non-performing loans in the total volume of loans had negative and statistically significant impact on banks liquidity whereas loan growth, growth rate of gross domestic product on the basis price level, liquidity premium paid by borrowers and short term interest rate had negative and statistically insignificant impact on banks liquidity. Bank size had positive and significant impact and inflation rate had positive and insignificant impact on banks liquidity.

Aspachs et al. (2005) study bank specific and macroeconomic determinants of liquidity of 57 UK resident banks; the data was on a quarterly basis over the period from 1985Q1 to 2003Q4. The study found that the liquidity ratio is a function of: probability of obtaining the support from lender of last resort in case of a liquidity shortage; which lower the incentive to hold liquid assets, short term interest rate which captures the monetary policy effect; the negative regression coefficient signals that when policy rates are high banks respond by holding a smaller amount of liquid assets, growth rate of gross domestic product; banks hold smaller amount of liquidity in periods of stronger economic growth, and interest margin as a measure of opportunity costs of holding liquid assets which has a negative impact on liquidity holdings. For foreign owned banks, support from lender of last resort does not appear to affect their holding of liquid assets. When it comes to short term interest rate and growth rate of gross domestic product, these variables are statistically significant, too, but their effect on bank liquidity is smaller. Interest margin affects liquidity of foreign owned banks positively. Bank profitability; loan growth where higher loan growth should signal increase in illiquid assets and size of the bank are not statistically significant.

Whereas the empirical analysis of the hypothesis that interest rates affect banks‟ risk taking and the decision to hold liquidity across European countries provided by Lucchetta (2007). The analysis is based on data of 5066 European banks over the period from 1998 to 2004. The study came to conclusion that across European countries, the interbank interest rate positively affects the liquidity retained by banks and the decision of a bank to be a lender in the interbank market. The key variable which affects the decision to lend in the interbank market is the liquidity price which depends on the demand and supply of liquidity and on the risk free interest rate. The increase of this price increases the liquidity supply and thereby the lending in the interbank market. As this new liquidity is invested by borrowers in risky loans, the rise in risk free interest rate increases banks´ risk taking behavior; which is measured by the share of loans on total assets and share of loan loss provisions on net interest revenues. The results also showed that bank size matters: the lender banks tend to be smaller than borrower ones. The relation between monetary policy interest rate and the decision of a bank to hold liquidity and to lend in the interbank market is negative.

Rauch et al. (2010) studied liquidity created by all 457 German state-owned savings banks and its determinants in period from 1997 to 2006. According to this study, bank liquidity is determined by macroeconomic factors, mainly by: monetary policy interest rate which has highly significant negative influence on bank liquidity (i.e. tightening monetary policy reduces bank liquidity), and level of unemployment which is connected with demand for loans and can also act as a proxy for general health of the economy and the negative influence means; the negative influence which has been proved that the healthier the economy is, i.e. the lower the unemployment rate, the more liquidity is created by banks. They do not find any bank specific factors, such as bank profitability or size of the bank measured by total number of bank customers, to have any influence on liquidity creation. Also the savings quota which should indicate the deposit behavior of private clients is not statistically significant.

And also Cornett et al. (2011) studied how banks manage the liquidity shock that occurred during the financial crisis of 2007-2009 by adjusting their holdings of cash and other liquid assets and how these efforts affected credit availability. Their sample included quarterly data of all US commercial banks over the period 2006Q1 through 2009Q2. They estimated regression function separately for small and large banks with following explanatory variables: the share of illiquid assets such as loans, leases, asset-backed securities, mortgage-backed securities on total assets; the share of core deposits i.e. deposits under USD 100 000 plus all transactions deposits on total assets; bank capital adequacy and the ratio of unused commitments to commitments plus assets.

They came to conclusion that during the crisis, liquidity risk exposure led to greater increases in liquid assets, mirrored by greater decreases in credit origination. In other words, banks with more illiquid asset portfolios increased their holdings of liquid assets and decreased lending. The results showed significant differences between small and large banks. Mainly small banks that relied more heavily on stable sources of financing, i.e. core deposits and capital, continued to lend relative to other banks. Moreover, large banks have higher share of illiquid assets on total assets than small banks and also hold a greater fraction of unused commitments. Large banks are more exposed to liquidity risk than small banks across four dimensions: more undrawn commitments, less capital, less reliance on core deposits and lower liquidity of balance sheet assets. Off-balance sheet liquidity risk materialized as borrowers drew on pre existing commitments in large quantities.

The study made by Vtyurina et al. (2012) on the determinants of banks" liquidity buffers in Central America by using the Using a panel of about 100 commercial banks from the region.

And hence, the result of their study revealed that the demand for precautionary liquidity buffers is associated with measures of bank size, profitability, capitalization, and financial development. Deposit dollarization is also associated with higher liquidity, reinforcing the monetary policy and market development challenges in highly dollarized economies. According to this study; Bank size, capital adequacy, and financial development has positive relationship with bank liquidity holding, whereas profitability, net interest margin, loan loss reserve ratio and GDP has negative relationship with liquidity holding and the recent study by Berrospide (2013) examined bank liquidity Hoarding and the Financial Crisis in U.S commercial banks. The study was conducted through panel dataset using quarterly balance sheet data from reports of income and condition (Call Reports) for all U.S. commercial banks between 2005 and 2009. The findings of his study revealed that banks held more liquid assets in anticipation of future losses from securities write-downs. This implies that small amount of liquid assets may lead banks to liquidity risk.

Therefore, banks preferred to hold more liquid assets to remain liquid. However, holding more liquid assets in banks portfolio had an adverse impact on their profit. For instance, Bordeleau &

Graham (2010) by their study entitled the impact of Liquidity on Bank Profitability, analyze the impact of liquid asset holdings on bank profitability for a sample of large U.S. and Canadian banks. The result reveals that even though there is a situation at which holding further liquid assets diminishes a banks‟ profitability, the banks that hold some liquid assets could improve their profitability.

II. Related empirical evidence in Africa

Chagwiza (2011) made study on Zimbabwe regarding the commercial banks liquidity and its determinants. The main objective of his study was to identify the determinants of liquidity in Zimbabwean commercial banks using data from January 2010 to December 2011 and the regression analysis was used. The result of his study revealed that, there was a positive relationship between bank liquidity and the following firm specific factors; capital adequacy, total asset(TOA), Gross domestic product, and bank rate, while there was negative relationship with macro economic factors; adoption of multiple-currency, inflation rate, and business cycle.

And the most recent studies made by Laurine (2013) again in Zimbabwe regarding Zimbabwean Commercial Banks Liquidity Risk Determinants after Dollarization. The aim of his paper was that empirically investigating the determinants of Zimbabwean commercial banks liquidity risk after the country adopted the use of multiple currencies exchange rate system and to attain the intended objective panel data regression analysis was used on monthly data from the period of March 2009 to December 2012. The result of the study revealed that capital adequacy and size have negative and significant influence on liquidity risk where as spread; non-performing loans have a positive and significant relationship with liquidity risk. Reserve requirement ratios and inflation were also significant in explaining liquidity during the studied period.

And also 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.

Entirely unique is the approach of Fielding and Shortland (2005). Except of common determinants, they investigate the impact of violent political incidents arising from conflict between radical Islamic group and the Egyptian state. Based on data for the period 1983-1996, they have found that bank liquidity: is pro-cyclical; the level of economic output is taken into account by logarithm of real gross domestic product, responds positively also to increases in the discount rate; although this response seems only to be temporary, is positively related to the degree of macroeconomic instability which is captured by the rate of depreciation of the black market exchange rate, and negatively related to economic reforms which lead to reduction of excess liquidity. However, the most important factor which impact on bank liquidity is number of violent political incidents: banks hold excessive liquid reserves in periods of political instability.

III. Related empirical evidence in Ethiopia

Tseganesh (2012) made study on determinants of banks liquidity and their impact of financial performance on commercial banks in Ethiopia. The aim of her study was concerned with two points; identify determinants of commercial banks liquidity in Ethiopia and see the impact of banks liquidity up on financial performance through the significant variables explaining liquidity. The data was analyzed by using balanced fixed effect panel regression model for eight commercial banks in the sample covered the period from 2000 to 2011 and the result of her study indicate that capital adequacy, bank size, share of nonperforming 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 where as real GDP growth rate and loan growth had statistically insignificant impact on banks liquidity. Also the result of her study revealed that; among the statistically significant factors affecting banks liquidity, capital adequacy and bank size had positive impact on financial performance whereas, non performing loans and short term interest rate had negative impact on financial performance while interest rate margin and inflation had negative but statistically insignificant impact on financial performance. At the end she concluded as, the impact of bank liquidity on financial performance was non-linear/positive and negative.

Also other study made by Worku (2006) in Ethiopia regarding liquidity and its impact on performance of commercial banks. And he 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.

Also in the same year, the researcher 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).

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

2.4 Conclusion and knowledge gap

In line with the above theoretical and empirical review; liquidity is important to all business specially for banking industry since their function is creations of liquidity on both the asset and liability side of their balance sheet. It suggested that commercial banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors. As it is evident in different literature (for instance Vodová 2011; 2013) the most important task is to choose the appropriate explanatory variables. Hence, the selection of variables for this study was on the basis of previous studies that reviewed in the literature and the idea of the researcher and, so it focused on bank specific and macro economic variables that determine the liquidity of commercial banks in Ethiopia.

Unlike the empirical studies, theory on bank liquidity was well documented. According to the review, most of the empirical studies were done on the area of bank liquidity 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. Studies cited above suggest that commercial banks‟ liquidity was determined both by bank specific factors (such as size of the bank, capital adequacy, Non performing loan, profitability, Loan growth 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. Hence, as it was clearly indicated in the empirical review, most of the studies regarding the determinants of banks liquidity were done on the word wide base, some of them were done in Africa. However to the knowledge of the researcher, it is possible to say few or finger counted studies in Ethiopia concerning to banks liquidity but most of them disregard studying determinants of liquidity directly, rather studying on points like the relationship between liquidity and performance of banks in Ethiopia(Worku 2006; Semu 2010).

The study made by Tseganesh (2012) on the determinants of banks liquidity and their impact on financial performance, and she tried to investigated determinants of banks liquidity directly.

But the measurement used by the researcher for liquidity risk was only liquidity ratios. However, according to Poorman and Blake (2005) measuring liquidity risk based on the traditional liquidity ratios only was not enough.

Therefore, the banking industry in Ethiopia is on the growth stage with opening of new banks, besides with the absence of active secondary stock exchange in the country; it is important to notify the important determinants of banks liquidity by making empirical investigation to already established banks. Hence, this study aimed to investigate bank specific and macroeconomic factors affecting commercial banks liquidity by using financing gap for measurements of liquidity as of the (Basel Committee on Banking Supervision 2000).

CHAPTER THREE

RESEARCH METHODOLOGY

The preceding chapter has indicated that the literature on the determinants of commercial banks liquidity. Both theoretical and empirical reviews were made and indicated that almost the absence of empirical studies in Ethiopia regarding the determinants of commercial banks liquidity. Hence, the main objective of this study was that; to investigate the determinants of commercial banks liquidity in Ethiopia. To attain the intended objective the research methodology was adopted for this study and which consisted of; the research approach adopted, variables description and hypotheses of the study, population, sampling design, and sample size, data collection, presentation, and analysis techniques, regression model specification, and the conceptual frame work was give at the end

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3.1. Research approach adopted

Research is a process of systemic, methodical and ethical inquiry and investigation to solve practical problem and increase knowledge. Since discipline is established by developing a body of knowledge, every research should add new knowledge to the body of existing data. Research paradigm or world view or epistemology is described as a holistic approach underlying a research approach (Kassim 2001; Creswell 2009). It reflects the philosophy of knowledge or how we reach the knowledge while approach/methodology focuses on the strategies of how we come to know (Trochim 1998).

According to Creswell (2009), there are three basic research approaches; these are quantitative, qualitative and mixed research approaches. For the purpose of this study, quantitative research approach was used to meet the overall objective of the study and to test the hypotheses under it.

Quantitative methods are frequently described as deductive in nature, in the sense that inferences from tests of statistical hypotheses lead to general inferences about characteristics of a population and also this method is frequently characterized as assuming that there is a single „truth‟ that exists, independent of human perception (Guba and Lincoln 1994).

According to Loose (1993), a deductive research approach entails the development of a conceptual and theoretical structure prior to its testing through empirical observation. As of Morse(1991) If the problem is identifying factors that influence an outcome, the utility of an intervention or understanding the best predictors of outcomes` then a deductive (quantitative) approach is best; It is also the best approach to test a theory or explanation. Also Creswell (2003) indicated that the researcher tests a theory by specifying narrow hypotheses and the collection of data to support or refute the hypotheses.

Quantitative research methods attempt to maximize objectivity, replicability, and generalizibility of findings, and are typically interested in prediction; This research approach conventionally commences by analyzing the literature to identify a single selected problem/knowledge gap leading to the isolation of the major research question(s) in which the existing knowledge may be inadequate (could be identified gaps between existing theories or evidence, contradictions to be explored, or new contexts for applying previous findings) (Sutrisna 2009).Therefore, the purpose of using quantitative approach in this study was that to apply previous findings in the context of Ethiopia. As per Denzin and Lincoln (1994), the goal of this approach is to measure and analyze causal relationships between variables within a value free framework. Hence, this study was conducted based on the philosophy of positivism that strongly argues on objectivism, measurability, scientific methods and value free; and ignores belief, emotion and perception. According to Denscombe (2007) positivism is an approach to social research which seeks to apply the natural science model of research to the investigation of the social world and it is based on the assumption that there are patterns, regularities, causes and consequences in the social world, just as there are in the natural world.

Therefore, for this study quantitative research approach enable to see the relationship between the liquidity of commercial banks and the major firm specific and macroeconomic factors affecting banks liquidity in Ethiopia by establishing causal relationship; besides, this enable to test the theory in the context of Ethiopia.

3.2. Variable description and hypotheses of the study

This study attempted to see the relationship between the dependent and independent variables through testing the hypotheses regarding to the relationships between liquidity of banks and firm specific and macroeconomic factors affecting it in the commercial banks of Ethiopia. Hence, to attain the objective of the study the following hypotheses were developed with the detail descriptions of the variables under the study.

3.2.1. Dependent variables

Liquidity of banks: liquidity is the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. As indicated in the theoretical literature, there are different measures of liquidity, such as liquidity gap, liquidity ratios, one dimensional or multi dimensional, Liquidity index, financing gap, and etc. But some of the liquidity measures have their own limitation; if we see liquidity gap, it was more data intensive and there was no standard technique to forecast inflows and outflows and the liquidity ratio do not always capture all, or any of liquidity risk (Vodová 2013). While financing gap that was proposed by Basel committee for banking supervision as the best measures of liquidity, which was the difference between the bank‟s average loans and average deposits divided by total asset. Hence, the larger the financing gap, the more the bank needs to borrow in the money markets and the greater the liquidity problems in the future due to increased deposit withdrawals and/or increased exercise of loan commitment (Basel Committee on Banking Supervision 2000). Authors like, Rafique & Malik (2013), Vodová (2011) used financing gap for measuring liquidity in their study. For the purpose of this study financing gap was used as a measure of liquidity in the bank. Therefore, the following formula was developed for the dependent variable:

$$\text{Liquidity of bank} = \frac{\text{average loans} - \text{average deposits}}{\text{Total assets}}$$

3.2.2. Independent variable

Capital adequacy of banks: Capital of banks includes; common stocks, surplus funds, undivided profit, reserve for contingencies and other capital reserves. As it was discussed in the literature review part, there are two opposing theoretical views regarding to the relationship between banks liquidity and capital adequacy. These are financial fragility-crowding of deposit hypothesis and risk absorption hypothesis. The first argument suggests that there is negative relationship between capital adequacy and bank liquidity whereas, the second argument is opposing to this. This study considered the second hypothesis since it has been used by various empirical studies reviewed under this study (i.e Diamond and Dybvid 1983). The proxy for capital adequacy used in this study was the ratio of equity to total assets as of (Gorton and Winton 2000; Berger and Bouwman 2009).

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

Non-performing loans: Nonperforming loans are loans that are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract. This measures the quality of banks asset. Unlike other firms banks assets are composed of large amount of loans. If this loan is considered to be uncollectable that leads to reduction in banks profitability and make large number of depositors to fear and run against the bank. Therefore, it expected that there was negative relationship between bank liquidity and the amount of non-performing loans. The proxy used for nonperforming loans was the ratio of provision for impairment loses to the total outstanding loan and advance to customer as per (Barr et al. 1994).

H2: Non performing loan has negative and significant impact on banks liquidity

Bank size: Bank size measures its general capacity to undertake its intermediary function. As it was stated in the literature review part there was two opposing arguments both theoretically as well as empirically regarding to the relationship between bank liquidity and size. The first view was too big to fail which considers negative relationship between size and liquidity whereas; the traditional transformation view suggested positive relationship. Therefore, this study supported the second argument that was positive impact of bank size on liquidity. The proxy for bank size used in this study was the natural logarithm of total assets as of (Poorman and Blake 2005; Shen et al. 2010).

H3: Bank size has positive and significant impact on liquidity.

Profitability: Profitability is the ability of a bank to generate revenue in excess of cost, in relation to the bank‟s capital base. However, as indicated in the literature; there have been varying reports on the relationship between bank liquidity and profitability. The first argument is that banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability, which indicated the positive relationship between liquidity and profitability. On the other hand other researchers argue that, holding liquid assets imposes an opportunity cost on the bank given their low return relative to other assets which indicated the inverse relationship between liquidity of bank and profitability. Hence, this study supported the second argument that there was a negative relationship between liquidity and profitability. To proxy profitability return on asset (i.e. the ratio of Net income after tax to total asset) was used as of (Molyneux and Thornton 1992).

H4. Profitability has negative and significant impact on banks liquidity

Loan growth: Provision of loan is one of the major functions of banks by which banks create liquidity to the external public. Generally loans are considered as illiquid assets and generate higher revenue to banks. Therefore, the increase in loan means increase in illiquid assets and decrease in short term/liquid assets. As it was made by various empirical studies; this study expected a negative relationship between banks loan growth and liquidity. The proxy for loan growth was the annual growth rate of gross loans and advances to customers as per (Pilbeam 2005; Vodová 2011).

H5: Loan growth has negative and significant impact on banks liquidity

GDP: this indicates the overall economic well being of a country. According to bank liquidity and financial fragility theory, when the economy is at boom or goes out of recession, economic units including banks are optimistic and increase their long term investment and decrease their holding of liquid assets while in the period of recession the opposite is true. Therefore, there was a negative relationship between banks liquidity and economic cycle. To proxy GDP, the annual real GDP rate was used as per (Aspachs et al. 2005).

H6: The real GDP rate has negative and significant impact on banks liquidity.

Inflation rate: According to the recent theory of information asymmetry in the credit market an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including banks rise with the rise in inflation, hence there was a positive relationship between inflation and banks liquidity. To proxy inflation rate the percentage change in CPI was used as of (Huybens and Smith 1999).

H7: Inflation rate has positive and significant impact on banks liquidity.

Interest rate margin: Interest rate margin is the amount of interest rate paid by borrowers that force liquidity holders to part it. According to the liquidity preference theory, lenders need high interest rate which includes the interest rate margin/ liquidity premium in order to lend.

Borrowers are prepared to pay interest rate margin/ a liquidity premium to lenders to induce them to lend long. The size of interest rate margin/ liquidity premium increases with the time to maturity. Therefore, as they got higher premium lenders give up their liquid money, besides the rate of interest is the price which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash. Hence, higher interest rate margin/higher liquidity premium will force banks to lend more and reduce their holding of liquid assets. Therefore, there was negative relationship between interest rate margin and banks liquidity. To proxy interest rate margin, the difference between annual average lending rate and deposit rate was used (Brock and Suarez 2000).

H8. Interest rate margin has negative and significant impact on banks liquidity.

3.3. Population, Sampling design, and Sampling frame

Population of the study: The study population/participants were all private as well as public commercial banks that existed in the fiscal year 2012/13. According to NBE (2012/13), there are eighteen commercial banks in the year 2012/13. These are; Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Bank of Abyssinia S.C (BOA), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Cooperative Bank of Oromia S.C (CBO), Lion International Bank S.C (LIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Buna International Bank S.C (BUIB), Birehan International Bank S.C (BIB), Abbay Bank S.C (AB),Addis International Bank S.C (AIB), Debub Global Bank S.C (DGB), and Innat Bank S.C (ENTB).

The first two are publically owned and the remaining sixteen‟s are privately owned commercial banks.

Sampling design: The sampling technique used under this study was non random purposive or judgmental sampling. In this type of sampling, items for the samples are selected deliberately; the researcher choice concerning the items remains supreme. In other words, under purposive or judgmental sampling the organizers of the inquiry purposively choose the particular units of the universe for constituting a sample on the basis that the small mass that they so select out of a huge one will be typical or representative of the whole (Kothari 2004). This enables to select samples which are suitable to achieve the study objective. Hence, for this study ten (10) commercial banks were purposively selected.

Sampling frame: The frame for drawing sample included those commercial banks having at least seven (7) years working experience in Ethiopia (i.e. from 2007 to 2013). The reason for using seven years data was that to increase the sample size. Hence, In Ethiopia there are ten commercial banks having at least seven years working experience which included: Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Bank of Abyssinia S.C (BOA), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Cooperative Bank of Oromia (CBO) and Lion International Bank (LIB). Therefore, it was possible to draw a relationship among variables using 70 observations; across ten banks over seven years (i.e. the matrix for the frame was 7*10 that included 70 observations).

3.4. Data collection, presentation, and analysis techniques

3.4.1. Data and data collection instruments

Since conducting appropriate data gathering instruments help the researcher to combine the strengths and amend some of the inadequacies of any source of data to minimize risk of irrelevant conclusion, this study used only a panel secondary data. As per Koul (2006), Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings.

Accordingly, structured document review was used for this study to collect required information, which was relevant for addressing the objectives of the study. The panel secondary data was quantitative in nature and encompasses seven years banks‟ audited financial statements (balance sheet and income statement) and macroeconomic reports. And hence, Bank specific data were collected from audited financial statements (balance sheet and income statement) of each commercial bank included in the sample and macroeconomic data were obtained from NBE and MoFED from 2007 to 2013. The panel was balanced as of all banks in the sample were reported over the whole period of time. All data were collected on the annual base and the figures for the variables were on June 30 of each year under study.

3.4.2. Data presentation and analysis techniques

After the data were collected and then arranged, the next step was analyzing and interpreting them accordingly to achieve the stated objective. In this study two type of statistical analysis was used to test the proposed hypotheses. Those are descriptive statistics and inferential statistics/multiple regression analysis to see the effect (relationship) of explanatory or independent variables on the dependent variable.

First, the inferential statistics/multiple regression analysis, the most important part of the analysis, helps to identify the determining variables of liquidity of commercial banks and draw relationship between dependent and independent variables. The regression analysis was concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view to estimating and/or predicting the (population) mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter (Gujarati 2004). To do so, firstly fixed vs. random effect model test was made this help to identify which model is appropriate for the data under study. Next classical linear regression model (CLRM) assumptions/ diagnostic tests were conducted in order to see the applicability of the regression model developed to test the relationship between banks liquidity and independent variables and then inferential statistics/multiple regression analysis was made. Before proceeding to the analysis of the multiple regression result, descriptive statistics of both dependent and independent variables were calculated over the sampled period. This helps to convert the raw data in a more meaning full form which enables the researcher to understand the ideas clearly (Malhotra 2007). It deals with a simple description of variables like mean, maximum, minimum and standard deviation of each variable. Therefore, inferential statistics/multiple regression analysis, the descriptive statistics, and the entire tests listed above were conducted by using E-view6 software econometric package.

3.5. Regression model specification

The nature of data used in this study was enabling to use panel/longitudinal data model which was deemed to have advantages over cross sectional and time series data methodology. Panel data involves the pooling of observations on the cross sectional over several time periods. As Brooks (2008) stated the advantages of using panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time series or pure cross sectional data alone. Second, it is often of interest to examine how variables, or the relationships between them, change dynamically (over time). To do this using pure time series data would often require a long run of data simply to get a sufficient number of observations to be able to conduct any meaningful hypothesis tests. But by combining cross sectional and time series data, one can increase the number of degrees of freedom and thus the power of the test by employing information on the dynamic behavior of a large number of entities at the same time. The additional variation introduced by combining the data in this way can also help to mitigate problems of multicollinearity that may arise if time series are modeled individually. Third, by structuring the model in an appropriate way, the researcher can remove the impact of certain forms of omitted variables bias in regression results.

Hence, the regression model used for this study was similar with that of Rafique & Malik (2013) and Vodová (2011). The fixed effect panel data model was selected and used for hypothesis testing. It is one of panel data model which enables to control for unobserved heterogeneity among cross sectional units and to get the true effect of the explanatory variables. Thus, the following equation indicated the general model for this study.

$\mathbf{yit = \alpha_0 + \Sigma\beta_k x_{k,i,t} + \varepsilon_{i,t}}$ Where $\mathbf{y_{it}}$ = the dependent variable (i.e. Liquidity of banks i at time t), $\mathbf{X_{k,i,t}}$ = the independent variables of the study, $\boldsymbol{\alpha_0}$ = intercept/constant term, $\boldsymbol{\beta_K}$**'s** $(\boldsymbol{\beta_1 - \beta_8})$ = parameters estimated/coefficients of the explanatory variables, **i** = the cross section, **t** = time series dimension, $\boldsymbol{\varepsilon_{i,t}}$ = the error term, and **Σ**= Summation.

Hence, the general models which incorporated all of the variables to test the hypotheses of the study was as follows: $\mathbf{LIQi,t = \alpha_i + \beta_{1(CAPi,t)} + \beta_{2(NPLi,t)} + \beta_{3(SIZEi,t)} + \beta_{4(PROFi,t)} + \beta_{5\,(LGi,t)} + \beta_{6(GDPt)} + \beta_{7(INFt)} + \beta_{8(IRMt)} + \varepsilon_{i,t}}$

Where, LIQi,t: is liquidity of banks i at time t

CAPi,t: is capital adequacy of i^{th} bank on the year t, the proxy was the ratio of total bank

Capital to total assets. i.e. CAP = Equity/ total assets

NPLi,t: is the nonperforming loan of i^{th} bank on the year t, the proxy was provision for impairment loses/total outstanding loan and advance to customer.

SIZEi,t: is the size of i^{th} bank on the year t, the proxy was natural logarithm of bank‟ total assets

PROFi,t: is the profitability of i^{th} bank on the year t, the proxy was Return on asset i.e ROA, or NI after tax/total asset

LGi,t: is the loan growth of i^{th} bank on year t, the proxy was annual loan growth rate

GDPt: is the real domestic product growth or GDP growth of Ethiopia on the year t, the proxy was annual real GDP rate.

INFt: is the overall inflation rate in Ethiopia on the year t, the proxy was % change in CPI

IRMt: is the overall interest rate margin in Ethiopia on the year t, the proxy was the difference between the gross cost paid by a borrower to a bank and the net return received by a depositor.

α_i : The constant term for bank i

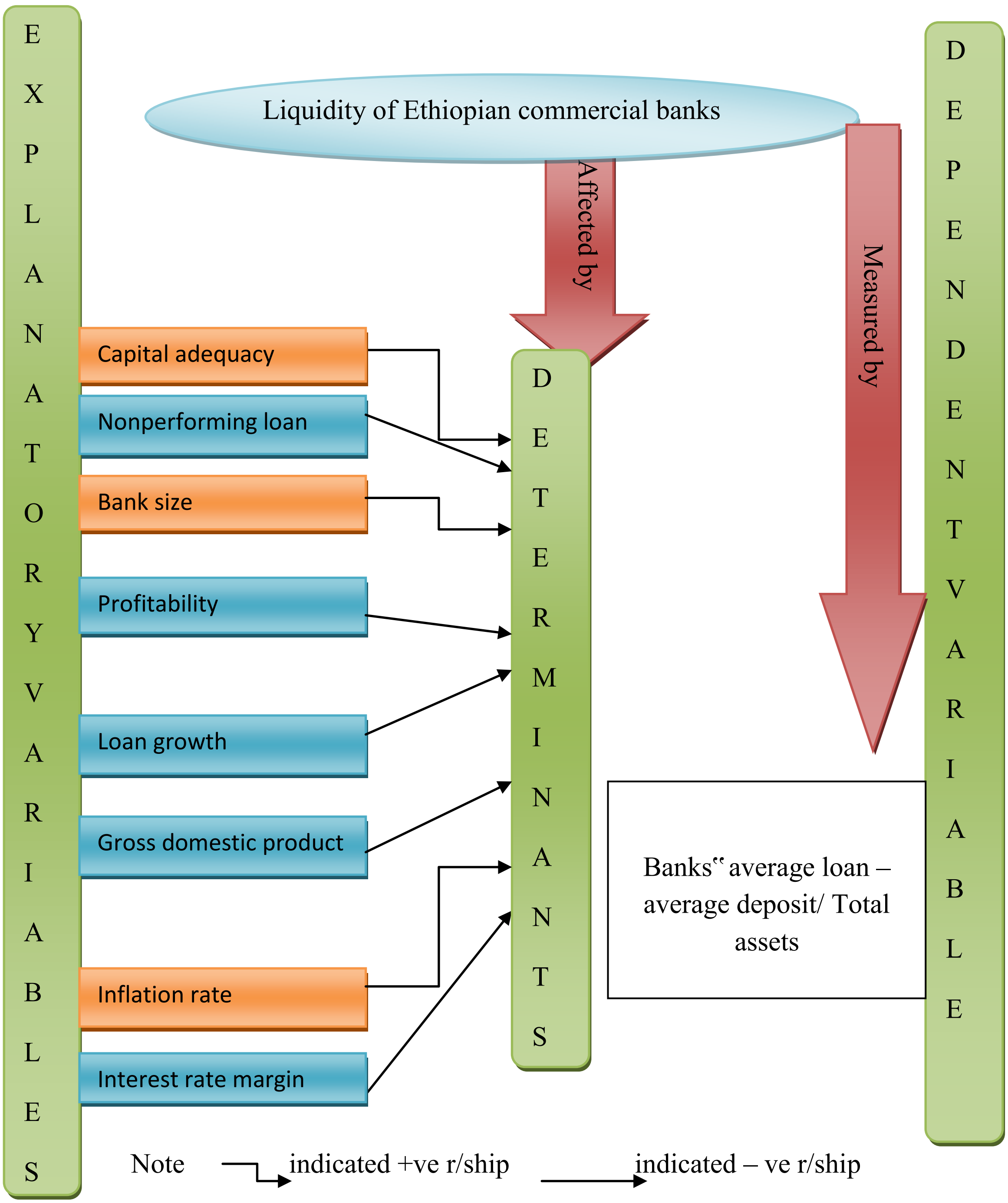
$\beta_{1-9:}$ are parameters estimated/coefficient of the independent variables and

$\varepsilon_{i,t}$: the error term

3.6. Conceptual frame work

On the basis of the hypotheses that developed from the literature part and the regression model of the study, the following conceptual frame work was developed.

Fig. 3.1 Conceptual framework



Source: Own design

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

In this chapter the collected data were presented and important correlation and regression results were discussed accordingly, first fixed vs. random effect model test was made this help to identify which model is appropriate for the data, next the classical liner regression model/CLRM test or Diagnostic tests were made, correlation analysis between study variables and the descriptive statistics of dependent and independent variables were followed. The results of fixed effect panel data regression model were presented, and finally the most important part; that was detail discussion of results based on the findings and empirical literatures reviewed for the study were made.

4.1 Choosing Fixed versus random effect model

The collected data were estimated based on the panel model, which included cross sectional and time series observations for ten commercial banks that ranges over 2007 to 2013. Fixed effects and random effects models are commonly used models for the panel data. In order to choose fixed or random effect model a formal test so called hausman test was used which was based on the null hypothesis in favor of random effect model estimator. When the test is made it is important to see the p-value because the decision was made on the basis of this value, accordingly if p value is higher than 0.05 (i.e. it is insignificant) hence random effects is preferable whereas if p value is lower than 0.05 (i.e. it is significant) fixed effect is preferable (Gujarati 2004). Hence according to hausman test for this panel data model shown in table 4.1

below, the model is better off if fixed effect model is used since the p-value for the model is 0.0204, which is less than 0.05(significant).

Table 4.1 Tests for choosing fixed versus random effect model

Test cross-section random effects

Test summary	Chi-sq. statistic	Chi-sq.d.f	**Prob.**
Cross-section random	14.986646	9	0.0204

Source: E-views output from the financial statements of sampled banks and own computation

4.2 Testing assumptions of classical linear regression model (CLRM)

After choosing whether fixed or random effect was appropriate for the study, the next step was testing for the assumption of CLRM. This was important to make sure that the data and the model fit with classical linear regression model assumptions. Hence, the assumptions of CLRM was tested to know whether the data and the model for this study was fit or not with the assumption.

As per Brooks (2008), the first assumption required that the average value of the errors is zero (E (ut) = 0*)*. In fact, if a constant term is included in the regression equation, this assumption will never be violated. Therefore, since the constant term (i.e. α) was included in the regression equation, the average value of the error term in this study was expected to be zero.

- **Test for normality assumption**

Checking whether the disturbances are normally distributed or not is one of the assumptions of CLRM; hence the normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Accordingly one of the most commonly applied tests for normality was the Bera-

Jarque (BJ) test, so which test 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 fat the tails of the distribution are. If the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant. This means that the *p*-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% level (Brooks 2008).

As shown in the appendix B1, kurtosis approaches to 3 (3.311816) and the Bera-Jarque statistics were not even at 10% level of significance as per the P-values shown in the histogram in the appendix B1(0.295445). Therefore, the null hypothesis that is the error term was normally distributed should not be rejected and it seems that the error term in this case follows the normal distribution.

- **Test for multicollinearity assumption**

This is the other assumptions of CLRM and concerned with the existence of relationship 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). The condition of multicollinearity exists where there is high, but not perfect, correlation between two or more explanatory variables (Cameron and Trivedi 2009; Wooldridge 2006). Churchill and Iacobucci (2005) stated that 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.

Even if how much correlation causes multicollinearity is not clearly defined, there is an argument provided by different authors. 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 as there is no consistent argument on the level of correlation that causes multicollinearity.

Therefore, in this study correlation matrix for nine independent variables of the study shown below in the table had been estimated. From the result of the following correlation matrix table, the highest correlation value of 0.451 was observed between nonperforming loan and capital adequacy, followed by the correlation value of 0.341 between size and interest rate margin. Since there is no correlation value above 0.7, 0.75, and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, hence it was possible to conclude that there was no multicollinearity problem in this study.

Table 4.2 correlation matrix between explanatory variables of the study

	CAP	NPL	SIZE	PROF	LG	GDP	INF	IRM
CAP	1							
NPL	0.451010	1						
SIZE	-0.236236	0.185064	1					
PROF	-0.070824	-0.016464	-0.001268	1				
LG	-0.006209	-0.153305	-0.039991	-0.103021	1			
GDP	0.071542	-0.000296	-0.016342	-0.090906	0.045384	0.013925	1	
INF	0.005084	0.000316	-0.069258	-0.111132	0.083236	0.012483	-0.029452	1
IRM	0.295533	0.220681	-0.340793	-0.016051	0.302571	0.037282	0.088740	0.096201	1

Source: E-views output from the financial statements of sampled banks and own computation.

- **Test for Heteroskedasticity assumption**

This was the third assumption of CLRM and stated that the variance of the errors is constant; which is known as the assumption of Homoscedasticity. If the residuals of the regression have systematically changing variability over the sample, (i.e. the errors do not have a constant variance) that a sign of Heteroskedasticity is observed. To test this assumption the white test was used having the null hypothesis of Heteroskedasticity. Hence, according to table 4.3 below the p-value was in excess of 0.05, therefore it is possible to say that there was no evidence for the presence of Heteroskedasticity. The white test result was fully attached in the appendix B3.

Table 4.3 Heteroskedasticity test: white test result

F-statistic	1.876999	Prob. F (9, 60)	0.2250
Obs*R-squared	35.54355	Prob. Chi-square (9)	0.3566
Scaled explained SS	33.66031	Prob. Chi-square (9)	0.3451

Source: E-views output from financial statements of sampled banks and own computation

- **Test for Autocorrelation assumption**

This was the last assumption of CLRM for this study and states that CLRM"s disturbance term is the covariance between the error terms over time (or cross-sectionals, for that type of data) is zero. In other words, it is assumed that the errors are uncorrelated with one another. Besides if the errors are not uncorrelated with one another it would be stated that they are „autocorrelated" or that they are „serially correlated" (Brooks 2008).

This test was made by using Durbin and Watson test. Durbin-Watson (DW) is a test for first order autocorrelation i.e. it tests only for a relationship between an error and its immediately previous value. DW is approximately equals to $2(1 - \hat{\rho})$, where $\hat{\rho}$ is the estimated correlation coefficient between the error term and its first order lag (Brooks 2008).

Therefore, from table 4.7 fixed effect regression result the value of Durbin-Watson stat (i.e. 1.815196) this revealed that there was no serious evidence of autocorrelation in the data since the DW test result approaches two(2) because as per Brook (2008) stated above there is no autocorrelation problem if the DW is near 2. To make it more convincible for the absence of autocorrelation problem a formal test so called Breusch-Godfrey was made because as stated above the Durbin-Watson tests" only for the first order autocorrelation or (i.e. it test only for one lag- value). Hence, the BG- test was made for ten lag-values and the result was given below in table 4.4, besides the full result was attached in the appendix B4. Since the p-value of F-stat was 0.7936, we fail to reject the null hypotheses in that the p-value was above 5% which indicated that there is no autocorrelation problem.

Table 4.4 Breusch-Godfrey test for the absence of serial autocorrelation

F-statistic	0.473948	Pro.	F (10, 50)	0.7936
Obs*R-squared	3.066317	Prob.	Chi-square (10)	0.6898

Source: E-views output from financial statements of sampled banks and own computation

4.3 correlation analysis between study variables

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship). If it is stated as y and x are correlated, this 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 (Brooks 2008). Hence, table 4.5 indicated the correlation between dependent and independent variables of the study.

Table 4.5 correlation matrix between dependent and independent variables

	LIQ	CAP	NPL	SIZE	PROF	LG	GDP	INF	IRM
LIQ	1	-0.29916	-0.03991	0.243805	-0.29583	0.01077	-0.27105	-0.00274	0.07975

Source: E-views6 output from financial statements of sampled banks and own computation

According to table 4.5 above, capital adequacy was negatively correlated with liquidity indicated by the correlation of -0.29916. This correlation showed that as the bank‟s capital strength increase, liquidity decreases. Nonperforming loan was negatively correlated with liquidity, with the correlation coefficient of -0.03991. This correlation revealed that as the nonperforming loan of banks increase, liquidity decreases. The LnTOA which measured the size of banks was positively correlated with liquidity, with the correlation coefficient of 0.243805. This indicated that as the banks size increases, liquidity also increases. On the other hand profitability and inflation rate were negatively correlated with liquidity, with the coefficient of -0.29583 and -0.00274. This revealed that as the aforementioned variables increase, liquidity move to opposite direction. And the GDP rate was negatively correlated with liquidity, with the correlation coefficient of -0.27105. This revealed that as the real GDP rate increase, liquidity again moves in the opposite direction. Loan growth and interest rate margin were positively correlated with liquidity, with the correlation coefficient of 0.01077 and 0.07975 respectively. This revealed that as inflation rate and interest rate margin increases, liquidity also increases in the same direction.

4.4 Descriptive Statistics of the variables

This section provides the descriptive statistics of dependent and independent variables which helped to have the overall look at variables being studied. It indicated the result of all variables calculated as mean, median, standard deviation, minimum and maximum values with the number of observations under the study was demonstrated in tabular form.

Hence, table 4.6 below presented the descriptive statistics values of the study variables that were both dependent and independent variables for the study period and all variables comprised 70 observations. The study used the dependent variable which measures the liquidity of sampled commercial banks and nine independent variables were included both bank specific and macro economic variables. Bank specific variables were capital adequacy, nonperforming loan, bank size, profitability, and loan growth while the remaining three variables; real GDP rate, the general inflation rate, and interest rate margins" were macro economic variables of the study. Mean value shows the average value of all sampled banks in each variable; whereas the minimum and maximum values of each variable from all sampled banks were shown in the minimum and maximum statistics respectively. Sample variation from the mean was shown in the standard deviation statistics which is the square root of variance and normally good if it is low.

Table 4.6 Descriptive statistics of the variables

Dependent variable	Obser.	Mean	maximum	minimum	Std. Dev.
LIQ	70	-0.128715	0.357567	- 438138	0.297034

Independent variables	Obser.	Mean	maximum	minimum	Std. Dev.
CAP	70	0.19249	0.990497	0.029301	0.219336
NPL	70	0.040568	0.145659	0.001047	0.034248
SIZE	70	9.794696	11.35897	8.42608	0.56336
PROF	70	0.031779	0.353874	-0.01821	0.042072
LG	70	0.150959	0.971743	-0.99827	0.361728
GDP	70	0.109172	0.126	0.088374	0.011501
INF	70	0.20269	0.433029	0.080855	0.129236
IRM	70	0.011800	0.003280	-0.02650	0.01817

Source: E-views 6 output from financial statements of sampled banks and own computation

Liquidity is the ability of commercial bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses which measured in terms of the ratio of financing gap to total asset, financing gap is the deference between bank‟s loan and customer deposit. The higher the financing gap ratio the higher the liquidity problem since liquidity risk is the result when banks cannot accommodate decrease in liability which is deposit or increase in asset which is loan. Table 4.6 presented the mean value of financing gap ratio was -12.87%. The maximum and minimum value of LIQ was 35.76% and -43.81% respectively with the standard deviation of 29.70%. The negative sign of financing gap ratio indicated the excess of deposit over loan.

As a proxy for capital adequacy, the ratio of equity to total assets was used. Hence, according to table 4.6 the mean value of capital adequacy was 19.25%. This indicated that from the total asset only 19.25% was covered by equity share holders whereas the remaining 80.75% was covered/ financed by external funds. This implies that as there is high dependency on external funds that arises from higher deposit mobilization. Also the mean value of 19.25% was above the international standard for capital adequacy i.e. 8% (Reporter, 13 March 2010) with the maximum and minimum values of 99.05% and 2.93% respectively. The standard deviation for capital adequacy was 21.93% revealed that there was little dispersion towards the mean among commercial banks in Ethiopia. In general, although the bank with minimum capital adequacy ratio of 2.93% would be exposed to liquidity risk, the capital adequacy of Ethiopian commercial banks was at a good position since the mean capital ratio of 19.25% was more than the National Bank of Ethiopia (NBE) requirement.

Nonperforming loan was the other bank specific variable and measured as the ratio of provision for impairment loses to total outstanding loan and advance to customer. The mean value of NPL was 4.06% with the maximum and minimum values of 14.56% and 0.10% respectively. The minimum value of 0.10% was the value of NPL for LIB at the time of its establishment, i.e. 2006. The maximum value of 14.56% indicated that the presence of moderate credit risk in some banks and there was little dispersion of NPL among banks in Ethiopia that was shown by the standard deviation of 3.42%.

The asset size of bank was measured by natural logarithm of total asset (LnTA) which has the mean value of 9.79 and the standard deviation from the mean was 0.5633 which revealed some variation from its mean. Since, natural logarithm is used to reduce the variation of maximum and minimum value; the values were 11.35897 and 8.42608 respectively. And hence, the maximum and minimum value pertains to CBE and LIB respectively; since LIB is one of the recently established private owned commercial bank in Ethiopia. In terms of bank size CBE outweigh some private banks more than 100%.

Return on asset (ROA) was used to proxy profitability of commercial banks which was the ratio of net income after tax to the total asset. The mean value or average return on asset of selected banks over a period between 2007 up to 2013 was 3.18%, which mean that per one birr investment a bank generates 3.18% cents profit between years from 2007 up to 2013. The maximum and minimum values were 35.39% and -1.82% respectively. The most profitable observation of 35.39% indicated that a bank generates 35.39 cents return per one birr investment whereas the least profitable observation of -1.82%, indicated that a loss of 1.82 cents per one birr investment. The standard deviation of 4.21% implies that there was little variation in profitability among Ethiopian commercial banks.

The other bank specific variable was loan growth, to proxy it the annual loan growth rate of gross loan and advance to customer was used. Hence, the mean value of LG was 15.09% with the maximum and minimum values of 97.17% and -99.82% respectively. The standard deviation of 36.17% implies that there was high variation in terms of loan growth among Ethiopian commercial banks.

The remaining independent variables were macroeconomic indicators (i.e. GDP, Inflation rate, and Interest rate margin) which could affected banks liquidity position over time and these variables were the same for all sampled banks at a given period. The annual real GDP rate was used as a proxy for GDP rate, and hence according to table 4.6 the mean value of real GDP growth rate was 10.92%. This indicated the average real growth rate of the country‟s economy over the past 7 years. The maximum value was 12.6% which implies that within seven years the maximum growth of the economy was recorded in the year 2013 which come to real after nine(9) years (in 2005 the value was 12.6%) whereas the minimum value of 8.84% was recorded in the year 2012(i.e. 8.5%). Among the study variables the real GDP rate has minimum standard deviation which indicated that the existence of insignificant difference in each year concerning the economic growth.

The other macroeconomic variable was Inflation rate which measured as %change in CPI. Hence as of table 4.6 the mean %change in CPI was 20.27% for the test period, this implies that on average inflation was increased by 20.27% in each year. Here one can understand that the general inflation rate of the country on average over the past seven years was more than the average GDP. The maximum and minimum value of inflation rate was 43.3% and 8.1% respectively. Here the maximum value for inflation rate (i.e. 43.3%) was recorded in the year 2008 which was known with very inflated period in Ethiopia whereas the minimum value of inflation rate (i.e. 8.1%) was recorded in the year 2013. The standard deviation of 12.92% indicated that the existence of moderate difference in the change in inflation rate each year.

The last macroeconomic variable of this study was Interest rate margin which was measured as the excess of annual average lending rate over deposit rate. According to table 4.6 the mean value of IRM was 1.18% with the maximum and minimum value of 3.28% and -2.61% respectively. The maximum value of 3.28% seen in the year 2008 whereas the minimum value of -2.61% was seen in the year 2007. The standard deviation of 1.82% revealed that little variation of interest rate margin towards its mean value over the periods under study.

4.5 Results of the regression analysis

In this section the results of fixed effect regression model were presented. The regression results have their own implications, and hence beta indicates each variable‟s level of influence on the dependent variable which may has a coefficient of negative or positive. P-value indicates at what percentage or precession level of each variable is significant and R^2 values indicate the explanatory power of the model and in this study adjusted R^2 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. Therefore, the results of fixed effect regression model in this study were presented in table 4.7 below.

The operational panel regression model used to identify the statistically significant determinants of commercial banks liquidity measured by the ratio of financing gap to total asset was:

$$\mathbf{LIQi,t = \alpha_i + \beta_{1(CAPi,t)} + \beta_{2(NPLi,t)} + \beta_{3(SIZEi,t)} + \beta_{4(PROFi,t)} + \beta_{5\,(LGi,t)} + \beta_{6(GDPt)} + \beta_{7(INFt)} +}$$

$$\mathbf{B_{8(IRMt)} + \varepsilon_{i,}}$$

Table 4.7 Fixed effect regression results

Variable	Coefficient	Std.error	t-stat	Prob.
C	3.591624	0.710801	5.052923	0.0000
CAP	-0.505137	0.072600	-6.957807	0.0000***
NPL	-0.598288	0.691987	-0.864594	0.3913
SIZE	0.311664	0.066924	4.656948	0.0000***
PROF	-0.728726	0.322788	-2.257596	0.0283**
LG	0.033774	0.040968	0.824387	0.4136
GDP	-2.285726	0.990677	-2.307238	0.0251**
INF	-0.078707	0.088728	-0.887063	0.3792
IRM	0.013292	0.017931	0.741307	0.4619

R^2 = 0.830694 Mean dep.var = -0.128715

Adj.R^2 = 0.805298 S.D dep.var = 0.297034

Prob. (F-statistic) = 0.000000 DW-stat = 1.815196

The coefficient estimates are significant at 1 %$^{(***)}$; 5 %$^{(**)}$; and 10 %$^{(*)}$ respectively

Source: E-views output from financial statements of sampled banks and own computation

According to table 4.7 fixed effect regression results, adjusted R^2 has the value of 80.52% which revealed that the explanatory power of the model was good. The value (i.e. 80.52%) could be interpreted as; the variations of liquidity in Ethiopian commercial banks 80.52% were explained by CAP, NPL, SIZE, PROF, LG, GDP, INF, and IRM whereas the rest 19.48% variation of liquidity in Ethiopian commercial banks were explained by neither bank specific nor macroeconomic variables used in this study rather it goes to the error term. Generally, the value of adjusted R^2 in this study indicated good model specification. Also, the overall test of significant F statistics shows that the model was good enough fitted and statistically significant at 1% level (i.e. p-value = 0.000).

In general, the above table 4.7 indicated that; out of the total eight explanatory variables of the study two of them were statistically significant at 1% level (i.e. CAP and SIZE) while PROF and GDP were significant at 5% level. The rest four variables had no statistically significant impacts on liquidity of Ethiopian commercial banks for the period between2007-2013. Real GDP growth rate was the only macroeconomic variable that significantly affected liquidity, but the rest four variables were go to bank specific variables; this indicated that most statistically significant variables that affected liquidity of Ethiopian commercial banks were from bank specific factors.

4.6 Discussions of the regression results

In this section the discussions of regression results were made on the basis of related literature provided in chapter two of this study. Accordingly, the relationship between dependent and independent variables were discussed on the basis of the findings of this study and then it was related to the theoretical literature and the finding of other researchers provided in the empirical review under this study.

Capital adequacy and liquidity

Capital adequacy which was measured by the ratio of equity to total asset was statistically significant variable that affected liquidity of Ethiopian commercial banks at 1% significant level with the p-value of 0.000. And has a negative coefficient value of -0.505137 which indicated that when the ratio of capital to total asset rises by 1%, the liquidity of Ethiopian commercial banks decreases by 50.51%, holding other variables constant. This finding was opposite to the hypotheses of this study (H1) and in line with the findings of Vodová (2012); Subedi and Neupane (2011); and Laurine (2013). The negative and statistically significant impact of capital adequacy on liquidity of Ethiopian commercial banks were supported the arguments of the financial fragility-crowding out hypotheses. According to this argument, bank capital tends to impede liquidity creation through two distinct effects: the financial fragility structure and the crowding-out of deposits. The financial fragility structure is characterized by lower capital, tends to favor liquidity creation; this theory was supported by (Diamond and Rajan 2001), and hence they model a relationship bank that raises funds from investors to provide financing to an entrepreneur. The entrepreneur may withhold effort, which reduces the amount of bank financing attainable. More importantly, the bank may also withhold effort, which limits the bank"s ability to raise financing. A deposit contract mitigates the bank"s holdup problem because depositors can run on the bank if the bank threatens to withhold effort and therefore maximizes liquidity creation. Providers of capital cannot run on the bank, which limits their willingness to provide funds, and hence reduces liquidity creation. Thus, the higher a bank"s capital ratio, the less liquidity it will create.

The second theory was concerned to a higher capital ratio may reduce liquidity creation through the crowding out of deposits. This argument was supported by Gorton and Winton (2000), and they stated that deposits are more effective liquidity hedges for investors than investments in equity capital. Thus, the finding of this study revealed that higher capital ratios shift investors" funds from relatively liquid deposits to relatively illiquid bank capital, which reducing the overall liquidity for investors. Therefore, the hypotheses stated; there was positive and statistically significant relationship between capital adequacy and banks liquidity was rejected.

Nonperforming loan and liquidity

Nonperforming loan of Ethiopian commercial banks in this study was measured by the ratio of provision for impairment loses to the total outstanding loan and advance to customer found to be insignificant with the p-value of 0.3913 and has a negative coefficient of (i.e. -0.598288) and it was opposite to the hypotheses of this study (H2). But in line with the findings of Vodová(2012) made study on Slovaks" commercial banks regarding the determinants of liquidity and found that non-performing loans have no statistically significant effect of the liquidity of Slovak commercial banks. And the coefficient of -0.598288 indicated that for 1% rises in the NPL leads to a 59.83% decreases in liquidity of Ethiopian commercial banks for the sampled period under the study, holding other variables constant. Since the amount of nonperforming loan measures the quality of bank assets, large amount of nonperforming loans (NPL) leads the banking sector to efficiency problem and the banking system into failure by reducing their liquidity holding; however, as per the finding of this study NPL has no statistically significant impact on the liquidity position of Ethiopian commercial banks. Therefore, the hypotheses stated; there was negative and statistically significant relationship between nonperforming loan and banks liquidity was rejected.

Bank Size and liquidity

Natural logarithm of the total asset as a proxy of bank size was used to know the effect of bank size on liquidity of Ethiopian commercial banks in this study. Bank size found to be a positive and statistically significant at 1 % level of significance with a p value of 0.0000 and this was in line with the hypotheses of this study (H3).The coefficient value of 0.311664 indicated that one birr increases in the total asset, resulted in the rises of 0.311664 birr in liquid assets of Ethiopian commercial banks, holding other variables constant.

This finding was consistent with the findings of Malik and Rafique (2013); Vtyurine et al.(2012); Chagwiza(2011); Subedi and Neupene (2011). And also it was supported the argument‟s that; small banks focus on the traditional intermediation and transformation activities and hold less liquid assets. This is to mean that small banks has little cash and cash equivalent reserves in other banks (central bank and other commercial banks) and hold less liquid assets (i.e. since they have little dealing with other types of investment instruments than loans). Besides the finding of this study showed that big banks (i.e. Commercial banks of Ethiopia, etc) have better trust by customers and good deposit attraction capacities that makes them more liquid than small banks i.e. LIB. Therefore, fail to reject the hypotheses stated; there was positive and statistically significant relationship between bank size and liquidity.

Profitability and liquidity

Profitability was measured by return on asset (ROA) for Ethiopia commercial banks in the sampled period and found to be significant at 5% level of significance with the p-value of 0.0283. The coefficient of -0.728726 showed that a 1% rises in banks liquidity leads to 72.87% decrease in the ratio of financing gap to total asset, holding other variables constant and it was in line with the hypotheses of this study (H4). This finding was consistent to the findings of Vtyurine et al. (2012); Vodová (2011); Berger and Bouwman(2007); Aspaches et al.(2005); Deep and Schaefer (2004). Also Valla et al.(2006) asserts that bank profitability which is according to finance theory negatively correlated with liquidity. Besides, it was in line with the arguments of that; holding liquid assets imposes an opportunity cost on the bank given their low return relative to other assets, which indicated the inverse relationship between liquidity of bank and profitability (Molyneux and Thornton 1992; Goddard, et al. 2004). Also the adverse effect of increased liquidity for financial institutions stated that, „although more liquid assets increase the ability to raise cash on short-notice, they also reduce the ability of management to commit credibly to an investment strategy that protects investors" which finally can result in reduction of the „firm"s capacity to raise external finance" in some cases (Myers and Rajan 1998). Hence, both the empirical founding"s of the previous researchers" and theoretical argument supported the finding of this study in that there was negative and statistically significant relationship between profitability and liquidity of commercial banks in Ethiopia. Therefore, fail to reject the hypotheses stated; there was negative and statistically significant relationship between profitability and banks liquidity.

Loan growth and liquidity

Annual growth rate of gross loans and advances to customers was used as a proxy for loan growth and which has a positive coefficient of 0.033774. The positive impact of loan growth on liquidity of Ethiopian commercial banks was opposite to the hypotheses of this study (H5). Besides, the positive impact of loan growth on liquidity of banks" was statistically insignificant with the p-value of 0.4136 and it was in line with the findings of Tseganesh (2012); Subedi and Neuwpane (2011). The finding of this study revealed that the impact of loan growth on liquidity of Ethiopian commercial banks was statistically not different from zero/insignificant; hence as per this finding larger amount of loans were provided from periodic deposits without affecting the amount of liquid assets held by the Ethiopian commercial banks. Therefore, the hypotheses stated; there was negative and statistically significant relationship between loan growth and banks liquidity was rejected.

GDP rate and liquidity

Gross domestic product (GDP) was among the macroeconomic variables that affected liquidity of Ethiopian commercial banks and the proxy was annual real GDP rate; which was statistically significant at 5% significance level with the p-value of 0.0251. And has a negative coefficient of (i.e. -2.285726) and which was in line with the hypotheses of this study (H7). The coefficient of -2.285726 indicated that a unit increases in annual real GDP rate leads to 2.285726 unit decreases in liquidity of Ethiopian commercial banks, holding other variables constant. The finding of this study was in line with the findings of Vtyurina(2012); Vodová (2011); (Valla et al. 2006); Aspachs et al.(2005).

Also this finding was supported the argument of Painceira (2010) and stated that in periods of economic expansion which are characterized by high degree of confidence of the economic units about their profitability; there is a rise in the level of investment, so economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates.

In line with the above argument the „loan able fund theory of interest" states that the supply for loan (i.e. illiquid assets for banks) increases when the economy is at boom or going out of recession (Pilbeam 2005). 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 (Aspachs et al. 2005). Hence, the finding of this study showed that when the economy growth faster and hence investment increases this means economic units (i.e. Ethiopian commercial banks) preferring more risky capital assets with higher return and they were more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates. Therefore, fail to reject the hypotheses stated; there was negative and statistically significant relationship between GDP growth rate and banks liquidity.

Inflation rate and liquidity

Inflation was the other macroeconomic variables of this study and found to be statistically insignificant factor in explaining liquidity of Ethiopian commercial banks with the p-value of 0.3792.The % change in CPI has a negative coefficient of (i.e. -0.078707); which means that one percent increase in %change in CPI leads to 7.87% decreases in liquidity of Ethiopian commercial banks, holding other variables constant. The finding of this study was consistent with the findings of Vodová (2012); Subedi and Neuwpane(2011). In general, the finding of this study suggested that even though the trends in inflation rate in Ethiopia was on a decreasing stage which has no any impact on liquidity of Ethiopian commercial banks and it was opposite to the hypotheses of this study (H8). Hence, the hypotheses stated; there was positive and statistically significant relationship between inflation rate and liquidity should be rejected.

Interest rate margin and liquidity

Interest rate margin was the last macroeconomic variable of this study and found to be positive and statistically insignificant with the p-value of (i.e. 0.4619) in explaining liquidity of Ethiopian commercial banks like the inflation rate above which was opposite to the hypotheses of this study(H9). And the coefficient of 0.013292 indicated that a 1% increase in IRM leads to 1.33% increases in liquidity of Ethiopian commercial banks, holding other variables constant. The finding of this study was consistent with the findings of Vodová (2012); Subedi and Neuwpane(2011). The positive coefficient of IRM is in line with the liquidity preference theory which stated that, lenders need high interest rate which includes the interest rate margin/ liquidity premium in order to lend besides the positive coefficient of interest rate margin was quite surprising because it highlighted the fact that higher interest rate margin didn‟t encourage banks to lend more rather it encouraged banks to hold more liquid assets. Hence, the hypotheses stated; there was negative and statistically significant relationship between IRM and banks liquidity should be rejected.

Table 4.8 Summary of actual and expected sign of explanatory variables on dependent variable with the decision of hypotheses

Explanatory variables	**Expected sign & impact on liquidity**	**Actual sign & impact on liquidity**	**Decision**
Capital adequacy	+ve & sig.	-ve & sig.	Rejected
Nonperforming loan	-ve & sig.	-ve & insig.	Rejected
Bank Size	+ve & sig.	+ve & sig.	Accepted @1%
Profitability	-ve & sig.	-ve & sig.	Accepted @ 5%
Loan growth	-v & sig.	+ve &insig.	Rejected
Real GDP rate	-ve & sig.	-ve & sig.	Accepted @ 5%
Inflation rate	+ve & sig.	-ve & insig.	Rejected
Interest rate margin	-ve & sig.	+ve & insig.	Rejected

Source: Own design

Note: sig. = statistically significant

Insig. = Statistically insignificant

CHAPTER FIVE

SUMMARY, CONCLUSSION AND RECOMMENDATIONS

On the basis of the findings of the study; this chapter provided the summary, conclusion and the recommendations parts. Accordingly, it was organized as follows; the first section deals with the summary of the study, the second section provided the conclusion part for the main findings of the study, and the last section deals with recommendations which followed by the room for further research.

5.1 Summary

As it was stated in the literature part of this study, Liquidity creation is the primary reason why commercial banks exist. Banks do this through transforming their short-term deposits into long-term loans which make them inherently vulnerable to liquidity risk, both of an institution-specific nature and that which affects markets as a whole. Therefore the main objective of this study was to identify the determinants of commercial banks liquidity in Ethiopia. In doing so, the study covered the data of ten commercial banks in Ethiopia from the period 2007-2013.

To achieve the intended objective, the study used fixed effect panel regression model for nine variables of the study which were both macroeconomic and firm specific variables. Concerning the data of this study; audited financial statements were collected from head office of sampled banks (i.e for firm specific variables), and data concerning the macroeconomic variables were collected from NBE and MoFED. Data was analyzed by using both descriptive statistic and inferential statistics/multiple regression model, in doing so hausman test was made for choosing of fixed effect panel data model and employed to measure estimators. And then test for CLRM were made and all the data fitted the assumptions, finally the fixed effect regression results were presented and analyzed; Hence, the finding of this study proved that four explanatory variables, (i.e CAP, SIZE, PROF, and GDP) were statistically significant whereas, NPL, LG, INF, and IRM found to be insignificant in explaining liquidity of Ethiopian commercial banks for the tested period.

5.2 Conclusion

On the basis of fixed effect regression result, the following conclusions were made;

The result of this study confirmed that banks liquidity was highly affected by firm specific variables if compared to macroeconomic variables. The rationality behind was that among macroeconomic variables that chosen for this study, GDP growth rate was the only macroeconomic variable that statistically affected liquidity of Ethiopian commercial banks at 5% significance level. The rest three variables were go to firm specific variables. Accordingly, Bank size which measured by LnTA has positive and statistically significant impact on liquidity while capital adequacy measured by the ratio of equity to total asset, profitability measured by ROA, and GDP growth rate measured by the annual real GDP rate have negative and statistically significant impact on liquidity. The coefficient of capital adequacy was opposite to the hypotheses of the study whereas bank size, dependency on external funds, profitability, and GDP growth rate were in line with the hypotheses of the study.

Loan growth and interest rate margin have positive relationship with liquidity but has no any impact on liquidity of banks/ insignificant whereas inflation rate and nonperforming loan have negative relationship with liquidity but their values were statistically insignificant/not different from zero. The coefficient of loan growth, inflation rate, and interest rate margin were opposite to the hypotheses of the study whereas the coefficient of nonperforming loan was in line with the hypotheses of the study. However, the finding of this study revealed that these variables have no any power in explaining liquidity of Ethiopian commercial banks for the tested period.

In general when it was seen from the hypotheses of this study, from five bank specific variables four of them were statistically significant whereas from three of macroeconomic variables only one was statistically significant in explaining liquidity of Ethiopian commercial banks and hence in statistical terms three variables were accepted, i.e. one of them at 1% level of significance while two of them at 5% level of significance whereas the rest five variables were rejected.

5.3 Recommendations

This study was intended to investigate the determinants of liquidity of Ethiopian commercial banks; and hence on the basis of the findings of the study, the following recommendations were drown:

- The positive relationship between natural logarithm of total asset/size and banks liquidity was shown that as small banks were highly exposed to liquidity problem than big banks. This might be due to the fact that small banks were mainly engaged on the traditional intermediation and transformation activities as it was supported by the theory. This means that small banks has little cash and cash equivalent reserves in other banks and hold less liquid assets when compared to big banks. Since big banks might got better trust by customers and good deposit attraction capacities that makes them more liquid and reduce their financing gap which in turn decrease their liquidity problem. Therefore, small banks which were recently established and engaged on the traditional intermediation and transformation activities have to think over this diverse effect of bank size on their liquidity and go in to action that enables them to foster their bank size and got reputation from the general public. This can be made through opening branches at different areas of Ethiopian locals based on feasibility studies in the current situation, increasing their outreach at new customers through extensive promotion, developing new banking products like e-banking and building confidence to their customer via developing faithfulness to the existing shareholders; besides which help to increase their level of profitability.

- Concerning to capital adequacy of Ethiopian commercial banks it become better if regulatory bodies like NBE make a periodic supervision and check up on capital strength of respective banks. Since, as it was discussed in the descriptive statistic part of this study; the bank with a capital adequacy ratio of 2.93% during the test period which was far from the NBE requirement 8 % and would be exposed to liquidity problem which could be the problem of the banking sector as a whole because it has a contagious effect.
- Generally, the empirical finding of this study revealed that bank specific variables have more significant impact on liquidity position of Ethiopian commercial banks for the study period and management able to give more attention to banks specific factors, since they are under their control.

5.4 Room for further research

This study was attempted to investigate both the bank specific and macroeconomic variables that affected the liquidity of Ethiopian commercial banks. Since liquidity is very crucial to the existence of banks; factors that affect it should be identified, therefore there has to be further research on the area of factors that affecting liquidity of Ethiopian commercial banks by incorporating any other firm specific and macroeconomic variables, and regulatory factors since regulations are subject to frequent change.

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Appendices

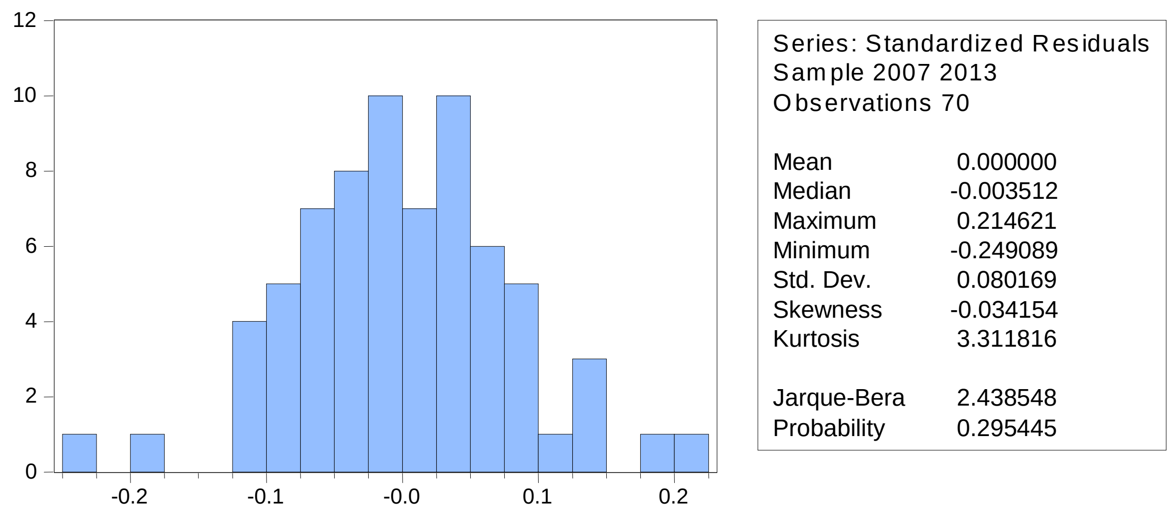
Appendix A: List of sampled banks,

Ethiopian commercial banks	Year of establishment
1. Commercial Banks of Ethiopia	1963
2. Construction and Business bank	1975
3. Awash International Bank	1994
4. Dashen Bank	1995
5. Abyssinia Bank	1996
6. Wugagen Bank	1997
7. United Bank	1998
8. Nib International Bank	1999
9. Co-opeartive Bank of Oromia	2004
10. Lion International Bank	2006

Source: National Bank of Ethiopia

Appendix B: Tests for the CLRM assumptions/Diagnostic test

1. **Test for Normality; Bera-Jarque(BJ) test**



2. Test for multicollinearity; Using Correlation Matrix

	LIQ	CAP	NPL	SIZE	PROF	LG	GDP	INF	IRM
LIQ	1								
CAP	-0.29916	1							
NPL	-0.03991	0.451010	1						
SIZE	0.243805	-0.236236	0.185064	1					
PROF	-0.29583	-0.070824	-0.016464	-0.001268	1				
LG	0.01077	-0.006209	-0.153305	-0.039991	-0.103021	1			
GDP	-0.27105	0.071542	-0.000296	-0.016342	-0.090906	0.045384	1		
INF	-0.00274	0.005084	0.000316	-0.069258	-0.111132	0.083236	-0.029452	1	
IRM	0.07975	0.295533	0.220681	-0.340793	-0.016051	0.302571	0.088740	0.096201	1

3. Test for Heteroskedasticity; white test

F-statistic	1.876999	Prob. F(9,60)	0.2250
Obs*R-squared	35.54355	Prob. Chi-Square(9)	0.3566
Scaled explained SS	33.66031	Prob. Chi-Square(9)	0.3451

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 12/19/14 Time: 20:56

Sample: 2007 2013

Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.063316	0.040592	-1.559806	0.1241
CAP^2	0.015967	0.021476	0.743514	0.4601
NPL^2	-0.181659	1.028138	-0.176687	0.8603
SIZE^2	0.000269	0.000364	0.739322	0.4626
PROF^2	-0.021497	0.236114	-0.091045	0.9278
LG^2	0.055848	0.060300	0.926166	0.5652
GDP^2	2.068122	1.444687	1.431536	0.1575
INF^2	-0.087001	0.056374	-1.543292	0.1280
IRM^2	0.002633	0.001347	1.955040	0.1345

R-squared	0.507765	Mean dependent var	0.023655
Adjusted R-squared	0.433930	S.D. dependent var	0.038255
S.E. of regression	0.028782	Akaike info criterion	-4.126553
Sum squared resid	0.049705	Schwarz criterion	-3.805339
Log likelihood	154.4293	Hannan-Quinn criter.	-3.998963
F-statistic	1.876999	Durbin-Watson stat	1.919178
Prob(F-statistic)	0.225055		

4. Test for Autocorrelation;

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.473948	Prob. F(10,50)	0.7936
Obs*R-squared	3.066317	Prob. Chi-Square(10)	0.6898

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 12/24/14 Time: 22:31

Sample: 2007 2013

Included observations: 70

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.489301	0.479097	1.021297	0.3120
CAP	0.030568	0.087193	0.350579	0.7274
NPL	-0.276913	0.580368	-0.477134	0.6353
SIZE	-0.027917	0.041750	-0.668666	0.5068
PROF	-0.394346	0.383750	-1.027612	0.3091
LG	0.046915	0.048326	0.970804	0.3363
GDP	-0.821374	1.329250	-0.617923	0.5394
INF	-0.018733	0.114578	-0.163494	0.8708
IRM	-0.018845	0.018552	-1.015807	0.3146
RESID(-1)	0.569740	0.559363	1.018551	0.7832
RESID(-2)	0.280874	0.168230	1.669584	0.1173
RESID(-3)	-0.013596	0.157211	-0.086485	0.9314
RESID(-4)	-0.049718	0.150319	-0.330750	0.7422
RESID(-5)	0.000406	0.150964	0.002690	0.9979
RESID(-6)	0.125206	0.154069	0.812657	0.4203
RESID(-7)	-0.213751	0.154396	-1.384438	0.1724

RESID(-8)	0.051133	0.159116	0.321353	0.7493
RESID(-9)	0.283325	0.165808	1.708748	0.1765
RESID(-10)	0.028263	0.147668	0.191393	0.8490

R-squared	0.051105	Mean dependent var	3.11E-17
Adjusted R-squared	-0.272382	S.D. dependent var	0.074164
S.E. of regression	0.083657	Akaike info criterion	-1.901004
Sum squared resid	0.307934	Schwarz criterion	-1.342512
Log likelihood	73.03013	Hannan-Quinn criter.	-1.682547
F-statistic	0.157983	Durbin-Watson stat	1.879062
Prob(F-statistic)	0.999821		

Appendix C: Result of fixed effect regression model

Dependent Variable: LIQ

Method: Panel Least Squares

Date: 12/24/14   Time: 21:57

Sample: 2007 2013

Periods included: 7

Cross-sections included: 10

Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.591624	0.710801	5.052923	0.0000
CAP	-0.505137	0.072600	-6.957807	0.0000***
NPL	-0.598288	0.691987	-0.864594	0.3913
SIZE	0.311664	0.066924	4.656948	0.0000***
PROF	-0.728726	0.322788	-2.257596	0.0283**
LG	0.033774	0.040968	0.824387	0.4136
GDP	-2.285726	0.990677	-2.307238	0.0251**
INF	-0.078707	0.088728	-0.887063	0.3792
IRM	0.013292	0.017931	0.741307	0.4619

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.830694	Mean dependent var	-0.128715
Adjusted R-squared	0.805298	S.D. dependent var	0.297034
S.E. of regression	0.131067	Akaike info criterion	-2.015213
Sum squared resid	1.030708	Schwarz criterion	-2.631250
Log likelihood	68.31279	Hannan-Quinn criter.	-2.865024
F-statistic	32.70972	Durbin-Watson stat	1.815196
Prob(F-statistic)	0.000000		

***, **, *significant@1%, 5% and 10% level of significance