Factors Affecting Liquidity of Selected Commercial Banks in Ethiopia

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Statement of Declaration

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

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This is to certify that the thesis prepared by Belete Fola, entitled: Factors Affecting Liquidity of Selected Commercial Banks in Ethiopia 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 complies the accepted standards with respect to originality and quality.

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Abstract

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This study examines the bank-specific and macro-economic factors affecting bank liquidity for eight commercial banks in Ethiopia, covering the period of 2002-2013 by using balanced fixed effect panel regression. To this end, the study adopts a mixed methods research approach by combining documentary analysis and in-depth interviews. The findings of the study show that capital strength, interest rate margin and inflation had statistically significant and positive relationship with banks' liquidity. On the other hand, loan growth had a negative and statistically significant relationship with banks' liquidity. However, the relationship for profitability, non-performing loans, bank size and gross domestic product were found to be statistically insignificant. The study suggests that focusing and reengineering the banks alongside the key internal drivers could enhance the liquidity position of the commercial banks in Ethiopia. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the internal environment and the macroeconomic environment together in developing strategies to improve the liquidity position of the banks.

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

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List of Acronyms

AB: Abay Bank

AdIB: Addis International Bank

AIB: Awash International Bank

BBI: Berhan International Bank

BIB: Bunna International Bank

BIS: Bank for International Settlement

BLUE: Best Linear Unbiased Estimator

BoA: Bank of Abyssinia

CAP: Capital adequacy

CBB: Construction and Business Bank

CBE: Commercial Bank of Ethiopia

CBO: Cooperative Bank of Oromia

CBRC: China Banking Regulatory Commission

CLRM: Classical Linear Regression Model

DGB: Debub Global Bank

DW: Durbin-Watson

EB: Enat bank

GDP: Gross Domestic Product

HP: Hypotheses

INFL: Inflation

IRM: Interest rate margin

JB: Jarque-Bera

LG: Loan growth

LIB: Lion International Bank

LIQ: Liquidity

LOLR: Lender of last resort

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NIB: Nib International Bank

NPLs: Non-performing loans

OECD: Organization for Economic Cooperation and Development

OIB: Oromia International Bank

OLS: Ordinary Least Square

PR: Profitability

RQ: Research Question

UB: United Bank

US: United States

WB: Wegagen Bank

ZB: Zemen Bank

Chapter 1 Introduction

1.1. Background on the Study

Liquidity for a bank means the ability to meet its financial obligations as they come due, without incurring unacceptable losses (BIS, 2008). Hence, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans. Therefore, banks have to hold optimal level of liquidity that can maximize their profit and enable them to meet their obligation. 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. Market liquidity risk is the risk that a bank cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption.

According to Aspachs et al. (2005), there are three mechanisms that banks can use to insure against liquidity crises:

i. Banks hold buffer of liquid assets on the asset side of the balance sheet. A large enough buffer of assets such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities or reverse repo trades reduce the probability that liquidity demands threaten the viability of the bank.

ii. Second strategy is connected with the liability side of the balance sheet. Banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. However, this strategy is strongly linked with market liquidity risk.

iii. The last strategy concerns the liability side of the balance sheet, as well. The central bank typically acts as a Lender of Last Resort to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage.

During global financial crisis, many banks struggled to maintain adequate liquidity. In order to sustain the financial system, unprecedented levels of liquidity support were required from central banks (Černohorský et al., 2010). Even with such extensive support, a number of banks failed, were forced into mergers or required resolution (BIS, 2009; Teplý, 2011). The crisis showed the importance of adequate liquidity risk measurement and management.

Generally, banks strive to strike a balance between profitability and liquidity (Niresh, 2012). The provision of sufficient liquidity to customers at all times is an essential feature of banking. To achieve this goal, banks ensure that sufficient provision of cash and other near cash securities are made available to meet withdrawal obligations and new loan demand by customers in need of liquidity.

For aforementioned reason, any bank operating in Ethiopia shall statutorily require to comply with the reserve and liquidity requirement directive of the National Bank of Ethiopia (NBE) as a means of effectively managing the liquidity positions of banks. As a matter of fact, the first strategy to liquidity management in Ethiopia is compliance with these statutory reserve requirement and liquidity ratios as stipulated by the NBE directives. To this regard, strategic measures has been employed by the NBE to improve banking system liquidity & stability and a steady flow of credit to the real sector of the economy includes the continuous reduction of the statutory reserve requirement and liquidity ratio. For instance, NBE has reduced statutory reserve requirement from 15% to 10% and then to 5% and liquidity ratio requirement from 25% to 20%

and then to 15% under Directives No. SBB/45/2008, SBB/46/2012 & SBB/55/2013 and Directives No. SBB/44/2008, SBB/45/2012 & SBB/57/2014, respectively.

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

In light of the above, a lot of research work has so far taken place concerning the issue of determinants of bank liquidity. For instance, Rauch et al. (2009) and other several studies like Shen et al. (2009) and Vodova (2011) have shown that bank liquidity is influenced by both internal and external factors. However, these studies were based on data from other countries and their findings may not be applicable to the Ethiopian banking sector. Moreover, those literatures by themselves provide contradictory conclusions for they were based on different models and methodologies. In the context of Ethiopia, to the knowledge of the researcher, there appears to be only one work on the assessment of determinants of the banks' liquidity which was conducted by Tseganesh (2012). The study conducted by her examined determinants of liquidity of commercial banks in Ethiopia, by adopting a quantitative approach only, overlooked some

important variables that can significantly affect Ethiopian banks' liquidity. Moreover, her conclusions were also dependent on secondary data solely or used documentary survey only as data collection methods. Furthermore, the study adopts a quantitative approach only without considering a lot of its limitations.

Due to the unexpected shock and grievous loss in financial institutions, absence of capital markets and interbank borrowing; reviewing determining determinants of liquidity is vital for a better understanding on the concept of liquidity risk in relation with other financial risks. Then, without hesitation financial institutions liquidity is utterly crucial to the economic excellence of a country. The aim of this paper is therefore to identify determinants of liquidity of Ethiopian commercial banks. The remaining discussions in the chapter are arranged in eight sections. The first section presents an overview of the Ethiopian banking system as a background for the research. Section 1.3 presents the problem statement. Section 1.4 presents the research methodology. Section 1.5 presents the research objectives and hypotheses of the study. Section 1.6 presents the scope of the study. Section 1.7 discusses the limitations of the study. Section 1.8 presents the significance of the study. Finally, the structure of the study is discussed in section 1.9.

1.2. Overview of the Ethiopian banking system

Modern banking in Ethiopia started in 1905 with the establishment of Abyssinian Bank which was based on a fifty year agreement with the Anglo-Egyptian National Bank. In 1908 a new development bank (Societe Nationale d'Ethiope Pour le Development del'Agriculture et du Commerce) and two other foreign banks (Banque de l'Indochine and the Compagnie del'Afrique Orientale) were also established (Degefe 1995 cited in Geda 2006). As noted in Geda (2006)

these banks were criticized for being wholly foreign owned. In 1931 the Ethiopian government purchased the Abyssinian Bank, which was the dominant bank, and renamed it the Bank of Ethiopia i.e., the first nationally owned bank on the African continent (Gedey 1990, pp. 83, cited in Geda 2006).

During the five-years of Italian occupation (1936-1941) banking activity of the country was relatively expanded. In that time, the Italian banks were particularly active. As a result, most of the banks that were in operation during this period were Italian banks namely, Banco di Italy, Banco di Roma, Banco di Napoli, BancoNacionale, Casa de Creito and Society Nacionale di Ethiopia. After independence from Italy's brief occupation, where the role of Britain was paramount owing to its strategic planning during the Second World War, Barclays Bank was established and it remained in business in Ethiopia between 1941 and 1943 (Degefe 1995 cited in Geda 2006). Following this, in 1943 the Ethiopian government established the State Bank of Ethiopia. As noted in Degefe (1995 cited in Geda 2006) the establishment of the Bank by Ethiopia was a painful process because Britain was against it. The Bank of Ethiopia was operating as both a commercial and a central bank until 1963 when it was remodeled into today's National Bank of Ethiopia (the Central Bank, re-established in 1976) and the Commercial Bank of Ethiopia (CBE). After this period many other banks were established; and just before the 1974 revolution those banks were in operation (Degefe 1995 cited in Geda 2006).

As stated in Degefe (1995 cited in Geda 2006), all privately owned financial institutions including three commercial banks, thirteen insurance companies, and two non-bank financial intermediaries were nationalized on 1 January 1975[1]. The nationalized banks were reorganized and one commercial bank (the CBE), a national bank (recreated in 1976), two specialized banks

[1]The commercial banks were Addis Ababa Bank, Banco di Napoli and Banco di Roma.

i.e., the Agricultural & Industrial Bank, renamed recently as the Development Bank of Ethiopia and a Housing & Saving Bank, renamed recently as the Construction & Business Bank, and one insurance company (Ethiopian Insurance Company) were formed. Following the regime change in 1991 and the liberalization policy in 1992, these financial institutions were reorganized to work to a market-oriented policy framework. Moreover, new privately owned financial institutions were also allowed to work alongside the publicly owned ones. As a result, currently, the country has three public-owned and sixteen private banks, which are operating throughout the country (NBE 2013/2014). The three governments owned banks are Development Bank of Ethiopia (DBE), Commercial Bank of Ethiopia (CBE) and Construction & Business Bank (CBB). The sixteen privately owned banks are Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wegagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berhan International Bank S.C (BBI), Bunna International Bank S.C (BIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Abay Bank S.C. (AB), Addis international Bank SC. (AdIB), Debub Global Bank S.C. (DGB) and Enat Bank S.C. (EB).

1.3. Statement of the problem

The financial system enables an economy to be more productive as it allows investors with few resources to use savings from those with few prospects of investing. Moreover, with regard to liquidity, the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently vulnerable to liquidity risk, both of an institution-specific nature and that which affects markets as a whole. Liquidity creation itself is seen as the primary source of economic welfare contribution by banks but also as their primary source of

risk (Bryant 1980 or Calomiris and Kahn 1991). Therefore, virtually every financial transaction has implications for a bank's liquidity.

In recent years, the world economy has experienced a number of financial crises. Often, at the center of these crises are issues of liquidity provision by the banking sector and a financial market. For example, when crises are likely to arrive, banks seem less willing to lend and hold more liquidity due to the low level of liquidity in the market for external finance (Acharyaet al, 2011). Berger and Bouwman (2009b) found the connection between financial crises and bank liquidity creation: the subprime lending crisis was preceded by a dramatic build-up of positive abnormal liquidity creation, which implies that "too much" liquidity creation may also lead to financial fragility. Acharya and Naqvi (2010) are also successful in explaining how the seeds of a crisis may be sown when banks are flush with liquidity. Hence, bank liquidity management is important for both bank managers and policymakers in safeguarding overall financial stability.

Therefore, globally, the adequacy of liquidity plays very crucial roles in the successful functioning of all business firms. However, the issue of liquidity, though important to other businesses, is most paramount to banking institutions. Liquidity shortage, no matter how small, can cause great damage to a bank's operations (Ifeoma et al, 2013). Liquidity crisis, if not properly managed, can instantly destroy those good customer relationships built over the years. Managing liquidity is therefore a core daily process requiring bank managers to monitor and project cash flows to ensure that adequate liquidity is maintained at all times.

However, the liquidity fragility is also a source of efficiency. Diamond and Rajan (2001) argue that the financial intermediation structure is efficient in that it disciplines banks when carrying out their lending function. The threat of a run is an incentive for the bank to choose projects with

high return. More generally, this also suggests that an “even more liquid” bank might not always be desirable for the efficiency of the financial system. Therefore, effective liquidity risk management helps ensure a bank’s ability to meet cash flow obligations, which are uncertain as they are affected by external events and other agents’ behavior and to keep their optimal profitability.

Likewise, Tseganesh (2012) stated that the liquidity risk is said to be assassin of banks. This risk can adversely affect both bank’s earnings and the capital. Therefore, it becomes the top priority of a bank’s management to ensure the availability of sufficient funds to meet future demands of providers and borrowers, at reasonable costs. Episodes of failure of many conventional banks from the past and the present provide the testimony to this claim. For instance, as United States/U.S. subprime mortgage crisis reached its peak in the years 2008/9 unprecedented levels of liquidity support were required from central banks in order to sustain the financial system. Even with such extensive support, a number of banks failed, were forced into mergers or required resolution. A reduction in funding liquidity then caused significant distress. In response to the freezing up of the interbank market, the European Central Bank and U.S. Federal Reserve injected billions in overnight credit into the interbank market. It is evident that liquidity and liquidity risk is very up-to-date and important topic. Therefore banks and more so their regulators are keen to keep a control on liquidity position of banks.

Generally, in order to undertake their operations properly and profitably commercial banks have to maintain their optimal liquidity. When we say banks are liquid, they are able to serve the demand of new borrowers and the withdrawal of cash by their depositors without affecting their day to day activities. To do so they have to keep sufficient liquid assets on their balance sheet. What is more necessary behind maintaining their liquidity is that properly identifying and

managing important factors affecting the liquidity position of banks. According to Asphachs et al. (2005), banks have three possible layers of insurance; a buffer of liquid assets in banks' individual portfolios, unsecured lending/borrowing in the interbank market and a lender of last resort/LOLR safety net. The first one is internal and the remaining two are external sources of liquidity. Like the sources of their liquidity, the liquidity position of banks can be affected by bank specific factors, macroeconomic factors and government/central bank regulations. Firm specific factors include profitability, loan growth, bank size, capital adequacy, the percentage of non-performing loan on the total volume of loans which measures loan quality and others. Macroeconomic factors include gross domestic products/GDP, the rate of inflation, interest rate margin and other macroeconomic factors.

The Ethiopian financial sector is largely bank-based as the secondary market is still not established 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. Hence, keeping their optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers.

On the other hand, in Ethiopia studies in relation to determinants of banking industry's liquidity considering both internal and external factors are very scanty. In the context of Ethiopia, to the knowledge of the researcher only one related study conducted by Tseganesh (2012) which tries to identify the impact of some bank-specific and macroeconomic variables of Ethiopian banks liquidity. The study overlooked some important variables that can significantly affect liquidity of the Ethiopian banking industry from the point of view of the theories and previous empirical studies (to be discussed in chapter two). Besides, her study adopts a quantitative approach only without considering a lot of limitations of it. In general, the lack of sufficient research on the

determinants of bank liquidity in the context of Ethiopia and the existence of knowledge gap in the area was initiated this study. Therefore, this study seeks to fill the gap by providing full information about the internal and external factors that affects Ethiopian commercial banks liquidity by incorporating the untouched ones.

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1.4. The research objective and hypotheses

In the context of the problems, the general objective of this study is to assess the factors that affect bank liquidity in Ethiopia.

Research question (RQ)

In line with the broad purpose statement, the following specific research question was formulated:

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

Research hypotheses (RH)

In line with the broad purpose statement the following hypotheses were formulated for investigation. Hypotheses of the study stands on the theories related to a banks' liquidity that has been developed over the years by banking area researcher's and past empirical studies related to a bank's liquidity. The results from the literature review (to be established in the next chapter) were used to establish expectations for the relationship of the different determinants. Hence, based on the objective, the present study seeks to test the following 8 hypotheses:

H1. There is a significant negative relationship between the profitability and bank's liquidity.

H2.There is a significant negative relationship between the non-performing loans of a bank and the bank's liquidity.

H3. There is significant positive/negative relationship between the capital adequacy and bank's liquidity.

H4. There is significant positive/negative relationship between the bank size and bank's liquidity.

H5. There is significant negative relationship between the loan growth and bank's liquidity.

H6.There is a significant negative relationship between real gross domestic product growth and bank liquidity.

H7. There is significant negative relationship between the interest rate margin and bank liquidity.

H8.There is a significant positive relationship between inflation and bank liquidity.

1.5. Research methodology

In order to achieve the objective stated in the preceding section, considering the nature of the problem and the research perspective this study used mixed research approach. A mixed methods approach was chosen as it increases the likelihood that research generates more accurate results than is the case if a single method had been adopted. As noted in Creswell (2009) mixed research is an approach that combines or associates both qualitative and quantitative research methods. It is also more than simply collecting and analyzing both kinds of data, it involves the use of both

approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research. As a result, mixed methods provide a more accurate picture of the phenomena being investigated.

For the study the target population consists of all commercial banks registered by NBE. The study selected a sample of eight commercial banks which are under operation in the country at least for the last twelve years. Consequently, the study consists of the two governments owned commercial banks namely, CBE and CBB. Moreover, the study also includes the six leading private commercial banks in the country in terms of their year of establishment and market share namely, AIB, DB, BoA, UB, WB and NIB. The analyses are basically concentrated on the data available in financial statements of banks and other documents which had macro-economic data in relation to the selected variables kept by NBE, the banks themselves and Ministry of Finance and Economic Development (MoFED), covering the period of 2002-2013. Moreover, in-depth interview with four finance managers of the selected banks were utilized to gain a greater insight into the findings from documentary analysis.

1.6. Scope of the study

The scope of the study is restricted to the assessment of the internal and external factors affecting bank liquidity of all commercial banks registered by the NBE and that have at least twelve years data i.e., 2002-2013. As a result, it includes the two governments owned commercial banks namely, CBE and CBB. The scope of the study also includes the six leading private commercial banks in the country in terms of their year of establishment and market share namely, AIB, DB, BOA, WB, UB and NIB.

1.7. Limitation of the study

In conducting the study, there was lack of financial data for recent year, 2014 for public owned banks. Therefore, the study is limited to take data up to the year 2013. Moreover, lack of sufficient relevant and up to date published literatures mainly in the context of Ethiopia and absence of full information displayed on websites is the major constraints during the study. Finally, the researcher himself may be biased in interpreting the results that was collected through interviews.

1.8. Significance of the study

The significance of this research includes the following:

- The study draws some conclusions and identifies the factors affecting bank liquidity significantly. Thus, it gives indicator to the management of the banks and policy makers to take remedial action;
- It helps other researchers as a source of reference and as a stepping stone for those who want to make further study on the area afterwards;
- It contributes its part to the well-being of the financial sector of the economy and the society as a whole; and
- It gives to all stake holders in the area the opportunity to gain deep knowledge about the relationship of internal and external factors and liquidity.

1.9. Structure of the study

This study mainly focuses on the identification of both the internal (bank-specific factors) and the external factors which includes macro-economic factors that can affect liquidity of the

Ethiopian commercial banks in general. The study organized into six chapters. Chapter one presents introductions of the study. The literature review part of the study presented in chapter two. The review of the literature includes the theoretical review in its first section which followed by the review of the empirical literature related to the area and conclusion and knowledge gap finally. Chapter three presents the research design and methodology. The results of the different methods used were presented in chapter four. This is followed by an analysis of the results of the different methods concurrently in chapter 5. Finally, chapter six presents the conclusions and recommendations.

Chapter 2 Literatures review

Several factors influence banks' operations and banks' liquidity, recognizing and understanding the underlying concepts and definitions of the banking sector is essential in order to assure results and analyses. Hence, chapter two serves as background for this study by describing concepts of financial intermediation and factors that could influence banks' liquidity. Subsequent chapters will build on concepts and definitions described here. In light of the above, the purpose of this chapter is to review the literatures related to bank liquidity and its determinants. The review has three sections. Section 2.1 presents a review of the theoretical aspects related to bank liquidity and its determinants. This is followed by the review of the empirical literatures in relation to bank liquidity and its determinants in section 2.2. Section 2.3 presents the conceptual framework. Finally, conclusions on the literature review and knowledge gaps are presented in section 2.4.

2.1. Theoretical review

This section reviews the basic theoretical issues related to banks liquidity and its determinants. Hence, section 2.1.1 presents the role of banks in the economy. Then, section 2.1.2 presents the theories related to bank liquidity. Finally, section 2.1.3 presents the theories related to the factors influencing bank liquidity.

2.1.1. The role of banks

To start very basic, this paragraph discusses the role of banks in the economy and examines the question why banks exist. At first sight, the answer to this question is very intuitive and simple;

banks act as an intermediary between those who are in need for money and those who have excess of money. Looking more closely to this question there could be a more detailed explanation. Namely, in a perfect capital market of Modigliani-Miller (1958), financial institutions are superfluous (Santos 2001); namely, entities can borrow and save directly through the capital market. In reality, such perfect market does not exist; transaction costs and monitoring costs distort capital markets. Furthermore, capital markets suffer from the information asymmetry and the agency problem. The agency problem refers to the dissimilar incentives of borrowers and savers, in a broader context it refers to the dissimilar incentives of principals and agents (Jensen & Meckling 1976). In a case of financial distress, borrowers are limited liable; implying that they have incentives to alter their behavior by taking on more risk than savers are willing to accept. Monitoring the borrowers' behavior is time consuming, complex and expensive for individuals. In general, in inefficient markets, financial intermediation is beneficial since banks have lower monitoring and transaction costs than individuals, due to economies of scale and scope.

Another important aspect of banking is the function of maturity transformation. Banks receive short-term savings from depositors and transform those savings into long-term loans to borrowers. By holding a part of the short-term savings in liquid assets and cash, banks could withstand daily withdrawals from depositors. Banks offer a unique service; lending long term while guaranteeing the liquidity of their liabilities to depositors, which can withdraw their money at any time without a decline in nominal value (Schooner & Talyor 2010 cited in van Ommeren 2011). Capital markets cannot achieve maturity transformation with the same benefits as banks can. Individual investors face liquidity, price and credit risk, which they cannot diversify to the extent banks can. As savers do not withdraw their deposits at the same time, banks hold only a

minor part of the savings in liquid cash. Thus, banks diversify liquidity risks over a large pool of savers. Individual savers can also diversify their investments in terms of credit and price risks but it remains unlikely that they could withdraw the investments at any time without facing liquidity issues.

Nowadays, bank activities are more diverse than ever. In the past decades, competition has increased and new activities have emerged. The traditional form of banking, receiving deposits and extending credits, has become less important. Ever since the complexity of balance sheet has increased, as did balance sheet and risk management (van Greuning & Bratanovic 2009 cited in Ommeren 2011). Besides the incorporations of liquidity, price and credit risks in banking activities, banks increasingly faces market risks (e.g. interest rate risk and currency risk). One may assume that banks' risk managers properly diversify these risks and closely monitor borrowers' behavior to avoid bank failure or financial distress. Nevertheless, monitoring bank behavior is required to safeguard the continuity and stability of the banking sector due to moral hazard issues.

2.1.2 Theories of bank liquidity

This section discusses about the existing liquidity theories which mainly focuses on sources of liquidity risk and mechanisms to measure those risk.

Inventory management theory

Baumol's (1952) inventory management model and Miller and Orr's (1966) model which recognized the dynamics of cash flows are some of the earlier research efforts attempted to develop models for optimal liquidity and cash balances, given the organization's cash flows the

focus was on using quantitative models that weighed the benefits and costs of holding cash (liquidity). These earlier models help financial managers understand the problem of cash management, but they rest on assumptions that do not hold in practice.

The model postulates that firms identify their optimal level of cash holdings by weighting the marginal costs and marginal benefits of holding cash. The benefits related to cash holdings are: reducing the likelihood of financial distress, allows the pursuance of investment policy when financial constraints are met, and minimizes the costs of raising external funds or liquidating existing assets. The main cost of holding cash is the opportunity cost of the capital invested in liquid assets. Firms will therefore trade-off holding cash and investing it depending on its investment needs.

Demand for money theory

Miller and Orr (1966) model of demand for money by firms suggests that there are economies of scale in cash management. This would lead larger firms to hold less cash than smaller firms. It is argued that the fees incurred in obtaining funds through borrowing are uncorrelated with the size of the loan, indicating that such fees are a fixed amount. Thus, raising funds is relatively more expensive to smaller firms encouraging them to hold more cash than larger firms. Firms with more volatile cash flows face a higher probability of experiencing cash shortages due to unexpected cash flow deterioration. Thus, cash flow uncertainty should be positively related with cash holdings.

Barclay and Smith (1995), however provide evidence that firms with the highest and lowest credit risk issue more short-term debt while intermediate credit risk firms issue long-term debt. If we consider that firms with the highest credit rating have better access to borrowing, it is

expected that these firms will hold less cash for precautionary reasons, which would cause debt maturity to be positively related to cash holdings.

Keynes motives of money theory

The economics and finance literature analyze possible reasons for firms to hold liquid assets. Keynes (1936) identified three motives on why people demand and prefer liquidity. The transaction motive, here firms hold cash in order to satisfy the cash inflow and cash outflow needs that they have. Cash is held to carry out transactions and demand for liquidity is for transactional motive. The demand for cash is affected by the size of the income, time gaps between the receipts of the income, and the spending patterns of the cash available. The precautionary motive of holding cash serves as an emergency fund for a firm. If expected cash inflows are not received as expected cash held on a precautionary basis could be used to satisfy short-term obligations that the cash inflow may have been bench marked for. Speculative reason for holding cash is creating the ability for a firm to take advantage of special opportunities that if acted upon quickly will favor the firm.

Bank liquidity creation and financial fragility-theory

An important role of banks in the economy, as per the theory of financial intermediation, is to provide liquidity by funding long term, illiquid assets with short term, liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Diamond and Dybvig 1983) emphasize the "preference for liquidity" under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets.

However, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. More generally, the higher is liquidity creation to the external public, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers. A natural justification for the existence of deposit-taking institutions, thereby giving also an explanation for the economically important role of banks in providing liquidity, was initially modeled by (Bryant 1980 and Diamond and Dybvig 1983). They showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against idiosyncratic consumption shocks.

Kashyap et al. (2002) conducted a related analysis justifying the existence of banks' liquidity creation. They argue that because banks carry out lending and deposit taking under the same roof, synergies must exist between these two tasks. These synergies can be found in the way deposits and loan commitments are secured through the holding of liquid assets as collateral against withdrawals. They regard these liquid assets as costly overheads. These overheads can be share by the two separate functions, hence the synergy. A detailed analysis of the link between liquidity shortages and systemic banking crises is given by (Diamond and Rajan, 2005). It is argued that the failure of a single bank can shrink the pool of available liquidity to the extent that other banks could be affected by it. A contagion effect is the result. However, as solvency and liquidity effects interact it is hard to determine the root of a crisis. Generally, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long term loans.

Quantitative framework for measuring liquidity risk-theory

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

Liquidity risk of banks can be measured by liquidity gap/flow approach or liquidity ratio/stock approach. The stock approach focuses on the asset and liability sides of the balance sheet employing ratios to identify liquidity trends. The flow approach focuses on comparing the variability in bank's inflows and outflows to determine the amount of reserves that are needed during a period. The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit that has to be filled (Bessis, 2009). Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government

securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions.

Different authors like Moore (2010), Chagwiza (2014), Rychtárik (2009), or Praet and Herzberg (2008) provide various liquidity ratios such as liquid assets to total assets, liquid assets to deposits, loans to total assets, loans to deposits, loans to deposits & short term borrowings and total loan to total liabilities. To sum up, the stock approach employs various balance sheet ratios to identify liquidity trends. Although both approaches are intuitively appealing, the flow approach is more data intensive and there is no standard technique to forecast inflows and outflows. As a result, the stock approaches are more popular in practice and in the academic literature (see Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2011).

Among the above liquidity ratios, Tseganesh (2012) has used two ratios, namely liquid assets to total assets and loans to deposits plus short term borrowing by disregarding liquid asset to total deposit which is the current practice of the Ethiopian banks in line with regulatory body's liquidity requirement directives. The rationale for computing liquidity ratio interns of liquid assets to total assets in Ethiopian context is simply to know the amount of liquid assets from bank's total assets. But it is not way of measuring liquidity risk as per NBE's requirement. Rather as per NBE Directive No. SBB/57/2014, commercial banks liquidity risk is computed by using ratio of liquid assets to total deposits. Therefore, this study employs two ratios: liquid assets to total deposits and total loans & advances to total deposits ratio by using stock approach. The rationale to use the later ratio was in order to check the robustness of the results in the former one.

2.1.3. Factors affecting bank liquidity-*theory*

Theoretically factors affecting bank liquidity are mainly divided into two categories, such as internal and external variables. The internal (bank-specific factors) are factors that are related to internal efficiencies and managerial decisions. Such factors include determinants such as bank profitability, bank capital adequacy, bank size, asset quality, growth of loan and the like. The external or macro determinants are variables that are not related to bank management but reflect the economic and legal environment that affects the operation and liquidity positions of institutions. The macroeconomic factors that can affect bank liquidity include factors such as GDP, interest rate margin and inflation rate among others. Accordingly, section 2.1.3.1 presents bank specific factors followed by macroeconomic factors presented under 2.1.3.2.

2.1.3.1. Bank specific factors

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

It is argued that when banks hold high liquidity, they do so at the opportunity cost of some investment, which could generate high returns (Kamau 2009). The trade-offs that generally exist

between return and liquidity risk are demonstrated by observing that a shift from short term securities to long term securities or loans raises a banks' return but also increases its liquidity risks and the inverse is true. Thus 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. Myers and Rajan (1998) emphasized the adverse effect of increased liquidity for financial institutions stating that, "although more liquid assets increase the ability to raise cash on short-notice, they also reduce management's ability 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. Thus, this indicates the negative relationship between bank profitability and liquidity.

Non-performing loans and bank liquidity: Non-performing loans (NPLs) are loans that a bank customer fails to meet his/her contractual obligations on either principal or interest payments exceeding 90 days (Ghafoor, 2009). NPLs are loans that give negative impact to banks in developing the economy. Rise of non-performing loan portfolios significantly contributed to financial distress in the banking sector.

A definite fact, financial systems are responsible for managing complex and advance financial transactions. The banking systems play the central role of mobilizing and allocating resources in the market, conduit for savings and surplus funds channeled to deficit units. Financial institutions oversee that operations are being run effectively and efficiently. The financial term for this activity is known as "Risk Transformation" (riskless deposit to risky loans). Granting loans generate most profits for banks. However, it involves high risk and eventually the main contributor to non-performing loans (NPLs). A core substance for sustained and rapid economic

progress is financial stability. Financial stability measures are immensely used, among various indicators of financial stability include banks' non-performing loan reflecting on its asset quality, credit risk and also its efficiency in the allocation of resources to productive sectors. NPLs are the main contributor to liquidity risk, which exposes banks to insufficient funds for operations. Liquidity risk is the outcome of credit risk, which is the inability of borrowers to meet their repayment obligation. According to Dolan and Collender (2001), credit risk is measured by the percentage of non-performing loans to total loans.

On analysis, NPLs are found to affect liquidity. Firstly, Toby (2008), in his study quoted that the use of minimum liquidity ratio (MLR) as a monetary policy tool has an inverse association with industry asset quality measured with NPLs. As MLR rises further coupled with an outcome where bank liquidity ratio (BLR) rises, industry NPLs are expected to fall, and vice-versa. Hence, he concluded that the reason behind scheming excess liquidity may bring about adverse outcomes increasing NPLs.

Capital adequacy and bank liquidity: The primary reason why banks hold capital is to absorb risk – including the risk of liquidity crunches, protection against bank runs, and various other risks, most importantly credit risk. Although the reason why banks hold capital is motivated by their risk transformation role, recent theories suggest that bank capital may also affect banks' ability to create liquidity. These theories produce opposing predictions on the link between capital and liquidity creation.

The "financial fragility-crowding out" theories predicts that higher capital reduces liquidity creation. Diamond and Rajan (2000, 2001) focus on financial fragility. 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.

Moreover, the negative effect of capital on liquidity creation as suggested by Diamond and Rajan (2000, 2001) depends crucially on deposit insurance coverage being incomplete. If deposit insurance were complete, depositors have no incentive to run on the bank, and a deposit contract does not mitigate the bank's holdup problem.

Furthermore, Gorton and Winton (2000) show that a higher capital ratio may reduce liquidity creation through another effect: the crowding out of deposits. They consider that deposits are more effective liquidity hedges for agents than investments in bank equity. Indeed, deposits are totally or partially insured and withdraw able at par value. By contrast, bank capital is not eligible and with a stochastic value that depends on the state of bank fundamentals and on the liquidity of the stock exchange. Consequently, higher capital ratios shift investors' funds from relatively liquid deposits to relatively illiquid bank capital. Thus the higher is the bank's capital ratio; the lower is its liquidity creation.

Under the alternative "risk absorption" hypothesis, which is directly linked to the risk-transformation role of banks, higher capital enhances banks' ability to create liquidity. This insight is based on two strands of the literature. One strand consists of papers that argue that liquidity creation exposes banks to risk (e.g., Diamond and Dybvig 1983, Allen and Gale 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated

with having to dispose of illiquid assets to meet the liquidity demands of customers. The second strand consists of papers that posit that bank capital absorbs risk and expands banks' risk-bearing capacity (e.g., Repullo 2004 and Thadden 2004). Combining these two strands yields the prediction that higher capital ratios may allow banks to create more liquidity.

Bank size and bank liquidity: - According to the "too big to fail" argument, large banks would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannotta et al. 2007). Therefore, "too big to fail" status of large banks could lead to moral hazard behavior and excessive risk exposure. If big banks are seeing themselves as "too big to fail", their motivation to hold liquid assets is limited. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort. Thus, large banks are likely to perform higher levels of liquidity creation that exposes them to losses associated with having to sale illiquid assets to satisfy the liquidity demands of customers. Hence, there can be positive relationship between bank size and illiquidity. However, since small banks are likely to be focused on traditional intermediation activities and transformation activities (Rauch et al. 2008; Berger and Bouwman 2009a) they do have small amount of liquidity. Hence, there can be negative relationship between bank size and illiquidity.

Loan growth and bank liquidity: - Comptroller's Handbook (1998), states that lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. As such, it is one of the greatest sources of risk to a bank's safety and soundness. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. According to Pilbeam (2005, p.

42), in practice the amount of liquidity held by banks is heavily influenced by loan demand that is the base for loan growth. If demand for loans is weak, then the bank tends to hold more liquid assets (i.e. short term assets), whereas if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable. Therefore, a growth in loans and advances has negative impact on banks liquidity.

2.1.3.2. Macroeconomic factors

GDP growth and bank liquidity: - Macroeconomic context is likely to affect bank activities and investment decisions as the profile of bank liquidity (Pana et al. 2009 and Shen et al. 2010). For example, 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. Similarly, economic downturns are exacerbated by the reduction in bank credit supply. Based on these arguments, we can expect banks to increase their transformation activities and their illiquidity during economic booms.

According to 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, p. 74). In periods of economic expansion, which are characterized by high degree of confidence of the economic units about their profitability, there is a rise in the level of investment. During this expansion, economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates (Painceira 2010). As in Pilbeam (2005) 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.

Aspachs et al. (2005) indicated that banks hoard liquidity during periods of economic downturn, when lending opportunities may not be as good and they run down liquidity buffers during economic expansions when lending opportunities may have picked up. Thus, it can be expected that higher economic growth make banks run down their liquidity buffer and induce banks to lend more.

Bordo et al. (2001) suggest two explanations on the cause of liquidity runs on deposit money banks. They explained that runs on banks are a function of mass 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 repaying loans and depositors, anticipating an increase in defaults or non-performing 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."

Interest rate margin and bank liquidity: Liquidity premium is the amount of interest rate paid by borrowers that force liquidity holders to part it. Pilbeam (2005, p. 89) stated that according to the liquidity preference theory, lenders need high interest rate which includes the 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 a liquidity premium to lenders to induce them to lend long. The size of liquidity premium increases with the time to maturity. Therefore, as they got higher premium, lenders give up their liquid money. According to Keynes (1964, p. 167), 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).

Actually holding liquid assets reduces the risk that banks may not have sufficient cash to meet deposit withdrawals or new loan demand (i.e. liquidity risk), thereby forcing them to borrow at excessive costs. Thus, as the proportion of liquid assets increases, a bank's liquidity risks decreases, leading to a lower liquidity premium component of the net interest margin (Angbazo1997 and Drakos 2003). This indicates that liquidity and liquidity premium component of interest rate margin goes in opposite direction. On the other hand, the phenomena that banks are reluctant to take new risks and commit new loans are described as the "credit crunch" problem. In this case even if lending interest rate increase, banks do not raise their level of loan provision. According to Bernanke and Lown (1991), credit crunch is "a situation in which the supply of credit is restricted below the range usually identified with prevailing market interest rates and the profitability of investment projects". A "credit crunch" is a disequilibrium phenomenon. It is present when banks are unwilling to lend, especially when a firm with profitable projects cannot obtain credit in spite of low interest rates (lower than the expected

marginal products). Therefore, credit crunch reduce the capacity of banks in providing fresh fund for new projects with high interest rate and lead banks to hold more liquid assets.

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

2.2. Empirical literatures

The following section reviews the empirical evidence on factors affecting bank liquidity with a particular focus on those that have been conducted more recently, as far as they are the best indicators of the current situation. Determinants of bank liquidity studies conducted in single

country are reviewed in section 2.2.1.This is followed by a review of determinants of bank liquidity studies carried out on a panel of countries in section 2.2.2. Finally, related studies conducted in the Ethiopian context are reviewed in section 2.2.3.

2.2.1 Single country studies

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

Vodova (2011) aimed to identify important factors affecting commercial banks liquidity of Czech Republic. In order to meet its objective the researcher considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis by using EViews 7 software package. The study considered four firm specific and eight macroeconomic independent variables which affect banks liquidity. The expected impact of the independent variables on bank liquidity were: capital adequacy, inflation rate and

interest rate on interbank transaction/money market interest rate were positive and for the share of non-performing loans on total volume of loans, bank profitability, GDP growth, interest rate on loans, interest rate margin, monetary policy interest rate/repo rate, unemployment rate and dummy variable of financial crisis for the year 2009 were negative whereas, the expected sign for bank size was ambiguous (+/-). The dependent variable (i.e. liquidity of commercial banks) was measured by using four liquidity ratios such as liquid asset to total assets, liquid assets to total deposits and borrowings, loan to total assets and loan to deposits and short term financing. The study by Vodova (2011) revealed that bank liquidity was positively related to capital adequacy, interest rates on loans, share of non-performing loans and interest rate on interbank transaction. In contrast, financial crisis, higher inflation rate and growth rate of gross domestic product have negative impact on bank liquidity. The relation between the size of the bank and its liquidity was ambiguous as it was expected. The study also found that unemployment, interest margin, bank profitability and monetary policy interest rate/repo rate have no statistically significant effect on the liquidity of Czech commercial banks.

Agbada and Osuji (2013) studied the efficacy of liquidity management and banking performance in Nigeria using survey research methodology. Data obtained were first presented in tables of percentages and pie charts and were empirically analyzed by Pearson product-moment correlation coefficient (r). Findings from the empirical analysis were quite robust and clearly indicate that there is significant relationship between efficient liquidity management and banking performance and that efficient liquidity management enhances the soundness of bank.

Liquidity created by Germany's state-owned savings banks and its determinants has been analyzed by (Rauch et al. 2009). The study had twofold goals: first, it attempted to measure the liquidity creation of all 457 state owned savings banks in Germany over the period 1997 to 2006.

In a second step, it analyzed the influence of monetary policy on bank liquidity creation. The study measure the created liquidity using the calculation method set forth by (Berger and Bouwman 2007 and Deep and Schaefer 2004). To measure the monetary policy influence, the study developed a dynamic panel regression model. According to this study, following factors can determine bank liquidity: monetary policy interest rate, where tightening monetary policy expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, savings quota affect banks liquidity positively, level of liquidity in previous period has positive impact, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity. To perform the tests of measuring liquidity and analyzing influential factors on bank liquidity the researcher used bank balance sheet data and general macroeconomic data. The control variable for the general macroeconomic influence shows that there is a positive relationship between the general health of the economy and the bank liquidity creation. The healthier the economy is the more liquidity is created. It was also found that banks with a higher ratio of interest to provision income create more liquidity.

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

violent political incidents arising from conflict between radical Islamic groups and the Egyptian state.

Bank-specific and macroeconomic determinants of liquidity of English banks were studied by (Aspachs et al, 2005). The researchers used unconsolidated balance sheet and profit and loss data, for a panel of 57 UK-resident banks, on a quarterly basis, over the period 1985Q1 to 2003Q4. They assumed that the liquidity ratio as a measure of the liquidity should be dependent on following factors: Probability of obtaining the support from LOLR, which should lower the incentive for holding liquid assets, interest margin as a measure of opportunity costs of holding liquid assets expected to have negative impact, bank profitability, which is according to finance theory negatively correlated with liquidity, loan growth, where higher loan growth signals increase in illiquid assets, size of the bank expected to have positive or negative impact, gross domestic product growth as an indicator of business cycle negatively correlated with bank liquidity, and short term interest rate, which should capture the monetary policy effect with expected negative impact on liquidity. The output of the regression analysis showed that probability of getting support from LOLR, interest margin, and loan growth have negative and significant effect on banks liquidity whereas, profitability and bank size had statistically insignificant impact on liquidity. Using a measure of support expectations based on the Fitch support rating, the researchers also found strong evidence of the existence of such an effect, which may point to a rationale for regulatory liquidity requirements as a quid pro quo for LOLR support.

2.2.2 Panel country Studies

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

Determinants of liquidity risk of banks from emerging economies for a sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis were analyzed by (Bunda and Desquilbet 2008). The study was aimed to explore how the liquidity of commercial bank assets is affected by the exchange rate regime of the country in which they operate. The liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behavior of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors: total assets as a measure of the size of the bank, the lending interest rate as a measure of lending profitability, and the realization of a financial crisis, which could be caused by poor bank liquidity expected to have negative impact on banks liquidity

whereas, the ratio of equity to assets as a measure of capital adequacy, the presence of prudential regulation, which means the obligation for banks to be liquid enough, the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers, and the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes are expected to have positive impact on banks liquidity.

Shen et al. (2009) empirically investigate the causes of liquidity risk and the relationship between bank liquidity risk and performance. The study aimed to employ alternative liquidity risk measures besides liquidity ratios (i.e. financial gap measures provided by (Saunders and Cornett 2006)). The study further aimed to investigate the determinants of bank performance in terms of the perspective of the bank liquidity risk (bank liquidity risk and performance model). The study used an unbalanced panel dataset of 12 advanced economies commercial banks over the period 1994-2006. The panel data applied to instrumental variables regression, using two-stage least squares (2SLS) estimators to estimate bank liquidity risk and performance model. The researchers classified countries as bank-based or market-based system, and investigate the difference of causes of liquidity risk in different financial systems. The empirical results indicated that the bank-specific variable had the same effect on bank liquidity risk in two financial systems and liquidity risk was the endogenous determinant of bank performance. There are also other researchers investigated the relationship between bank liquidity risk and financial performance by taking liquidity as an endogenous variable.

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.

Lucchetta (2007) made empirical analysis of the hypothesis that interest rates affect banks' risk taking and the decision to hold liquidity across European countries. The liquidity measured by different liquidity ratios should be influenced by: behavior of the bank on the interbank market – the more liquid the bank is the more it lends in the interbank market, interbank rate as a measure of incentives of banks to hold liquidity, monetary policy interest rate as a measure of banks' ability to provide loans to customers, share of loans on total assets and share of loan loss provisions on net interest revenues, both as a measure of risk-taking behavior of the bank, where

liquid banks should reduce the risk-taking behavior, and bank size measured by logarithm of total bank assets. The results of the study revealed that the risk-free interest rate negatively affects the liquidity retained by banks and the decision of a bank to be a lender in the inter-bank market. Conversely, the inter-bank interest rate has a positive effect on such decisions. Typically, it is the smaller, risk-averse banks that lend in the inter-bank markets. Meanwhile, the risk-free interest rate is positively correlated with loans investment and bank risk-taking behavior.

2.2.3. Review of previous studies on Ethiopian banks

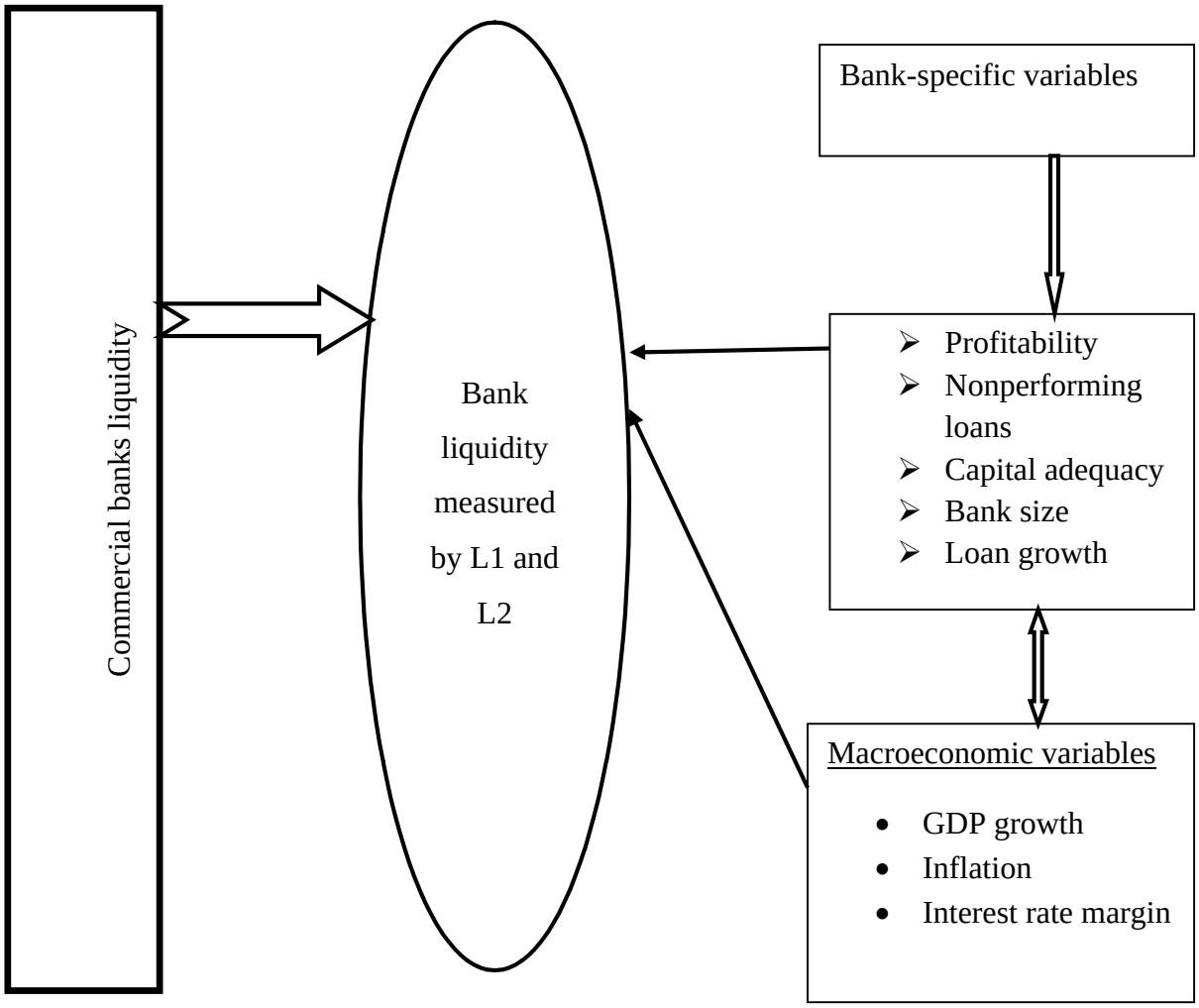
In the context of Ethiopia, to the knowledge of the researcher, there appears to be only one work on the assessment of determinants of the banks' liquidity which was conducted by the Tseganesh (2012). The study conducted by Tseganesh (2012) aim to identify determinants of commercial banks liquidity in Ethiopia and then to see the impact of banks liquidity up on financial performance through the significant variables explaining liquidity. Quantitative method particularly document survey approach was adopted for the study. She has used balanced fixed effect panel regression for the data of eight commercial banks in the sample covered the period from 2000 to 2011. Her study employed and analyzed eight factors affecting Ethiopian banks liquidity. The findings of the study showed that capital adequacy, bank size, share of non-performing loans in the total volume of loans, interest rate margin, inflation rate and short term interest rate had positive and statistically significant impact on banks liquidity. Real GDP growth rate and loan growth had statistically insignificant impact on banks liquidity. 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. Interest rate margin and inflation had

negative but statistically insignificant impact on financial performance. Her also study suggested that since the commercial banks adjusting their liquidity position for managing credit risk has negative impact on financial performance, it have to adopt other ways of managing credit risk, for instance; minimizing adverse selection during the time of credit approval and strict follow up of borrowers to minimize the problem of moral hazards after the provision of credit.

2.3. Conceptual Framework

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

Fig. 2.1 Relation between liquidity and its determinants



Source: Self developed

2.4. Conclusions and knowledge gap

According to above theoretical as well as empirical review, liquidity is important to all business specially for banking industry since it plays vital role of liquidity creation. “Liquidity creation” refers to the fact that banks provide illiquid loans to borrowers while giving depositors the ability to withdraw funds at par value at a moment’s notice (Diamond and Dybvig, 1983). Banks also provide borrowers liquidity off the balance sheet through loan commitments and similar claims to liquid funds (Holmstrom and Tirole, 1998). This chapter also revealed that banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors. Accordingly, this study focused on some of the bank specific and macroeconomic factors affecting Ethiopian commercial banks liquidity.

The review of the literature reveals that the existence of many gaps of knowledge in respect of the factors affecting bank liquidity, particularly in the context of Ethiopia. So far as the review of the literature discloses, very scanty work has been done with the objective of identifying the determinants of liquidity of banks in Africa in general and Ethiopia in particular.

In the context of Ethiopia, to the knowledge of the researcher only one related study was conducted by Tseganesh (2012) assesses the determinants of banks liquidity and their impact on financial performance in case of commercial banks in Ethiopia, which tries to identify the impact of some bank-specific and macroeconomic variables. The study overlooked some important variables that can significantly affect liquidity of the Ethiopian banking industry from the point of view of the theories and previous empirical studies reviewed above like profitability and also disregarded liquid assets to total deposit ratio from considering as measurement of liquidity which is a current practice of the Ethiopian commercial banks to measure liquidity ratio as per regulatory body’s requirement among others.

Besides, the study adopts a quantitative approach only without considering a lot of limitations of it. Furthermore, her conclusions depended on secondary data solely (used documentary survey only as data collection methods). Therefore, the objective of this study is to assess the factors that affect bank liquidity in Ethiopia and fill the knowledge gap by adopting a mixed method using both primary (in-depth interview) and secondary data (survey of document).

Chapter 3 Research design and methods

The earlier chapter presented the review of the existing evidence on factors affecting the liquidity of Ethiopian commercial banks and the identified knowledge gap. The results from a review of the literature are used to establish expectations for the relationship of the different determinants. Therefore, the purpose of this chapter is to present the research question and hypotheses, the underlying principles of research methodology and the choice of the appropriate research method for the thesis. The chapter is organized as follows. The first section 3.1 presents the research hypotheses and question along with the broad research objective. Section 3.2 discusses the research approaches while section 3.3 finally presents the method adopted in the study.

3.1. Hypotheses, determinants selection and research question

As shown in the first chapter, in the context of the problems highlighted the broad objective of this research is to identify factors that affect bank liquidity in Ethiopia. In line with the broad purpose statement eight hypotheses and one specific research question were formulated for investigation purpose. Thus, subsection 3.1.1 presents the dependent variable as proxy for banks' liquidity. Then the independent variables that are selected and categorized into bank-specific and macroeconomic determinants of banks' liquidity are presented in subsection 3.1.2.

3.1.1. Dependent variables

Bank Liquidity: Liquidity is defined as ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Generally, there are two methods of measuring liquidity of banks which are stock/ratio approach and the flow/gap approach. The first approach employs various balance sheet ratios to identify liquidity trends and it is easy to compute. Whereas, the second flow approach is more data intensive and there is no

standard technique to forecast inflows and outflows. As a result, the stock approaches are more popular in practice and in the academic literature (Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2013). Therefore, this study attempts to measure liquidity by using two different liquidity measures similar to most of the aforementioned researchers by using stock approach due to its easiness and availability of data to measure banks liquidity. Accordingly, the following liquidity ratios were used.

Liquid assets to total deposits (L1)

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

As per NBE's lastly replacement liquidity requirement directives No. SBB/57/2014, "liquid assets" includes cash, deposits with the National Bank and other local and foreign banks having acceptance by the National Bank, other assets readily convertible into cash expressed and payable in Birr or foreign currency having acceptance by the National Bank, deposits held in Organization for Economic Cooperation and Development (OECD) member countries'

currencies and payable by banks of OECD member countries and in such other currencies as may be approved by the National Bank as well as securities issued by OECD member countries denominated in currencies of such countries and such other assets as the National Bank may from time to time declare to be liquid assets. For the purpose of this research, the liquid assets include cash on hand (local and foreign), deposits with the National Bank Ethiopia and other local and foreign banks having acceptance by the National Bank and treasury bills.

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

Total Loans to total deposits (L2)

The liquidity ratio L2 relates illiquid assets with liquid liabilities. It indicates what percentage of the volatile funding of the bank is tied up in illiquid loans. The total deposits used in this study includes saving deposits, time/fixed deposits and demand deposits. Therefore, the higher this ratio the less liquid the bank is. This ratio was used in order to check the robustness of the results in L1.

$$L2 = \frac{\text{Total loans}}{\text{Total deposits}}$$

3.1.2. Independent variables

This subsection describes the independent variables that are used in the econometric model to estimate the dependent variable. According to prior researches towards the determinants of

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

Bank specific variables:

Profitability: Profitability accounts for the impact of better financial soundness on bank risk bearing capacity and on their ability to perform liquidity transformation (Rauch et al. 2008 and Shen et al. 2010). The trade-offs that generally exist between return and liquidity risk are demonstrated by observing that a shift from short term securities to long term securities or loans raises a banks' profitability but also increases its liquidity risks and the inverse is true. Therefore, the hypothesis is stated as:

H1. There is a significant negative relationship between the profitability and bank's liquidity

Non-performing loans: non-performing loans are loans that a bank customer fails to meet his contractual obligations on either principal or interest payments exceeding 90 days. This measures the quality of banks asset. Unlike other firms, banks' assets are composed of large amount of loans. If this loan is considered to be uncollectable that leads to reduction in banks profitability and make large number of depositors to fear and run against the bank. NPLs are the main contributor to liquidity risk, which exposes banks to insufficient funds for operations. Liquidity

risk is the outcome of credit risk, which is the inability of borrowers to meet their repayment obligation. According to Dolan and Collender (2001), credit risk is measured by the percentage of non-performing loans to total loans. Therefore, it is expected that there is negative relationship between bank liquidity and the amount of non-performing loans, the hypothesis is stated as follows.

H2.There is a significant negative relationship between the non-performing loans of a bank and the bank's liquidity

Capital adequacy: Although the reason why banks hold capital is motivated by their risk transformation role, recent theories suggest that bank capital may also affect banks' ability to create liquidity. These theories produce opposing predictions on the link between capital and liquidity creation. The "financial fragility-crowding out" theories predicts that higher capital reduces liquidity creation. Diamond and Rajan (2000, 2001) focus on financial fragility. On the other hand, "risk absorption" hypothesis, which is directly linked to the risk-transformation role of banks, higher capital enhances banks' ability to create liquidity. This insight is based on two strands of the literature. One strand consists of papers that argue that liquidity creation exposes banks to risk (e.g., Diamond and Dybvig 1983, Allen and Gale 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet the liquidity demands of customers. The second strand consists of papers that posit that bank capital absorbs risk and expands banks' risk-bearing capacity (e.g., Repullo2004 and Thadden 2004). Combining these two strands yields the prediction that higher

capital ratios may allow banks to create more liquidity. Since the expected sign of the effect of capital adequacy on liquidity is unpredictable, the hypothesis is stated as follows:

H3. There is significant positive/negative relationship between the capital adequacy and bank's liquidity.

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

H4. There is significant positive/negative relationship between the bank size and bank's liquidity.

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

H5. There is significant negative relationship between the loan growth and bank's liquidity

Macroeconomic variables:

Real GDP growth: GDP is a countries financial health indicator. In reference to Painceira (2010), research on liquidity preference during different business cycle states that banks liquidity fondness is low in the course of economic boom. Where, banks confidently expect to profit by expanding loan able funds to sustain economic boom, while restrict loan able funds during economic downturn to prioritize liquidity. To sum up, banks prefer high liquidity due to lower confidence in reaping profits during economic downturn. Aspachset al (2005) has also inferred that banks prioritize liquidity when the economy falls, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favorable. Thus, to best knowledge, banks forgo liquidity inducing lending during economic growth. Even Valla et al (2006) reported a negative relationship between liquidity and GDP real growth. Therefore, the study expected negative relationship between banks liquidity and economic cycle.

H6.There is a significant negative relationship between real gross domestic product growth and bank liquidity

Interest rate margin: According to Keynes (1964, p. 167), 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. 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). As the proportion of liquid assets increases, a bank's liquidity risks decreases, leading to a lower liquidity premium component of the net interest margin (Angbazo 1997 and Drakos 2003). This indicates that liquidity and liquidity premium component of interest rate margin goes in opposite direction. Thus, the variable is expected to exhibit negative relationship with bank liquidity.

HP7. There is significant negative relationship between the interest rate margin and bank's liquidity

Inflation rate: An increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including banks will rise with the rise in inflation. Hence, the variable is expected to exhibit positive relationship with bank liquidity.

H8.There is a significant positive relationship between inflation and bank liquidity

Moreover, the subsequent research question was developed by the researcher with the intent of achieving the research objective qualitatively as far as mixed method approach is used in this particular study:

RQ1- What are the determinants of banks' liquidity in Ethiopia and how do those factors influence the liquidity of Ethiopian banks'?

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

Table 3.1 Description of the variables and their expected relationship

Variable	Measure	Notation	Expected sign
Dependent variables			
Liquidity ratio 1	Total liquid assets to total deposits	L1	NA
Liquidity ratio 2	Total loans & advances to total deposits	L2	NA
Independent variables			
Bank-specific variables			
Profitability	Net income after tax/total assets	PR	-
Non-performing loans	Non-performing loans/gross loans ratio	NPLs	-
Capital adequacy	Equity/ total assets ratio	CAP	+/-
Size	Natural logarithm of bank's total	BSIZE	+/-

	assets		
Loan growth	Annual change in total loans	LG	-
Macroeconomic variables			
Economic growth	Growth rate of real GDP	GDP	-
Interest rate margin	Interest rate on loans minus interest rate on deposits	IRM	-
Inflation	Annual inflation rate of Ethiopia	INFL	+

3.2. Research approaches

In the investigative study there are three common approaches to business and social research namely, quantitative, qualitative and mixed methods approach (Creswell, 2003, p.13). Quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell 2009). On the other hand, qualitative research approach is a means for exploring and understanding the meaning of individuals or groups ascribe to a social or human problem with intent of developing a theory or pattern inductively (Creswell 2009). Finally, mixed methods approach is an approach in which the researchers emphasize the research problem and use all approaches available to understand the problem (Creswell, 2003).

Therefore, based on the above discussions of the three research approaches and by considering the research problem and objective, in this study, the quantitative method is primarily used. However, to have a better insight and gain a richer understanding about the research problem, the quantitative method is supplemented by the qualitative method of inquiry. That is, to get the benefits of a mixed methods approach, as presented below, and to mitigate the bias in adopting

only either quantitative or qualitative approach, the current research combines both quantitative and qualitative research approaches.

As noted in Greene et al. (1989, p. 259 cited in Yesegat 2009, pp.75-76) adopting a mixed methods approach has a number of benefits. The first benefit is triangulation pertaining to a situation where researchers seek convergence, corroboration, correspondence of results from quantitative and qualitative methods to increase validity of constructs and inquiry results. Secondly, by mixing methods complementarily, researchers seek elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method. Thirdly, by mixing methods with developmental intent, researchers seek to use the results from one method to help develop or inform the other method. Fourthly, mixing methods with initiation intent seeks the discovery of paradox and contradiction, new interpretations, the recasting of questions or results from one method with questions or results from the other method. Finally, to increase the scope of inquiry mixed method with expansion intent seeks to extend the breadth and range of inquiry by using different methods for different inquiry components. Hence, the succeeding section presents the methods adopted in the study.

3.3. Methods adopted

Research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell 2009, p. 3). Therefore, in order to achieve the objective stated in the preceding section, considering the nature of the problem and the research perspective this study used mixed research approach. Accordingly, the quantitative method was mainly used to investigate determinants of liquidity of banks in Ethiopia, and the financial data were collected through structured survey of documents.

Following this, the qualitative method was used to support the quantitative findings and to gain additional insight into the factors that may affect the liquidity of banks in Ethiopia. The qualitative data were collected through in-depth interviews with the finance managers of Ethiopian commercial banks.

A mixed methods approach was chosen as it increases the likelihood that the research generates more accurate results than is the case if a single method had been adopted. As noted in Creswell (2009) mixed research is an approach that combines or associates both qualitative and quantitative research methods. It is also more than simply collecting and analyzing both kinds of data, it involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research. As a result, mixed methods provide a more accurate picture of the phenomena being investigated. Hence, the following sections present consecutively the quantitative and qualitative aspects of the research method.

3.3.1. Research method: quantitative aspect

According to Leedy & Ormord (2005 cited in Zewdu 2010, p.45) survey research is a common method used in business among quantitative strategies of inquiry that includes experimental design on it. As a result, in order to generalize the findings to the whole banks operated in the country, in the current study the researcher adopts survey research method.

3.3.1.1. Survey design: documentary Analysis

According to Creswell (2003, p. 153) the purpose of survey is to generalize description of trends, attitudes, or opinions from a sample to a population so that inferences can be made about some characteristic, attitude, or behavior of this population. Moreover, as noted in Fowler (1986) it is

also reasonable to use survey designs because of its benefits such as the economy of the design and the rapid turnaround in data collection and identifying attributes of a large population from a small group of individuals. Therefore, it is logical to apply survey method for this study. The survey was carried out by means of structured document review.

Sampling design

For the study the target population would be all commercial banks registered by NBE and under operation in the country currently. Currently, in Ethiopia, there are two public-owned and sixteen private commercial banks which are operating throughout the country (NBE, 2013/2014) such as CBE, CBB, DB, AIB, WB, UB, NIB, BOA, LIB, CBO, BBI, BIB, OIB, ZB, AB, AdIB, DGB and EB. The first two are publicly owned and the remaining sixteen are privately owned commercial banks. But, because of lack of 12 years data that is required for the analysis purpose in most of the newly established private banks, the number of sample banks were reduced to eight namely, (CBE), (CBB), (DB), (AIB), (WB), (UB), (NIB) and (BoA). The researcher believes that the sample size is sufficient to make sound conclusion about the population as far as it covers above 44% of the total population. The purposive sampling technique was employed. Purposive sampling targets a particular group of people. When the desired population for the study is rare or very difficult to locate and recruit for a study, purposive sampling may be the only option.

Data collection

To analyze the effect of bank specific factors on liquidity of Ethiopian banks, audited financial statements of eight banks (CBE, CBB, AIB, DB, WB, BoA, UB and NIB) for 12 consecutive

years .i.e., from 2002-2013 were collected. The secondary data that were collected through structured document reviews are mainly from the records held by NBE and the banks themselves. Moreover, in order to analyze the relationship that exists between liquidity and macro-economic variables, macroeconomic data were also collected for the same years. Those macroeconomic data were mainly gathered from the records held by NBE and MoFED through structured document review.

Data analysis techniques

To meet the objective of the study, the paper was primarily based on panel data, which was collected through structured document review. As noted in Baltagi (2005) the advantage of using panel data is that it controls for individual heterogeneity, less collinearity among variables and tracks trends in the data something which simple time-series and cross-sectional data cannot provide. Thus, the collected panel data was analyzed using descriptive statistics, correlations, multiple linear regression analysis and inferential statistics. Mean values and standard deviations were used to analyze the general trends of the data from 2002 to 2013 based on the sector sample of eight commercial banks and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables. A multiple linear regression model and t-static was used to determine the relative importance of each independent variable in influencing liquidity. The multiple linear regressions model was run, and thus OLS was conducted using EVIEWS 7 econometric software package, to test the casual relationship between the firms' liquidity and their potential determinants and to determine the most significant and influential explanatory variables affecting the liquidity of Ethiopian banks. The rational for choosing OLS is as noted in Petra (2007) that OLS outperforms the other estimators

when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS.

In light of the above, to investigate the effect of bank-specific and macroeconomic determinants of bank liquidity, the following general multivariate regression equation similar to Vodova (2011, 2013) and Munteanu (2012) was adopted:

$$Y_{it} = \alpha + \beta_{.} x_{it} + u_{it}$$

Where:

$\mathbf{Y_{it}}$ represents dependent variables; subscript ***i*** denote the cross-section and ***t*** representing the time-series dimension; $\mathbf{x_{it}}$ is a vector of explanatory variables for bank *i* in time *t*; **α** is constant; **β** are coefficient which represents the slope of the explanatory variables and $\mathbf{u_{it}}$ is the error term.

A fixed cross-sectional effect is specified in the estimation so as to capture unobserved idiosyncratic effects of different banks. In addition, as noted in Gujarati (2004) if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model and random effect model. Hence, the choice here is based on computational convenience. On this score, fixed effect model is preferable than random effect model (Gujarati 2004). Since the number of time series (i.e. 12 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks) and adjusted R^2 value and Durbin-Watson stat value increases with the use of cross-sectional fixed effect model, fixed effect model is preferable than random effect model in this case.

As noted in Brooks (2008) there are basic assumptions required to show that the estimation technique, OLS, had a number of desirable properties, and also so that hypothesis tests regarding the coefficient estimates could validly be conducted. If these Classical Linear Regression Model (CLRM) assumptions hold, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators. Therefore, for the purpose of this study, diagnostic tests are performed to ensure whether the assumptions of the CLRM are violated or not in the model. Thus, the following section discusses about the nature and significance of the model misspecification tests.

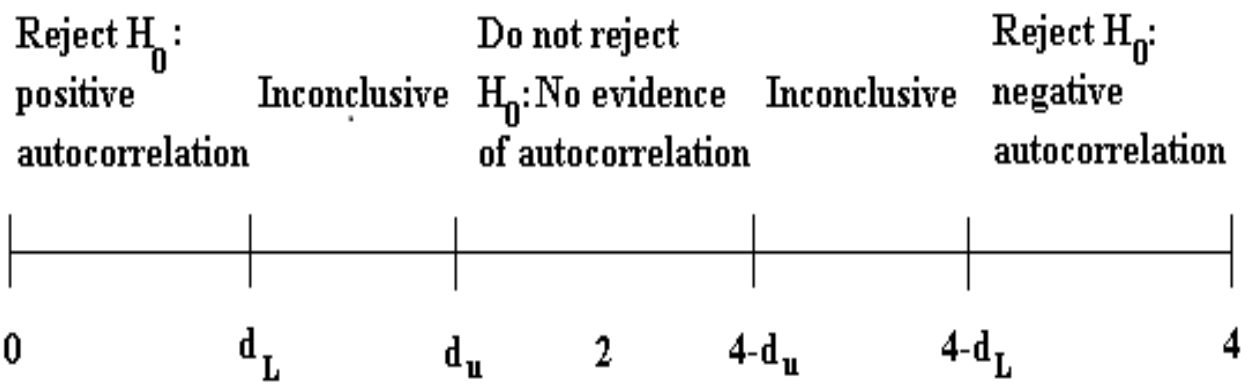
Test for heteroscedasticity

To test for the presence of heteroscedasticity, the popular white test was employed. This test involves testing the null hypothesis that the variance of the errors is constant (homoscedacticity) or no heteroscedasticity versus the alternative that the errors do not have a constant variance.

Test for Autocorrelation

This is an assumption that the errors are linearly independent of one another (uncorrelated with one another). If the errors are correlated with one another, it would be stated that they are auto correlated. To test for the existence of autocorrelation or not, the popular Durbin-Watson test was employed. As noted in Brooks (2008) the rejection / non-rejection rule would be given by selecting the appropriate region from the following figure:

Figure 3.1: Rejection and non-rejection regions for Durbin-Watson Test



Where, $\mathbf{d_U}$ is an upper critical value and $\mathbf{d_L}$ is a lower critical value.

Test for Normality

As noted in Brooks (2008) a normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. One of the most commonly applied tests for normality; the Bera-Jarque formalizes these ideas by testing whether the coefficient of skewness and the coefficient of excess kurtosis are zero and three, respectively. Brooks (2008) also states that, if the residuals are normally distributed, the histogram should be bell shaped and the Bera-Jarque statistic would not be significant at 5% significant level.

Test for Multicollinearity

To test the independence of the explanatory variables or to detect any multicollinearity problem in regression model the study used a correlation matrix of independent variables. The problem of multicollinearity usually arises when certain explanatory variables are highly correlated. Usually, as noted by Hair et al. (2006) correlation coefficient below 0.9 may not cause serious multicollinearity problem. In contrary to this, Kennedy (2008) argued that as any correlation

coefficient above 0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results.

Coming back to the model, based on the general model provided earlier and on the base of selected variables the empirical model used in the study was as follows:

$$LIQ_{i,t} = \alpha + \beta 1(PR_{it}) + \beta 2(NPL_{it}) + \beta 3(CAP_{it}) + \beta 4(BSIZE_{it}) + \beta 5(LG_{it}) + \beta 6(GDP_t) + \beta 7(IRM_t) + \beta 8(INFL_t) + U_{i,t}$$

Where,

LIQ_{it} = is liquidity ratio measured by L1 & L2 for i^{th} bank on year t.

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

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

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

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

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

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

IRM_t = is interest rate margin on the year t.

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

U_{it} = is a random error term

In general, the discussion so far has shown the quantitative component of the research design; the following section presents the qualitative part.

3.3.2 Research Method: Qualitative aspect

In the current study qualitative data was gathered as a supplementary of the quantitative one. In-depth interviews were the primary data collection technique in this study for gathering data in qualitative methodologies. The interviews were conducted with the finance managers of the selected four banks namely CBB, AIB, BoA and NIB. A total of four finance managers were interviewed from the aforementioned banks. In this study, the interview was totally unstructured. The respondents were contacted once and each respondent were contacted at different times. The interviews were conducted to know about both the internal and external factors affecting the liquidity of banks in Ethiopia and to what extent these determinants exert impact on Ethiopian banks liquidity. Furthermore, the interviewees' were asked about the major determinant factors among the identified and the measures taken to reduce the effect of factors that affects bank liquidity negatively.

In respect of the method of analyzing the data collected from in-depth interviews, the results of the interview are analyzed using triangulation with the findings of the structured record reviews. As a result, the response of the interviewees' for the interview questions were used for supporting the result obtained from analysis of structured record reviews or as arguments.

Conclusion and relation between research questions/ hypotheses and data sources

This chapter presented the hypothesis and research questions, and the method adopted to address them. It also explains the quantitative, qualitative and mixed research approach with the method adopted for this study. In connection to this, based on the underlying principles of research methods and the research problem mixed methods approach has been chosen as appropriate to this research. Beside, this chapter puts forward the necessary information about the sampling

design and the data collection instrument. Finally, the analysis techniques used in this study were presented.

The relationship between research questions and hypotheses on the one hand and different data sources on the other hand are summarized in table 3.2.

Table: 3.2 Relationships between research question, hypotheses and different data source

Research questions and hypotheses	**Data sources**
RQ1- What are the determinants of banks' liquidity in Ethiopia and how do those factors influence the liquidity of Ethiopian banks'?	In-depth unstructured interview
HP1: There is a significant negative relationship between the profitability and bank's liquidity.	Bank-specific data from income statement and balance sheet held by banks themselves and NBE and macroeconomic data from the records held by NBE and MOFED
HP2: There is a significant negative relationship between the non-performing loans of a bank and the bank's liquidity.	
HP3: There is significant positive/negative relationship between the capital adequacy and bank's liquidity.	
HP4: There is significant positive/negative relationship between the bank size and bank's liquidity.	
HP5: There is significant negative relationship between the loan growth and bank's liquidity.	
HP6: There is a significant negative relationship between	

real gross domestic product growth and bank liquidity.	
HP7: There is significant negative relationship between the interest rate margin and bank's liquidity.	
HP8: There is a significant positive relationship between inflation and bank liquidity.	

Chapter 4 Results

The earlier chapter presented the research methods adopted in the study. Whereas this chapter presents the results of the different methods used. The remaining part of the chapter is organized into two sections. The first section 4.1 discusses the results of the documentary study. Then, the results of in-depth interviews with finance managers of the selected banks are presented in the second section 4.2.

4.1. Documentary analysis

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

4.1.1 Descriptive statistics

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

Table 4.1 Descriptive Statistics

	L1	L2	PR	NPLS	CAP	BSIZE	LG	GDP	IRM	INFL
Mean	0.465	0.689	0.025	0.109	0.095	22.269	0.236	0.091	0.072	0.142
Median	0.467	0.686	0.027	0.074	0.092	22.206	0.208	0.109	0.074	0.122
Maximum	0.782	0.998	0.040	0.535	0.271	26.007	0.779	0.126	0.078	0.364
Minimum	0.215	0.297	0.003	0.007	0.025	19.565	(0.123)	(0.021)	0.065	(0.106)
Std. Dev.	0.110	0.170	0.009	0.110	0.038	1.297	0.196	0.044	0.004	0.127
Observations	96	96	96	96	96	96	96	96	96	96

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

Table 4.1 describes the descriptive statistics for the dependent and independent variables, which also reveals all variables comprised 96 observations. The dependent variables are liquidity measured by liquid assets to total deposits ratio/L1 and total loans to total deposits ratio/L2. The remaining variables are the independent variables such as: profitability, non-performing loans, capital adequacy, bank size, loan growth, real GDP growth, interest rate margin, and general inflation rate.

The mean value of L1 was 46.46% which was by far above the statutory requirement of 15% set by NBE under NBE Directives No. SBB/57/2014. The standard deviations of 10.96% showed moderate dispersion of liquid assets to total deposits ratio from its mean for the banks in Ethiopia. The minimum and maximum values of L1 were 21.53% and 78.20%, respectively. The mean value of L2 was 68.91% which is considerably lower than the international standard for loans to deposit ratio (i.e. 75% (CBRC 2012)). This indicates on average for the commercial

banks in Ethiopia had rational amount of volatile liabilities/deposits were tied up with illiquid loans. There was high dispersion of L2 towards its mean value among banks that is shown by the standard deviation of 17.01%. The maximum value of L2 was 99.75% which is far above the standard whereas the minimum value was 29.69% which is far below the standard. This indicates that there were some commercial banks in Ethiopia having extra liquidity (banks around 30% L2) and others were going to face liquidity shortages/risk (banks around 100% L2). Therefore, it can be concluded that loans to deposit ratio was highly dispersed among commercial banks in Ethiopia.

Among the bank specific independent variables, bank size which is measured by natural log of total asset had the highest standard deviation (1.297), which means it is the most deviated variable from its mean compared to other variables. The maximum and minimum values were 26.007 and 19.565, respectively. The maximum and minimum values were indicating CBE and UB, respectively. Profitable firms are stronger to face financial distress and stronger to continue more than unprofitable firms in the future. Profitability, given as the ratio of profits after tax to total assets registered a mean value of 2.47% with a standard deviation of 0.9% which indicates that the variation of the profitability between the selected banks was very small. Profitability for the sample was ranged from 0.3% to 4%. That means, the most profitable bank among the sampled banks earned 4 cents of profit after tax for a single birr invested in the assets of the firm. On the other hand, the least profitable bank of the sampled banks earned 0.3 cents of profit after tax for each birr invested in the assets of the firm. The other bank specific factor affecting liquidity of Ethiopian commercial banks was NPLs that measures the asset quality of banks. The mean value of the percentage of non-performing loans in the total amount of loans and advances was 10.95% with the maximum and minimum of 53.5% and 0.7%, respectively. The mean value

of 10.95% is much above 5% maximum limit of regulatory body. The maximum value of 53.5% indicates the presence of high credit risk in some of the banks. There was moderate dispersion of NPL among banks in Ethiopia that is shown by the standard deviation of 11.02%. The mean value of capital adequacy was 9.52% which was above the minimum statutory requirement of 8% set by NBE under NBE Directives No. SBB/50/2011. The maximum and minimum values were 27.07% and 2.52%, respectively. The standard deviation for CAP was 3.76% revealing little dispersion towards the mean among banks in Ethiopia. Loan growth was measured as the annual percentage change in total loans & advances and this showed a mean of 23.60%. This indicates that, on average, growth rate was 23.60% during the twelve - year period and growth in total asset for the sample period were ranged from -12.29% to 77.91% with standard deviation of 19.56%. The 19.56% of standard deviation indicates the existence of high variation in growth rate among commercial banks in Ethiopia.

Table 4.1 also shows that the mean value of real GDP growth in Ethiopia for the last twelve years was 9.07%, with a maximum of 12.64% and a minimum of -2.1 %. As per the result GDP had a small standard deviation of 4.37% from its mean. The other macro-economic variable, general inflation rate, had a high standard deviation of 12.69% compared to GDP; this implies that inflation rate in Ethiopia during the study period remains somewhat unstable. The mean value of the general inflation rate of the country over the past twelve years was 14.19%, which was more than that of the average real GDP growth. The maximum inflation was recorded in the year 2009 (i.e. 36.40%) and the minimum was in the year 2002 (i.e. -10.60%). Finally, the other macroeconomic factor was related to interest rate margin measured by the difference between annual average lending and deposit rate. The mean value of the interest rate margin over the period under study was 7.24% with the maximum and minimum values of 7.75% and 6.50%,

respectively. There was smallest variation of interest rate margin towards its mean value over the periods under study with the value of standard deviation of 0.4%.

4.1.2. Correlation analysis among variables

According to Brooks (2008), correlation between two variables measures the degree of linear association between them. To find the association of the independent variables with the liquidity measured by both L1 and L2, Pearson product moment of correlation coefficient was used. Values of the correlation coefficient are always ranged between positive one and negative one. A correlation coefficient of positive one indicates that a perfect positive association between the two variables; while a correlation coefficient of negative one indicates that a perfect negative association between the two variables. A correlation coefficient of zero, on the other hand, indicates that there is no linear relationship between the two variables.

Table 4.2 Correlation matrix of dependent and independent variables

	L1	L2	PR	NPLS	CAP	BSIZE	LG	GDP	IRM	INFL
L1	1									
L2		1								
PR	0.098	(0.170)	1							
NPLS	0.031	0.114	(0.592)	1						
CAP	0.352	0.292	0.096	(0.183)	1					
BSIZE	(0.225)	(0.796)	0.408	(0.220)	(0.387)	1				

LG	(0.233)	0.318	0.133	(0.408)	0.228	(0.156)	1			
GDP	0.049	(0.159)	0.517	(0.465)	(0.169)	0.318	(0.010)	1		
IRM	0.394	0.378	(0.339)	0.414	0.060	(0.443)	(0.044)	(0.164)	1	
INFL	0.045	(0.232)	0.425	(0.422)	(0.058)	0.390	(0.049)	0.301	(0.469)	1

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

As table 4.2 clearly reveals, a liquid asset to total deposits ratio/L1 was positively correlated with profitability with a correlation of 0.098. L2 results have to be interpreted in reverse: positive sign of the coefficient means negative linear relationship with liquidity and conversely. With regard to L2, banks liquidity and profitability also had positive relationship with a correlation of -0.170. On the other hand, among bank specific factors NPLs and CAP had positive relationship with L1 and negative relationship with L2. Bank size had negative relationship with banks liquidity measured by L1 with a correlation of -0.225, but it has positive relationship with banks liquidity measured by L2 with a correlation of -0.796. Loan growth had negative relationship with banks liquidity measured by both L1 and L2 with a correlation of -0.233 and 0.318, respectively; which indicates that firm with higher loan growth have less bank liquidity.

Among the macroeconomic factors affecting liquidity, real GDP growth rate and general inflation rate had positive correlation with liquidity of commercial banks in Ethiopia in case of both L1 and L2. Finally, interest rate margin had positive relationship with L1 and negative relationship with L2.

4.1.3 Test results for the classical linear regression model assumptions

As it is mentioned in methodology part, diagnostic tests were carried out to ensure that whether the data fits the basic assumptions of classical linear regression model or not. Therefore, the results for model misspecification tests are presented as follows:

Test for Hetroscedasticity

Among the OLS assumptions, the first diagnostic test which is conducted in this study is heteroscedastic test. This theoretically expressed as by Brooks (2008, p.133) "Var (Ut) = $\sigma^2 < \infty$; it has been assumed that the variance of the errors is constant, σ^2 - this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic." White (1980) as cited by (Brooks, 2008 p. 134) is the most popular test of homoscedasticity. In this study as shown in table 4.3, both the F-statistic and Chi-Square versions of the test statistic gave the same conclusion that there is no evidence for the presence of heteroscedasticity, since the p-values were in excess of 0.05 to both L1 and L2 models.

Table 4.3 Heteroskedasticity Test: White

	L1 Model			**L2 Model**		
F-statistic	0.820509	Prob. F(44,51)	0.7476	1.301159	Prob. F(44,51)	0.1817
Obs*R-squared	39.7903	Prob. Chi-Square(44)	0.6525	50.77178	Prob. Chi-Square(44)	0.2242
Scaled explained SS	29.55344	Prob. Chi-Square(44)	0.9533	39.28935	Prob. Chi-Square(44)	0.6735

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

Test for Autocorrelation

As indicated in the table 4.4, the Durbin-Watson test statistic value was 1.674 and 0.932 for model L1 and L2, respectively. As mentioned in the previous chapter, to empirically analyze factors affecting bank liquidity in Ethiopia 96 (8*12) observations were used in the models. Therefore, the relevant critical values for the test are dL= 1.358, dU = 1.715, i.e., for 96 observations and 8 regressors and 4-dU = 4-1.715=2.285; 4 - dL = 4-1.358=2.642. The DW value (1.674) of L1 lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected whereas, the DW value (0.932) of L2 lies below the lower limit of the inconclusive region and indicate the presence of first order positive serial autocorrelation between the error term and its lag. Hence, the null hypothesis of no autocorrelation should be rejected in case of L2. With the presence of autocorrelation also coefficient estimates are consistent but they are not best linear unbiased estimator/ BLUE (Brooks 2008). In general, there is first order autocorrelation in the regression model of L2 but not in L1. Therefore, the researcher focused up on the results of L1 for the determinants of liquidity.

Table 4.4 Autocorrelation Test: Durbin Watson

Variables	DW test static result	
All bank-specific and macro-economic	**L1 Model**	**L2 Model**
	1.674	0.932

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

Test for Normality

As indicated in the appendix 2, the normality test for this study revealed that the coefficient of kurtosis was 2.56 & 3.22, and the Bera-Jarque statistic had a P-value of 0.681 & 0.471 for the model L1 and L2, respectively; implying that the data were consistent with a normal distribution assumption; since the P- value is in excess of 0.05 and the coefficient of kurtosis was close to 3 in both cases.

Test for Multicollinearity

Correlation matrix between independent variables is presented in table 4.5. The result of correlation matrix indicates that there were low data correlations among the independent variables. These low correlation coefficients indicate that, there is no problem of multicollinearity in this study. Besides, Kennedy (2008) stated that multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.70, but in this study there is no correlation coefficient that exceeds or even near to 0.70. Consequently, in this study there is no problem of multicollinearity which enhanced the reliability for regression analysis.

Table 4.5 Correlation matrix of explanatory variables

	PR	NPLS	CAP	BSIZE	LG	GDP	IRM	INFL
PR	1							
NPLS	-0.592	1						
CAP	0.096	-0.183	1					
BSIZE	0.408	-0.220	-0.387	1				
LG	0.133	-0.408	0.228	-0.156	1			

GDP	0.517	-0.465	-0.169	0.318	-0.010	1		
IRM	-0.339	0.414	0.060	-0.443	-0.044	-0.164	1	
INFL	0.425	-0.422	-0.058	0.390	-0.049	0.301	-0.469	1

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

4.1.4. Results of regression analysis

Under this section the empirical findings from the econometric results on the factors affecting bank liquidity in Ethiopia were presented. The section covers the empirical regression model used in this study and the results of the regression analysis.

Empirical model: The empirical model used in the study in order to identify the factors that can affect Ethiopian commercial banks' liquidity measured by L1 and L2 was provided as follows:

$$LIQ_{i,t} = \alpha + \beta 1(PR_{it}) + \beta 2(NPL_{it}) + \beta 3(CAP_{it}) + \beta 4(BSIZE_{it}) + \beta 5(LG_{it}) + \beta 6(GDP_t) + \beta 7(IRM_t) + \beta 8(INFL_t) + U_{i,t}$$

Table 4.6 presents the estimation results of the operational panel regression model of liquid assets to total deposits ratio (L1) as dependent variable and bank specific and macroeconomic explanatory variables for the sample of eight commercial banks in Ethiopia. The explanatory power of this model is high (i.e. around 59%) which indicates that the changes in the independent variables explain 59% of the changes in the dependent variable. That means profitability, equity to total asset ratio, non-performing loans, bank size, loan growth, gross domestic product, interest rate margin and general inflation rate collectively explain 59% of the

changes in liquidity measured by the ratio L1. The remaining 41% of changes was explained by other factors which are not included in the model. Thus, these variables collectively are good explanatory variables for the liquidity of commercial banks in Ethiopia. Table 4.6 described, the value of F-statistics is 7.68 with p-value of 0.0000, which used to measure the overall significance of the regression model, since the p-value is 0.0000 which is sufficiently low. The null hypothesis can be rejected and we can say that the model is well fitted at 1 percent level of significance, which enhances the reliability and validity of the model.

According to the results shown in table 4.6, capital adequacy, loan growth, interest rate margin and general inflation rate were the statistically significant factors affecting liquidity of commercial banks in Ethiopia. Loan growth and interest rate margin had significant impact on liquidity at 1% significance level. Capital adequacy had statistically significant impact on liquidity at 5% significance level. And general inflation rate had statistically significant influence on banks liquidity in Ethiopia at 10% significance level. On the other hand, profitability, non-performing loans, bank size and real GDP growth rate were statistically insignificant.

Moreover, table 4.6 also shows that the coefficient signs of non-performing loan, loan growth and real GDP growth rate against L1 were negative as far as the coefficients for those variables are negative -0.015, -0.183 and -0.028, respectively. This indicates that there was an inverse relationship between these three independent variables and L1. Thus the increase of those variables will lead to a decrease in liquidity measured by L1.

On the other hand, variables such as profitability, capital adequacy, bank size, interest rate margin and general inflation rate had a positive relationship with liquidity measured by the ratio L1 as far as their respective coefficients were 1.948, 0.888, 0.016, 14.659 & 0.152. This revealed that there was a direct relationship between these five independent variables and L1.

Table 4.6: Regression results for determinants of liquidity measured by liquid assets to total deposits ratio (L1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.074944	0.599868	-1.791968	0.0769
PR	1.948834	1.429251	1.363535	0.1765
NPLS	-0.015294	0.138882	-0.110121	0.9126
CAP	0.888632	0.338020	2.628931	0.0103**
BSIZE	0.016682	0.020909	0.797862	0.4273
LG	-0.182922	0.058236	-3.141043	0.0024***
GDP	-0.028205	0.242435	-0.116342	0.9077
IRM	14.65979	2.635772	5.561860	0.0000***
INFL	0.151949	0.078762	1.929227	0.0572*

R-squared	0.590149	Durbin-Watson stat	1.674056
Adjusted R-squared	0.513302		
S.E. of regression	0.076473		
F-statistic	7.679539		
Prob(F-statistic)	0.000000		

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

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

Table 4.7 presents the estimation results of the operational panel regression model of total loans to total deposits ratio (L2) as dependent variable and bank specific and macroeconomic

explanatory variables for the sample of eight Ethiopian commercial banks. This ratio measures the amount of volatile liabilities (i.e. deposits) tied up with illiquid assets (i.e. loans). As high value of this ratio means low liquidity, these results have to be interpreted in reverse: positive sign of the coefficient means negative impact on liquidity and conversely (Vodova, 2011).

From table 4.7 the R-squared statistics and the adjusted-R squared statistics of the model was 80.8% and 77.2%, respectively. The explanatory power of this model is very high (i.e. around 80.8%) which indicates that the changes in the independent variables explain 80.8% of the changes in the dependent variable. That is profitability, capital adequacy, non-performing loans, bank size, loan growth, gross domestic product, interest rate margin and inflation rate collectively explain 80.8% of the changes in L2. The remaining 19.2% of changes was explained by other factors which are not included in the model. Thus these variables collectively, are good explanatory variables of the liquidity of commercial banks in Ethiopia. Table 4.7 presented, the value F-statistics is 22.48 with p-value of 0.0000, which used to measure the overall significance of the regression model. The null hypothesis can be clearly rejected since the p-value is 0.0000 which is sufficiently low and we can say that the model is well fitted at 1 percent level of significance, which enhanced the reliability and validity of the model. The R square in case of L2 is higher than that of L1.

According to the results shown in table 4.7, profitability, non-performing loans, bank size, loan growth and interest rate margin were the statistically significant factors affecting liquidity of commercial banks in Ethiopia. Of which bank size and loan growth had significant impact on liquidity at 1% significance level. Non-performing loans and interest rate margin had statistically significant impact on liquidity at 5% significance level. And profitability had statistically significant influence on banks liquidity in Ethiopia at 10% significance level. On the other hand,

capital adequacy, real GDP growth rate and general inflation rate were statistically insignificant. Unlike as perL1, most of the variables were statistically significant in case of L2.

Table 4.7: Regression results for determinants of liquidity measured by total loans to total deposits ratio (L2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.657320	0.636778	2.602667	0.0110
PR	2.859503	1.517193	1.884733	0.0631*
NPLS	0.332021	0.147427	2.252094	0.0271**
CAP	0.431211	0.358818	1.201752	0.2330
BSIZE	-0.074523	0.022195	-3.357615	0.0012***
LG	0.327055	0.061819	5.290506	0.0000***
GDP	0.233266	0.257352	0.906408	0.3674
IRM	5.899827	2.797951	2.108624	0.0381**
INFL	0.125518	0.083608	1.501275	0.1372
R-squared	0.808237	Durbin-Watson stat		0.932466
Adjusted R-squared	0.772282			
S.E. of regression	0.081178			
F-statistic	22.47879			
Prob(F-statistic)	0.000000			

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

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

Moreover, table 4.7 also shows that the coefficient signs of profitability, non-performing loans, capital adequacy, loan growth, gross domestic product, interest rate margin and inflation rate against L2 were negative as far as the coefficients for those variables are 2.859, 0.332, 0.431, 0.327, 0.233, 5.899 and 0.125, respectively. This indicates that there was an inverse relationship between the aforementioned seven independent variables and L2. Thus the increase of those variables will lead to a decrease in L2. Of which non-performing loans, loan growth, gross domestic product had similar sign with that of model L1. On the other hand, only one variable (bank size) had a positive relationship with liquidity measured by L2 as far as its respective coefficient was-0.074, which is similar to that of L1. This revealed that there was a direct relationship between bank size and L2.

So far, the results of the documentary analysis which includes descriptive statistics, correlation matrix, tests for the classical linear regression model and regression analysis have been presented. The results of the tests for the classical linear regression model showed that the data fits all the basic assumptions of CLRMs except presence of positive serial autocorrelation in case of L2 whereas, the remaining results of the documentary analysis were used to assess the link that exists between bank-specific & macro-economic determinants of bank liquidity and liquidity measured by L1 & L2. The following section details the results of in-depth interview which was conducted with Ethiopian commercial banks finance managers.

4.2. In-depth interview results

In order to deeply understand how different internal and external factors affect the liquidity of the commercial banks in Ethiopia, unstructured interviews were utilized with some selected

Ethiopian commercial banks finance managers. The interviews were conducted with four finance managers of Ethiopian commercial banks namely, CBB, AIB, BOA and NIB. The finance managers were chosen as they are believed to be the most knowledgeable persons about the determinants of liquidity. Besides, the interviews were conducted independently with the officials. The interview questions were fully unstructured and focused on the identification of factors affecting Ethiopian banks liquidity in general. More specifically, the interview questions were tried to identify how those factors can influence liquidity, the major determinant factors among the influential factors and measures taken by the banks to reduce the negative influence of controllable factors.

According to an interview with the aforementioned banks finance managers, the factors that can affect Ethiopian banks liquidity can be classified in general into two major categories. The first category includes the internal determinants originate from bank accounts (balance sheets and/or profit and loss accounts) and therefore could be termed bank-specific determinants of liquidity. Another category of factors that can affect Ethiopian commercial banks liquidity includes external factors. The external determinants are variables that are not related to bank management but reflect the economic and legal environment that affects the liquidity position of Ethiopian banks. The collection of the bank-specific determinants of liquidity includes variables such as deposits, level of non-performing loans, profitability, loan growth, capital, bank size, interest rate on loans and branch network. Besides, efficient management of liquid assets, adequacy of adequate foreign currency at hand and bank's appetite to investments by banks themselves were also considered as internal factors that can affect Ethiopian banks liquidity. On the other hand, the external factors as per the interviews include change of deposit interest rate by NBE, gross domestic product, inflation, net interest margin, competition in the markets and government

regulation. In addition, absence of active secondary stock market, limited number of bank issue branches in the country and lack of awareness by the public in relation to savings were external factors that can affect liquidity of the Ethiopian commercial banks.

As per the interview with the finance managers, the increase in the level of deposits results in increased liquidity of the Ethiopian banking industry. According to officials when the bank's appetite to profitability is high, it gives out high amount of loans which is illiquid. When those disbursed loans were not collected as per the contract, it may affect the bank's liquidity in two ways. One, an equitable amount of liquid assets tied up in the form loan loss provision and, on the other hand, the bank may fail to meet its financial obligations as they come due whose source of fund is expected from loan repayment. Thus, this indicates that profitability, loan growth and level of non-performing loans have a negative relationship with liquidity. According to the officials, capital of the bank in total assets increases the goodwill of the bank in the eyes of the public which in turn increases their depositors (customers).This means in other words capital adequacy has a positive relationship with banks' liquidity. In addition, other bank-specific variables like more number of branches, efficient management of liquid assets and adequacy of adequate foreign currency on hand also affects bank liquidity positively. In contrary, bank's aggressive participation in different investment areas also recorded as factors that affect Ethiopian banks liquidity adversely.

The interview result also showed that the effects of external factors are either direct or indirect on Ethiopian banks liquidity. Among the external factors for example some government regulations like directives regarding NBE Bills; which forces banks to invest 27% of total loans disbursed on bonds (NBE Bills) on which banks have no right to use it for payment and settlement purposes when the need arises. This clearly shows the existence of an adverse impact

of these directives on banks liquidity. Likewise, absence of active secondary stock market, limited number of bank issue branches and lack of awareness by the public in relation to savings were also considered as factors that affect Ethiopian banks liquidity adversely. On the other hand, the effect of variables like gross domestic product and change in interest rate by NBE may be direct or indirect depending on the situation. The remaining external variable, as per the finance manager, inflation adversely affects banks' liquidity because as the general price level of goods and services in the economy increases, most of the times peoples do not want to come and deposit in the banks rather opts to engage in other investments or use for consumptions. Besides, the officials highlighted the fact that inflation deteriorates overall macroeconomic environment and thus lowers bank liquidity.

According to an interview conducted with Ethiopian banks finance managers almost all the aforementioned internal and external variables determine liquidity greatly either by having a direct or indirect impact on it. On the other hand, there are also some measures taken by the banks' management in order to reduce the influence of controllable factors that can affect banks' liquidity negatively. For instance; by maintaining minimum liquid assets limits set by regulatory body; by establishing an Asset & Liability Management Committee (ALCO) to manage its assets, liabilities and off-balance sheet items so as to fully meet the bank's contractual commitments; and by developing liquidity management policies/procedures that at a minimum cover: stress tests/scenario analysis, maturity gap analysis, cash flow projections, diversification of funding sources, limits on net cumulative funding mismatch, internal controls, and contingency planning and by making them practical banks currently trying to maintain reasonable liquidity position. In general all the above identified factors contribute to the presence high/low liquidity of Ethiopian commercial banks.

Chapter 5 Analysis and discussions

The preceding chapter presented mainly the outputs of the documentary analysis and in-depth interviews with selected Ethiopian banks' finance managers. Accordingly, based on the outputs presented in the preceding chapter, this chapter presents the analysis of the results for each explanatory variable. The analysis is based on the theoretical framework and the data collected through the data collection instruments. The data are analyzed in light of the specific research question and hypotheses stated. Hence, the analysis focuses mainly on the results of the regression analysis for the selected bank-specific and macro-economic factors that have an impact on bank liquidity. The selected factors of liquidity are profitability, non-performing loans, capital adequacy, bank size, loan growth, real GDP growth rate, general inflation rate and net interest margin. Due to presence of the positive serial autocorrelation problem in case of L2, the study analyzed the regression result of the L1 only. Moreover, the study also analyzed concurrently the results of the interviews by using them as an argument for the quantitative output.

Profitability

The results of fixed effect model in table 4.6 indicated that positive link between profitability and liquidity measured by the ratio of L1 which can be quite surprising. The result is inconsistent with researcher's expectations and also a finance theory which emphasizes the negative correlation of liquidity and profitability. Moreover, the coefficient of profitability was not statistically significant even at 10% significance level (p-value = 0.1765), implying that its influence is negligible. Thus, the hypothesis that states there is a significant relationship between

profitability and liquidity may be rejected or data did not support the hypothesis. Referring to previous studies, the results concerning profitability are mixed. The result of this study is similar to the findings of Aspachs et al, (2005), Vodova (2011) and it was opposite to Vodova (2012) and Vodova (2013).

In contrary to the above findings of regression result, the findings from the interview result indicates profitability was a proper determinant of bank liquidity. Besides, regardless of the findings of the regression analysis, the result of the interview reveals that the profitability of the bank demonstrates a negative relationship with liquidity. As per the interviews with the finance managers of banks, one possible explanation for their negative relationship was when the bank's appetite for profit is high, it provides large amount of loan in which liquid assets would be diminished. Therefore, conclusion about the impact of Ethiopian bank's profitability on liquidity remains ambiguous and further research is required.

Capital adequacy

The coefficient of capital strength which is measured by the equity to total assets ratio was positive and statistically significant at 5% significance level (p-value = 0.0103) as per L1, which is in line with the risk absorption hypothesis and findings of Vodova (2011) and Tseganesh (2012). According to this argument the higher capital to total assets ratio of banks, the higher the capacity of the bank to absorb risks and create higher level of liquidity to the external public through loans & advances. In other words, higher capital ratio of banks create positive signal to the external public and may attract more customers (depositors). In turn this enable banks to hold more liquid assets that create better potential to liquidity creation to the external public. The regression results implies that every one percent change (increase or decrease) in the capital

adequacy keeping the other things constant had a resultant change of 88.86% on the banks' liquidity in the same direction. Generally, the researcher fails to reject the third research hypothesis (i.e. there is significant relationship between capital adequacy and bank liquidity).

The findings from interviews data were also provide further support for the findings of the regression result which demonstrates a positive relationship between capital strength and liquidity. Therefore, based on this finding the relationship between capital adequacy and banks liquidity was in accordance with the expected sign.

Loan growth

The results of fixed effect model in the table 4.6 above indicated that loan growth had a negative and statistically significant impact on liquidity measured by L1, which is in accordance with expected sign. The negative impact of loan growth on banks' liquidity was based on the argument of taking loans as illiquid assets of banks. According to this argument when the amount of loans provided by banks increase, the amount of illiquid assets in the total assets portfolio of banks would increase and lead to the reduction in the level of liquid assets held by banks. The regression results implies that every one percent change (increase or decrease) in the banks' loan growth keeping the other things constant had a resultant change of -18.29% on the liquidity in the opposite direction. Therefore, the study fails to reject the hypothesis saying there is a significant negative relationship between loan growth and liquidity. The finding was opposite to the findings of Tseganesh (2012) and Vodova (2013). Similarly, the result generated from the interview also supports the output of the regression analysis fully. That is Ethiopian banks liquidity decreases as the loans & advances of the banks increase, which strengths the fact that loans are illiquid assets.

Inflation

The coefficient of inflation which is measured by the general inflation rate of Ethiopia was positive and statistically significant at 10% significance level (p-value = 0.0572) in case of L1. The positive and statistically significant impact of inflation was in line with expectation of the study, which was based on the argument that is based on the theory of information asymmetry, stating that in the inflationary economy, economic units including banks are refraining from long term investments due to the decline in the real value of their investments that aggravate the credit market rationing and prefer to hold risk free/liquid assets. This regression result implies that every one percent change (increase or decrease) in the general inflation rate keeping other things constant had a resultant change of 15.19% on the liquidity in the same direction. Hence, the study fail to reject the hypothesis stating inflation has positive and significant impact on banks liquidity. The result of this study is opposite to the findings of Vodova (2011, 2013) and it is consistent with the findings of Tseganesh (2012).

The result of the interview highly support the output of the regression analysis as far as both reveals that inflation is main determinant of the banks liquidity, but the interview results indicates that the negative impact of inflation on Ethiopian banks liquidity. The finance managers explained the fact that inflation deteriorates overall macroeconomic environment and thus lowers bank liquidity.

Interest rate margin

The coefficient of the interest rate margin was positive and statistically significant at 1% significance level (p-value=0.0000), which is in contrary to expected sign and liquidity preference theory. The finding is consistent with the findings of Tseganesh (2012), but the opposite to the findings of Vodova (2011). Positive effect of interest rate margin can be quite surprising. It can highlight the fact that higher interest rate margin do not encourage banks to lend more, rather it may encourage banks to hold more liquid assets. This is consistent with the problem of credit crunch and credit rationing though its presence in Ethiopia context is not supported by empirical evidence. On the other hand, this result also could be due to credit cap imposed on banks in Ethiopia by the NBE to discourage lending in order to control high jumping inflation in the two years period (2008/9 and 2009/10). More surprisingly the higher value of the coefficient (i.e. 14.65979) shows more than fourteen times rise/decline in the liquidity position of commercial banks in Ethiopia for a rise/decline in the interest rate margin by one percent. Generally, the researcher fails to reject the research hypothesis stating there is significant relationship between interest rate margin and bank liquidity. The results of the interview revealed that net interest margin remain as a major determinant factor that affects their liquidity negatively.

Non-performing loans

Non-performing loans is the ratio of the nonperforming loans to gross loans, which measures how much a bank is not collecting in year *t* relative to its gross loans disbursed, is used to measure its impact on Ethiopian banks liquidity. The results of fixed effect regression model in table 4.6 indicated above that the nonperforming loans had a negative relationship with liquidity,

which is similar to expected sign. The coefficients of the non-performing loans was not statistically significant even at 10% significance level (p-value = 0. 9126). The positive and insignificant impact of NPLs on banks liquidity measured by L1 indicates that non-performing loans was not considered as a proper explanatory variable of liquidity in Ethiopian banking industry. This insignificant result was also consistent with the previous empirical study of Vodova (2011, 2013). Therefore, this study rejected the hypothesis which says there is a significant negative relationship between non-performing loans and liquidity of the Ethiopian commercial banks.

Regardless of the findings of the regression analysis, the result of the interview reveals that the level of non-performing loans of banks is one of the major determinants of Ethiopian banks liquidity. However, the output of the regression analysis and the interview are in agreement in relation to the direction of the effect of non-performing loans as far as both of them proves the existence of negative or inverse relationship between non-performing loans and liquidity of Ethiopian banks. Therefore, as far as the interview results supports significant determinant of NPLs on Ethiopian banks liquidity unlike to L1 it calls further investigation in the area.

Bank size

Bank size which is measured by the natural log of total assets had a positive impact on liquidity measured by L1 which was in line with the assumption 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) since they have little dealing with other types of investment instruments than loans. The coefficients signs of bank size in case of L1 was not statistically significant even at

10% significance level (p-value = 0.4273). This implies that for the study period (2002-2013) bank size of Ethiopia do not have a relationship with their liquidity. Hence, the hypothesis saying there is a significant relationship between bank size and liquidity of commercial banks is rejected or data didn't support the hypothesis. The finding is consistent with the findings of Aspachs et al (2005) but the opposite to the findings of Vodova (2011).

In contrary to researcher hypothesis, the findings from the interview result indicated that the bank size is not a proper determinant of bank liquidity by supporting regression results. As per the interviews with the finance managers of banks, one possible explanation for this was regardless of size of the bank, bank's liquidity depends on its appetite to investment, the way to manage liquid assets efficiently and the like perspectives. However, the existence of different conclusion of Vodova (2011) which tells us that the bank size positively and significantly affects Czech commercial banks liquidity calls for a detailed investigation in the area.

Real GDP growth rate

The coefficient signs of real GDP growth rate showed negative impact on banks' liquidity position. The negative coefficient on GDP growth rate signals that according to researcher's expectation, liquidity tends to be inversely related to the business cycle. Most borrowers want to take a loan during expansion when they have valuable investments projects. Banks which would like to satisfy the growing demand for loans would face lower liquidity. The regression also shows that Real GDP growth rate is not statistically significant variable even at 10% significance level with p-value of 0.9077. This implies that for the study period (2002-2013) GDP growth rate of Ethiopia do not have a relationship with Ethiopian commercial banks liquidity. Hence, the hypothesis stating negative and significant relationship between real GDP growth rate and banks'

liquidity should be rejected. The result was similar with findings of Tseganesh (2012) and Vodova (2011) and it is inconsistent with the finding of Vodova (2013). The insignificancy and negative impact of real GDP growth rate could be due to the high level of inflation rate and credit crunch problem.

In contrary to the above findings of regression result, the findings from the interview result indicates real GDP growth rate was a proper determinant of bank liquidity. However, the output of the regression analysis and the interview are in agreement in relation to the direction of the effect of GDP as far as both of them proves the existence of inverse relationship between real GDP growth and liquidity of Ethiopian banks. Therefore, as far as the interview results supports significant determinant of GDP on Ethiopian banks liquidity unlike to L1 it calls further investigation in the area.

This chapter discussed the analysis of the results of multiple linear regressions model and in-depth interviews jointly. From the above analysis one can clearly identify that the bank specific variables affecting their liquidity includes capital adequacy and loan growth. Whereas profitability, non-performing loans and bank size are insignificant variables. On the other hand, among the external variables interest rate margin and inflation are significantly affects liquidity of Ethiopian banks, whereas GDP was insignificant factor for liquidity. The next chapter presents conclusions and recommendations of the study.

Chapter 6 Conclusions and recommendations

The preceding chapter presented the analysis of the findings, while this chapter deals with the conclusions and recommendations based on the findings of the study. Accordingly this chapter is organized into two sub-sections. Section 6.1 presents the conclusions and section 6.2 presents the recommendations.

6.1 Conclusions

The main objective of the study was to identify the bank-specific and macro-economic factors that can affect Ethiopian banks liquidity and to what extent these determinants exert impact on Ethiopian banks liquidity. In doing so, previous studies on bank liquidity have been reviewed and it is summarized that the liquidity of bank is usually expressed as a function of internal and external determinants.

According to the review on empirical literature and liquidity & its determinants area theories, the current study chosen and investigated the impact of five bank-specific and three macro-economic factors on the liquidity of the Ethiopian commercial banks over the period of 2002 to 2013. The bank-specific factors that were used in this study include variables such as profitability, non-performing loans, capital adequacy, bank size, and loan growth. On the other hand, the three macroeconomic conditions indicator variables employed in this study were real GDP growth, interest rate margin and inflation. To comply with the objective of this research, the paper is primarily based on quantitative research method which is supplemented by qualitative one. The quantitative data were mainly obtained from banks themselves, NBE and MoFED through documentary analysis in order to identify and measure the determinants of banks liquidity. In specific, multiple regression analysis is adopted to measure the effect of determinants on banks liquidity quantitatively. On the other hand, qualitative data were collected through unstructured

interview conducted with selected Ethiopian commercial banks finance managers. For testing the research hypotheses, a sample size of eight Ethiopian commercial banks were selected and the necessary financial data were collected for the time period of 2002 to 2013.

The empirical findings on the impact of bank liquidity in Ethiopian banks for the sample suggest the following conclusions.

The result showed a negative relationship between loan growth and liquidity with strong statistical significance in case of L1 which is as expected, indicating that the increase in loans provided by banks lead to the reduction of the level of liquid assets held by banks. In accordance with expectation of study, capital adequacy and inflation showed positive and significant relationship with banks liquidity measured by L1. The positive influence of the share of capital on total assets is consistent with the assumption that bank with sufficient capital adequacy should be liquid, too. The positive and statistically significant impact of inflation was based on the argument stating that in the inflationary economy, economic units including banks refraining from long term investments due to the decline in the real value of their investments that aggravate the credit market rationing and prefer to hold risk free/liquid assets.

Surprisingly, interest rate margin had positive and statistically significant impact on Ethiopian banks liquidity measured by L1 which was opposite to expected sign and it may indicate the presence of credit rationing and credit crunch in the economy or it could be due to credit cap during two years period (2008/09 & 2009/10) and the forced investment on bonds (NBE Bills) which amounts 27% of each total loans disbursed.

In contrary to the above results profitability, non-performing loans, bank size and GDP are factors that have little or no impact on the liquidity of Ethiopian banks as per L1 as far as all those variables were not significant even at 10% significance level.

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

Among external factors, the result of the interview showed that the government regulation regarding investment on bonds (NBE Bills) which amounts 27% of the loans & advances disbursement, specifically the 40% minimum limit on portfolio share of short-term loans had primarily serious adverse impact on banks' liquidity as it boldly changes liquid assets to illiquid long-term investment.

6.2 Recommendations

In light of the major finding obtained from the results, the following recommendations were made.

Bank's capital strength, loan growth, interest rate margin and inflation are significant key drivers of liquidity of commercials banks in Ethiopia. Definitely focusing and reengineering the

institutions along with these indicators could improve the efficient management of liquidity position of the commercial banks in Ethiopia.

Among the external factors included in this study general inflation rate and interest rate margin exists as significant key drivers of liquidity of Ethiopian banks. This is a clear signal to all commercial banks in Ethiopia that they cannot ignore the macroeconomic indicators when strategizing to improve on their position of liquidity. Thus, banks in Ethiopia should not only be concerned about internal structures and policies/procedures, but they must consider both the internal environment and the macroeconomic environment together in developing their strategies to efficiently manage their liquidity position.

Government regulation which forced private banks exclusively to make investment on bonds that amounts 27% of the total loans provided by the banks to customers is currently affecting the Ethiopian private banks liquidity since huge amount of loan able funds tied up in this bond (NBE Bills). Thus, the government should take some corrective actions like lessening the limit on portfolio share of short-term loans from its minimum limit of 40%. Since the maturity date of the short term loans at maximum is one year, there would have high probability of purchasing of bonds for a number of times as same amount of facilities provided to different customers which in turn adversely affects liquidity position of the Ethiopian banks.

Finally, the study investigated only limited internal and external variables by using 12 years data. There are other variables like interest rate on loans, total deposits and efficient management of liquid assets from internal and government regulation, industry concentration, reserve requirements and ownership structure from external variables which are not included in the

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

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Appendices

Appendix-1: Hetrocsedasticity Test

Hetrocsedasticity test for L1

Heteroskedasticity Test: White

F-statistic	0.820509	Prob. F(44,51)	0.7476
Obs*R-squared	39.79030	Prob. Chi-Square(44)	0.6525
Scaled explained SS	29.55344	Prob. Chi-Square(44)	0.9533

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/06/15 Time: 11:07
Sample: 1 96
Included observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.123915	3.651503	0.581655	0.5634
ROA	-6.488612	10.45560	-0.620587	0.5376
ROA^2	3.861870	26.04958	0.148251	0.8827
ROA*NPLS	-2.176617	4.112483	-0.529271	0.5989
ROA*CAP	-11.48925	8.672171	-1.324841	0.1911
ROA*BSIZE	0.145921	0.315304	0.462796	0.6455
ROA*LG	-0.374471	2.022532	-0.185150	0.8538
ROA*GDP	1.448078	9.355450	0.154784	0.8776
ROA*IRM	63.80098	79.79070	0.799604	0.4276
ROA*INFL	-0.311622	2.201608	-0.141543	0.8880
NPLS	0.368005	2.663392	0.138172	0.8906
NPLS^2	0.123006	0.383536	0.320716	0.7497
NPLS*CAP	-1.780309	1.127343	-1.579208	0.1205
NPLS*BSIZE	-0.011282	0.023117	-0.488029	0.6276
NPLS*LG	0.120670	0.300601	0.401429	0.6898
NPLS*GDP	-0.261864	0.782797	-0.334523	0.7394
NPLS*IRM	0.955465	33.10758	0.028859	0.9771
NPLS*INFL	0.060266	0.460101	0.130984	0.8963

CAP	0.829863	2.379560	0.348746	0.7287
CAP^2	0.387244	0.912040	0.424591	0.6729
CAP*BSIZE	-0.052691	0.072727	-0.724507	0.4721
CAP*LG	-0.387921	0.320905	-1.208834	0.2323
CAP*GDP	1.734705	1.785000	0.971823	0.3357
CAP*IRM	7.953274	15.88632	0.500637	0.6188
CAP*INFL	0.286306	0.441731	0.648146	0.5198
BSIZE	-0.016302	0.086208	-0.189099	0.8508
BSIZE^2	-0.000650	0.001328	-0.489317	0.6267
BSIZE*LG	-0.002995	0.009042	-0.331243	0.7418
BSIZE*GDP	0.094339	0.069095	1.365356	0.1781
BSIZE*IRM	0.529274	0.535503	0.988367	0.3276
BSIZE*INFL	0.013222	0.015290	0.864774	0.3912
LG	0.118623	0.364863	0.325116	0.7464
LG^2	-0.034178	0.044221	-0.772893	0.4432
LG*GDP	-0.021540	0.418616	-0.051456	0.9592
LG*IRM	0.481729	3.593411	0.134059	0.8939
LG*INFL	-0.084591	0.146369	-0.577934	0.5659
GDP	-2.487748	5.995535	-0.414934	0.6799
GDP^2	1.472633	3.584940	0.410783	0.6830
GDP*IRM	3.020334	71.88372	0.042017	0.9666
GDP*INFL	0.317291	1.540805	0.205926	0.8377
IRM	-50.33041	81.74784	-0.615679	0.5408
IRM^2	246.4544	514.8518	0.478690	0.6342
IRM*INFL	1.398768	7.131648	0.196135	0.8453
INFL	-0.437679	0.693474	-0.631140	0.5308
INFL^2	0.047402	0.221059	0.214431	0.8311

R-squared	0.414482	Mean dependent var	0.006506
Adjusted R-squared	-0.090670	S.D. dependent var	0.008795
S.E. of regression	0.009185	Akaike info criterion	-6.237404
Sum squared resid	0.004303	Schwarz criterion	-5.035366
Log likelihood	344.3954	Hannan-Quinn criter.	-5.751521
F-statistic	0.820509	Durbin-Watson stat	1.801797
Prob(F-statistic)	0.747598		

Heteroscedasticity test for L2

Heteroskedasticity Test: White

F-statistic	1.301159	Prob. F(44,51)	0.1817
Obs*R-squared	50.77178	Prob. Chi-Square(44)	0.2242
Scaled explained SS	39.28935	Prob. Chi-Square(44)	0.6735

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/06/15 Time: 11:12
Sample: 1 96
Included observations: 96

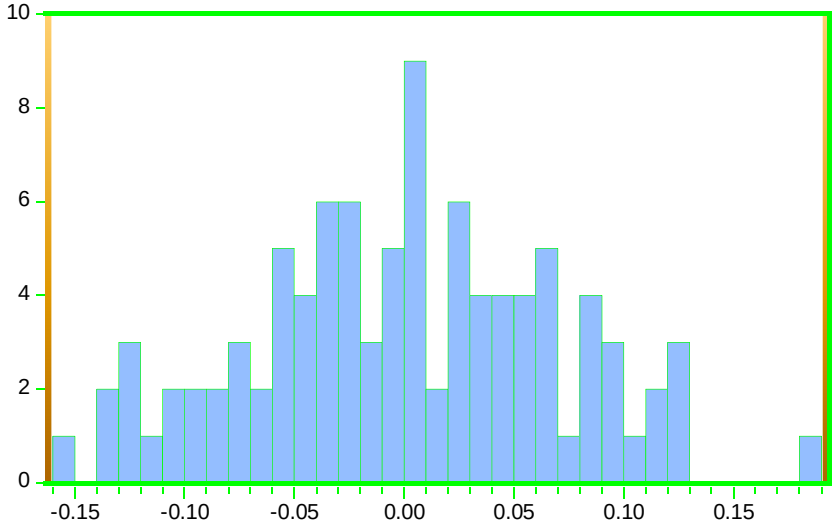
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.060652	4.069959	1.489119	0.1426
ROA	10.01967	11.65379	0.859778	0.3939
ROA^2	0.229132	29.03482	0.007892	0.9937
ROA*NPLS	-2.836766	4.583766	-0.618872	0.5388
ROA*CAP	-7.340981	9.665988	-0.759465	0.4511
ROA*BSIZE	-0.116906	0.351437	-0.332652	0.7408
ROA*LG	0.232939	2.254310	0.103331	0.9181
ROA*GDP	6.376654	10.42757	0.611519	0.5436
ROA*IRM	-99.20823	88.93458	-1.115519	0.2699
ROA*INFL	-1.502535	2.453909	-0.612303	0.5431
NPLS	0.208846	2.968612	0.070351	0.9442
NPLS^2	-0.159471	0.427488	-0.373042	0.7107
NPLS*CAP	-1.499232	1.256535	-1.193148	0.2383
NPLS*BSIZE	-0.010827	0.025766	-0.420209	0.6761
NPLS*LG	0.026240	0.335049	0.078316	0.9379
NPLS*GDP	-1.515544	0.872505	-1.737004	0.0884
NPLS*IRM	5.794776	36.90165	0.157033	0.8758
NPLS*INFL	-0.010688	0.512828	-0.020841	0.9835
CAP	0.101701	2.652253	0.038345	0.9696
CAP^2	1.285356	1.016558	1.264420	0.2118
CAP*BSIZE	-0.033386	0.081062	-0.411860	0.6822
CAP*LG	-0.329426	0.357681	-0.921006	0.3614
CAP*GDP	4.863451	1.989558	2.444488	0.0180

CAP*IRM	3.720897	17.70686	0.210139	0.8344
CAP*INFL	0.223525	0.492353	0.453993	0.6518
BSIZE	-0.106972	0.096088	-1.113273	0.2708
BSIZE^2	0.002603	0.001480	1.758436	0.0847
BSIZE*LG	-0.008521	0.010078	-0.845456	0.4018
BSIZE*GDP	0.061312	0.077013	0.796125	0.4296
BSIZE*IRM	-0.157604	0.596871	-0.264050	0.7928
BSIZE*INFL	0.006377	0.017042	0.374202	0.7098
LG	-0.003998	0.406675	-0.009832	0.9922
LG^2	0.023776	0.049289	0.482389	0.6316
LG*GDP	-0.490764	0.466589	-1.051812	0.2978
LG*IRM	3.730755	4.005210	0.931476	0.3560
LG*INFL	-0.109894	0.163142	-0.673609	0.5036
GDP	-15.14707	6.682613	-2.266640	0.0277
GDP^2	4.670578	3.995768	1.168881	0.2479
GDP*IRM	176.6393	80.12148	2.204643	0.0320
GDP*INFL	3.107706	1.717378	1.809564	0.0763
IRM	-118.4954	91.11601	-1.300489	0.1993
IRM^2	736.2094	573.8530	1.282923	0.2053
IRM*INFL	6.444873	7.948923	0.810786	0.4213
INFL	-0.835050	0.772945	-1.080349	0.2851
INFL^2	0.003083	0.246392	0.012511	0.9901

R-squared	0.528873	Mean dependent var	0.007920
Adjusted R-squared	0.122410	S.D. dependent var	0.010929
S.E. of regression	0.010238	Akaike info criterion	-6.020416
Sum squared resid	0.005346	Schwarz criterion	-4.818378
Log likelihood	333.9800	Hannan-Quinn criter.	-5.534532
F-statistic	1.301159	Durbin-Watson stat	1.854587
Prob(F-statistic)	0.181744		

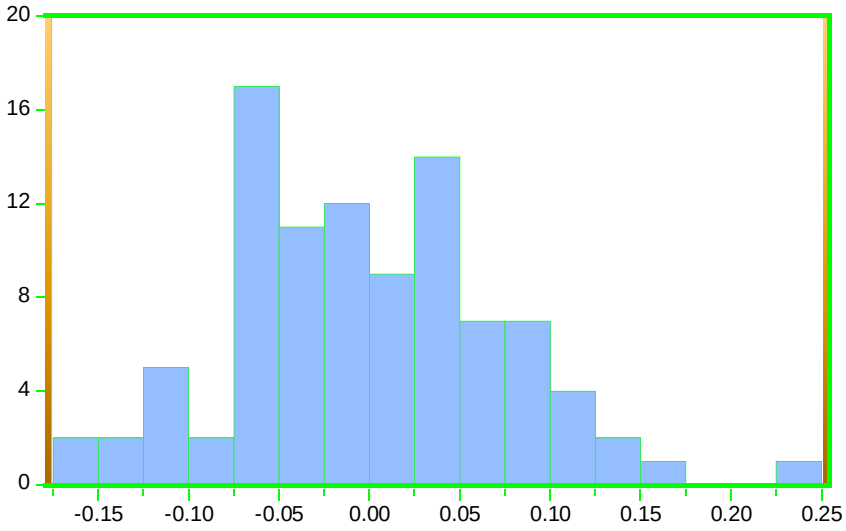
APPENDIX-2: Normality test

Normality test for L1



Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	5.78e-19
Median	0.002598
Maximum	0.181953
Minimum	-0.155462
Std. Dev.	0.070176
Skewness	-0.003003
Kurtosis	2.561758
Jarque-Bera	0.768367
Probability	0.681006

Normality test for L2



Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	2.46e-18
Median	-0.006421
Maximum	0.240216
Minimum	-0.166220
Std. Dev.	0.074494
Skewness	0.286556
Kurtosis	3.218534
Jarque-Bera	1.504863
Probability	0.471219

Appendix-3: Fixed effect regression outputs

Dependent Variable: L1
Method: Panel Least Squares
Date: 04/08/15 Time: 14:42
Sample: 2002 2013
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.074944	0.599868	-1.791968	0.0769
PR	1.948834	1.429251	1.363535	0.1765
NPLS	-0.015294	0.138882	-0.110121	0.9126
CAP	0.888632	0.338020	2.628931	0.0103
BSIZE	0.016682	0.020909	0.797862	0.4273
LG	-0.182922	0.058236	-3.141043	0.0024
GDP	-0.028205	0.242435	-0.116342	0.9077
IRM	14.65979	2.635772	5.561860	0.0000
INFL	0.151949	0.078762	1.929227	0.0572

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.590149	Mean dependent var	0.464649
Adjusted R-squared	0.513302	S.D. dependent var	0.109617
S.E. of regression	0.076473	Akaike info criterion	-2.152756
Sum squared resid	0.467845	Schwarz criterion	-1.725365
Log likelihood	119.3323	Hannan-Quinn criter.	-1.979998
F-statistic	7.679539	Durbin-Watson stat	1.674056
Prob(F-statistic)	0.000000		

Dependent Variable: L2
Method: Panel Least Squares
Date: 04/08/15 Time: 15:13
Sample: 2002 2013
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.657320	0.636778	2.602667	0.0110

PR	2.859503	1.517193	1.884733	0.0631
NPLS	0.332021	0.147427	2.252094	0.0271
CAP	0.431211	0.358818	1.201752	0.2330
BSIZE	-0.074523	0.022195	-3.357615	0.0012
LG	0.327055	0.061819	5.290506	0.0000
GDP	0.233266	0.257352	0.906408	0.3674
IRM	5.899827	2.797951	2.108624	0.0381
INFL	0.125518	0.083608	1.501275	0.1372

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.808237	Mean dependent var	0.689098
Adjusted R-squared	0.772282	S.D. dependent var	0.170114
S.E. of regression	0.081178	Akaike info criterion	-2.033334
Sum squared resid	0.527189	Schwarz criterion	-1.605943
Log likelihood	113.6000	Hannan-Quinn criter.	-1.860576
F-statistic	22.47879	Durbin-Watson stat	0.932466
Prob(F-statistic)	0.000000		

Appendix-4: Ratio data

Year	ID	L1	L2	PR	NPLs	CAP	BSIZE	LG	GDP	IRM	INFL
2002	CBE	0.428	0.5262	0.0229	0.5209	0.0493	23.8209	-0.0851	0.0163	0.0767	-0.106
2003	CBE	0.4009	0.4328	0.0225	0.535	0.0528	23.9096	-0.1229	-0.021	0.0742	0.109
2004	CBE	0.4076	0.3695	0.0119	0.3768	0.0468	24.0546	-0.0267	0.1173	0.0742	0.073
2005	CBE	0.5787	0.3767	0.0172	0.2752	0.0411	24.2249	0.1479	0.1264	0.0742	0.061
2006	CBE	0.4097	0.3286	0.0224	0.2245	0.042	24.3026	-0.0272	0.1154	0.0742	0.106
2007	CBE	0.5006	0.2969	0.0199	0.1452	0.0971	24.495	0.0498	0.1179	0.0742	0.158
2008	CBE	0.4740	0.4606	0.0270	0.0533	0.0904	24.6436	0.7767	0.1119	0.0742	0.253
2009	CBE	0.3591	0.4807	0.0323	0.0366	0.0848	24.8077	0.2058	0.1004	0.0742	0.364
2010	CBE	0.3855	0.4395	0.0265	0.0188	0.0748	25.0299	0.1488	0.1057	0.0775	0.028
2011	CBE	0.3569	0.4243	0.0251	0.0086	0.0548	25.4618	0.4982	0.1129	0.065	0.181
2012	CBE	0.2153	0.5345	0.0342	0.0074	0.0478	25.7909	0.7319	0.087	0.065	0.341
2013	CBE	0.453	0.4695	0.031	0.0223	0.0459	26.0072	0.1481	0.0982	0.065	0.135
2002	CBB	0.3968	0.9865	0.0042	0.4155	0.0835	20.6804	-0.0111	0.0163	0.0767	-0.106
2003	CBB	0.3593	0.9658	0.0117	0.4009	0.0849	20.6635	-0.0194	-0.021	0.0742	0.109
2004	CBB	0.4868	0.9365	0.0038	0.3547	0.0785	20.7787	0.0368	0.1173	0.0742	0.073
2005	CBB	0.5162	0.8116	0.0093	0.2776	0.048	21.3287	0.1692	0.1264	0.0742	0.061
2006	CBB	0.5755	0.9975	0.0312	0.1942	0.0562	21.3094	0.3757	0.1154	0.0742	0.106
2007	CBB	0.5106	0.9299	0.0296	0.1706	0.0603	21.3593	0.1272	0.1179	0.0742	0.158
2008	CBB	0.6369	0.9313	0.0352	0.1556	0.0566	21.5952	0.0436	0.1119	0.0742	0.253
2009	CBB	0.5153	0.8577	0.0284	0.1145	0.0592	21.6759	0.1341	0.1004	0.0742	0.364
2010	CBB	0.5295	0.7428	0.029	0.0656	0.0505	21.8744	0.1117	0.1057	0.0775	0.028
2011	CBB	0.3457	0.6888	0.0245	0.0432	0.048	21.9774	-0.0125	0.1129	0.065	0.181
2012	CBB	0.3718	0.5127	0.0193	0.0375	0.0302	22.5061	0.0442	0.087	0.065	0.341
2013	CBB	0.3072	0.4795	0.0176	0.0265	0.0252	22.792	0.0896	0.0982	0.065	0.135
2002	AIB	0.4333	0.6849	0.0108	0.2402	0.107	20.8294	0.1355	0.0163	0.0767	-0.106
2003	AIB	0.4768	0.6873	0.01	0.2513	0.0942	21.0605	0.2559	-0.021	0.0742	0.109
2004	AIB	0.4584	0.6336	0.0147	0.1839	0.0864	21.2942	0.1825	0.1173	0.0742	0.073
2005	AIB	0.4464	0.6649	0.0171	0.1202	0.0872	21.5235	0.3636	0.1264	0.0742	0.061
2006	AIB	0.3619	0.7293	0.0264	0.0956	0.0809	21.8064	0.4512	0.1154	0.0742	0.106

2007	AIB	0.3625	0.8072	0.0373	0.0736	0.0854	22.066	0.3419	0.1179	0.0742	0.158
2008	AIB	0.5566	0.7075	0.0296	0.0866	0.0997	22.2961	0.0899	0.1119	0.0742	0.253
2009	AIB	0.6422	0.5467	0.0223	0.0578	0.0930	22.5831	-0.0091	0.1004	0.0742	0.364
2010	AIB	0.6021	0.5152	0.0312	0.0547	0.0962	22.7958	0.1595	0.1057	0.0775	0.028
2011	AIB	0.5228	0.5148	0.0356	0.0387	0.1026	23.0374	0.2673	0.1129	0.065	0.181
2012	AIB	0.3434	0.5980	0.033	0.0191	0.1102	23.2029	0.3808	0.087	0.065	0.341
2013	AIB	0.3847	0.6146	0.0316	0.0229	0.1047	23.5008	0.4006	0.0982	0.065	0.135
2002	DB	0.4274	0.7322	0.0162	0.1422	0.0626	21.1194	0.2213	0.0163	0.0767	-0.106
2003	DB	0.4004	0.7816	0.0136	0.0889	0.0502	21.4119	0.4530	-0.021	0.0742	0.109
2004	DB	0.4004	0.7759	0.0209	0.0744	0.0519	21.708	0.3339	0.1173	0.0742	0.073
2005	DB	0.3604	0.7879	0.0208	0.0672	0.0711	21.9529	0.3207	0.1264	0.0742	0.061
2006	DB	0.3112	0.857	0.0293	0.0621	0.0684	22.2375	0.4176	0.1154	0.0742	0.106
2007	DB	0.3438	0.8204	0.031	0.0595	0.0801	22.5218	0.2604	0.1179	0.0742	0.158
2008	DB	0.4739	0.7123	0.0305	0.0589	0.0831	22.7811	0.0988	0.1119	0.0742	0.253
2009	DB	0.5634	0.5617	0.0257	0.0739	0.0809	22.9987	0.0159	0.1004	0.0742	0.364
2010	DB	0.5180	0.4977	0.0262	0.0300	0.0755	23.2372	0.1342	0.1057	0.0775	0.028
2011	DB	0.2558	0.5251	0.0307	0.0338	0.0786	23.4084	0.2315	0.1129	0.065	0.181
2012	DB	0.4105	0.5776	0.0372	0.0244	0.0753	23.5866	0.3066	0.087	0.065	0.341
2013	DB	0.3824	0.5591	0.0307	0.0297	0.0762	23.7063	0.0909	0.0982	0.065	0.135
2002	BOA	0.4785	0.7360	0.0049	0.3795	0.1252	20.856	-0.0262	0.0163	0.0767	-0.106
2003	BOA	0.4712	0.7519	0.0045	0.2843	0.1103	21.0107	0.2093	-0.021	0.0742	0.109
2004	BOA	0.4925	0.7545	0.0240	0.1751	0.1035	21.1839	0.1891	0.1173	0.0742	0.073
2005	BOA	0.4665	0.7585	0.0297	0.1240	0.1011	21.4445	0.2827	0.1264	0.0742	0.061
2006	BOA	0.3588	0.9017	0.03	0.0494	0.1186	21.765	0.5908	0.1154	0.0742	0.106
2007	BOA	0.3756	0.8471	0.0197	0.1054	0.1040	21.9458	0.1742	0.1179	0.0742	0.158
2008	BOA	0.4148	0.81	0.0034	0.1287	0.0954	22.1748	0.2222	0.1119	0.0742	0.253
2009	BOA	0.5625	0.6028	0.0183	0.1475	0.0814	22.4238	-0.0384	0.1004	0.0742	0.364
2010	BOA	0.4964	0.6136	0.0224	0.0698	0.0769	22.5606	0.1640	0.1057	0.0775	0.028
2011	BOA	0.4767	0.5458	0.0249	0.0397	0.0725	22.7081	0.0515	0.1129	0.065	0.181
2012	BOA	0.3726	0.5756	0.0263	0.0376	0.0904	22.8322	0.1754	0.087	0.065	0.341
2013	BOA	0.2320	0.5534	0.0269	0.0275	0.0895	23.0417	0.2065	0.0982	0.065	0.135
2002	WB	0.4427	0.7883	0.0093	0.1294	0.0913	20.2863	0.1802	0.0163	0.0767	-0.106
2003	WB	0.4460	0.8111	0.0124	0.1086	0.0956	20.6056	0.4064	-0.021	0.0742	0.109
2004	WB	0.4669	0.8425	0.0281	0.1224	0.0921	20.8543	0.2925	0.1173	0.0742	0.073
2005	WB	0.4814	0.7780	0.0297	0.0841	0.0891	21.2032	0.3577	0.1264	0.0742	0.061
2006	WB	0.3718	0.8960	0.0314	0.0485	0.0894	21.5382	0.5898	0.1154	0.0742	0.106
2007	WB	0.4847	0.7913	0.0322	0.0525	0.092	21.9702	0.3528	0.1179	0.0742	0.158
2008	WB	0.6080	0.7911	0.0337	0.0839	0.1215	22.1403	0.089	0.1119	0.0742	0.253
2009	WB	0.7820	0.5666	0.0353	0.077	0.137	22.3561	-0.0999	0.1004	0.0742	0.364
2010	WB	0.7739	0.6306	0.0389	0.0347	0.154	22.4711	0.1711	0.1057	0.0775	0.028
2011	WB	0.5551	0.4885	0.0401	0.0351	0.1358	22.8103	0.1763	0.1129	0.065	0.181

2012	WB	0.4847	0.6192	0.0403	0.0298	0.162	22.8452	0.2253	0.0870	0.065	0.341
2013	WB	0.3675	0.6212	0.0330	0.0270	0.1516	23.0645	0.3154	0.0982	0.065	0.135
2002	UB	0.7513	0.8624	0.0127	0.1595	0.2707	19.5649	0.2164	0.0163	0.0767	-0.106
2003	UB	0.5228	0.9159	0.0107	0.0993	0.1855	19.9661	0.7791	-0.021	0.0742	0.109
2004	UB	0.5451	0.7218	0.0104	0.099	0.135	20.3287	0.3241	0.1173	0.0742	0.073
2005	UB	0.5595	0.6855	0.0289	0.0845	0.0951	20.7937	0.5443	0.1264	0.0742	0.061
2006	UB	0.4861	0.823	0.0275	0.0418	0.0982	21.1926	0.6931	0.1154	0.0742	0.106
2007	UB	0.4919	0.915	0.0293	0.0459	0.1415	21.504	0.4044	0.1179	0.0742	0.158
2008	UB	0.5671	0.7611	0.0280	0.0398	0.1228	21.902	0.3189	0.1119	0.0742	0.253
2009	UB	0.5874	0.5952	0.0201	0.0462	0.0965	22.2606	0.1573	0.1004	0.0742	0.364
2010	UB	0.6931	0.5532	0.0296	0.0376	0.0859	22.4976	0.2144	0.1057	0.0775	0.028
2011	UB	0.5868	0.5402	0.03	0.0335	0.0938	22.7678	0.2538	0.1129	0.065	0.181
2012	UB	0.5436	0.6046	0.0339	0.0153	0.0978	22.8965	0.2467	0.087	0.065	0.341
2013	UB	0.3557	0.5842	0.0214	0.0253	0.0953	23.0236	0.1531	0.0982	0.065	0.135
2002	NIB	0.4841	0.9391	0.0243	0.0864	0.1704	20.0959	0.5429	0.0163	0.0767	-0.106
2003	NIB	0.4150	0.9354	0.0147	0.1234	0.1311	20.6011	0.6975	-0.021	0.0742	0.109
2004	NIB	0.3978	0.9447	0.0281	0.0877	0.1187	20.944	0.4291	0.1173	0.0742	0.073
2005	NIB	0.3794	0.9264	0.0266	0.1122	0.1103	21.2725	0.4415	0.1264	0.0742	0.061
2006	NIB	0.4096	0.9299	0.0286	0.0847	0.1209	21.4298	0.3019	0.1154	0.0742	0.106
2007	NIB	0.3704	0.967	0.0292	0.0556	0.1423	21.6815	0.2319	0.1179	0.0742	0.158
2008	NIB	0.5396	0.8558	0.0310	0.0673	0.1418	22.018	0.1634	0.1119	0.0742	0.253
2009	NIB	0.6582	0.6736	0.0320	0.1116	0.1288	22.2932	0.0504	0.1004	0.0742	0.364
2010	NIB	0.6234	0.6169	0.0336	0.0737	0.1284	22.5101	0.1468	0.1057	0.0775	0.028
2011	NIB	0.3666	0.5364	0.0347	0.0504	0.1350	22.685	0.0866	0.1129	0.065	0.181
2012	NIB	0.5106	0.6353	0.0346	0.0247	0.1540	22.8366	0.3406	0.087	0.065	0.341
2013	NIB	0.3388	0.6826	0.0255	0.0379	0.1515	22.9364	0.2249	0.0982	0.065	0.135

Appendix-5: Interview Instrument

Addis Ababa University

School of Business and Public Administration

Department of Accounting and Finance

Interview questions for the higher officials of Ethiopian Commercial Banks

1. What are the overall factors that can affect your banks' liquidity?
2. How do those identified factors affect/influence your banks' liquidity in general?
3. Among the identified factors that can influence your banks' liquidity, which of them are the major determinants of your banks' liquidity?
4. What types of measures are taken by your bank in order to reduce the influence of factors that affects liquidity negatively?
5. Do you think that the identified factors contribute to the existence of low or high liquidity of the bank? And, if they have, how do they contribute?
6. Any comments?

Thank you!