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SCHOOL OF GRADUATE STUDIES

DETERMINANTS OF LIQUIDITY OF COMMERCIAL BANKS'

IN ETHIOPIA

BY

MEKONNEN FEKADU HABTE

MAY 29, 2018

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DECLARATION

This is to certify that the thesis prepared by Mekonnen Fekadu, under guidance of Zenegnaw Abiy Hailu (PhD) entitled: "*Determinants of liquidity of commercial banks in Ethiopia*" and submitted in partial fulfillment of the requirements for the Degree of General Master of Business Administration with the regulations of the university and meets the accepted standards with respect to originality and quality. I similarly confirm that this thesis hasn't be given to either partially or entirely too any other learning institutions for obtaining any degree.

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ENDORSEMENT

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ABSTRACT

The purpose of this research is to identify the factors significant to explain Ethiopian commercial banks liquidity. The study has categorized the independent factors into bank specific factors and macroeconomic factors. The bank specific factors include capital adequacy, bank size, profitability, non-performing loans and leverage and while the macroeconomic factors include gross domestic product, general inflation, national bank bill, interest rate on loans and advances , interest rate margin, money market interest rate and unemployment rate. The panel data was used for the sample of seven commercial banks in Ethiopia from 2000 to 2017 year and estimated using fixed effect model (FEM), data was present by using descriptive statistics and the balanced correlation and regression analysis for liquidity ratios was conducted. This study obtained secondary data from seven Ethiopian commercial banks from the year 2000 to 2017.The study used purposive sampling method with selection criteria of longest establishment years, panel financial data availability, strong capital and assets share and ample operational experience for selection of seven from total of eighteen CBs. Bank specific and macroeconomic factors determine liquidity are analyzed by descriptive statistics, correlation and regression analysis techniques by balanced panel fixed effect multiple regression analysis model. The study revealed that non-performing loans and advances, interest rate on loans and advances and general inflation rate have positive and statistically significant whereas bank size, national bank bill purchase policy and interest rate margin have negative and statistically significant influence on CBs' liquidity in Ethiopia. But capital adequacy, profitability, leverage, real GDP growth rate, money market interest rate and unemployment rate have statistically insignificant influence on CBs' liquidity in Ethiopia. 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. The study also suggests that 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 and to increase financial soundness, strength, competiveness, development and growth of banking industry.

Key terms: *Liquidity, Ethiopian commercial banks, liquidity determinants, asset and liability management, balanced panel fixed effect multiple regression analysis*

ACKNOWLEDGEMENTS

LIST OF TABLES AND FIGURES

LIST OF ABBREVIATION AND ACRONYMS

AIB:	Awash International bank
BOA:	Bank of Abyssinia
BG:	Breusch-Godfrey
BJ:	Bera-Jarque
BSIZE:	Bank size
CAP:	Capital Adequacy
CBs:	Commercial Banks
CBE:	Commercial Bank of Ethiopia
CSA:	Central Statistical Agency
CLRM:	Classical linear Regression Model
CPI:	Consumer Price Index
DB:	Dashen Bank
DW:	Durbin-Watson
FEM:	Fixed Effect Model
GDP:	Gross Domestic Product
HP:	Hypotheses
IMF:	International Monetary Fund
INF:	Inflation Rate
IRM:	Interest Rate Margin
IRLA:	Interest Rate on Loans and Advances
LEV:	Leverage
LIQ:	Liquidity
LnTOA:	Natural Logarithm of Total Asset
LOLR:	Lender of Last Resort
MMIR:	Money Market Interest Rate
MoFEC:	Ministry of Finance and Economic Cooperation
NBBP:	National Bank Bill Purchase
NBE:	National Bank of Ethiopia
NIB:	Nib International Bank

NPLA:	Non-Performing Loans and Advances
OLS:	Ordinary Least Square
PFEA:	Public Finance Enterprise Agency
REM:	Random Effect Model
ROA:	Return on Asset
ROE:	Return on Equity
UB:	United Bank
UER:	Unemployment Rate
WB:	Wegagen Bank

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CHAPTER ONE

1. INTRODUCTION

1.1   Background of the Study

Banks play vital role in economic development through engaging themselves in an intermediary role which enhances investment and growth. Bashir (2007) observed that commercial banks contribute positively to the economic growth by channeling surplus funds to their most productive uses.

Liquidity is the ability of banks to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses (BIS, 2008). Liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans. 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 can not 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: First 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 to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage.

During the 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.

Liquidity management is a concept that is receiving serious attention all over the world especially with the current financial situations and the state of the world economy. Some of the striking corporate goals include the need to maximize profit, maintain high level of liquidity in order to guarantee safety, attain the highest level of owner's net worth coupled with the attainment of other corporate objectives. The importance of liquidity management as it affects corporate profitability in today's business cannot be over emphasized. The crucial part in managing working capital is required maintenance of its liquidity in day-to-day operation to ensure its smooth running and meets its obligation (Eljelly, 2004).

Managing liquidity is among the most vital activities of commercial banks. By assuring a bank's ability to meet its liabilities as they come due, liquidity management can reduce the probability of an irreversible adverse situation developing. Even in cases where a crisis develops because of a problem elsewhere at a bank, such as a severe deterioration in asset quality or the uncovering of fraud, or where a crisis reflects a generalized loss of confidence in financial institutions, the time available to a bank to address the problem will be determined by its liquidity. Indeed, the importance of liquidity transcends the individual institution, since a liquidity shortfall at a single institution can have system-wide repercussions. For this reason, the analysis of liquidity requires bank managements to measure not only the liquidity positions of banks on an ongoing basis but also to examine how funding requirements are likely to evolve under crisis scenarios.

Liquidity management therefore involves the strategic supply or withdrawal from the market or circulation the amount of liquidity consistent with a desired level of short-term reserve money without distorting the profit making ability and operations of the bank. (Olagunju, Adebayo 2011)

Financial inter-mediation role of the commercial banks hence becomes the bed-rock of the two major functions of commercial banks namely deposit mobilization and credit extension. An adequate financial intermediation requires the purposeful attention of the bank management to profitability and liquidity, which are two conflicting goals of the commercial banks. These goals are parallel in the sense that an attempt for a bank to achieve higher profitability will certainly erode its liquidity and solvency positions and vice versa. (Olagunju, Adebayo 2011)

In the financial intermediation process, a bank collects money on deposit from one group (the surplus unit) and grants it out to another group (the deficit unit). These roles involve bringing together people who have money and those who need money.

Liquidity management is an important aspect of monetary policy implementation, while the other integral component of monetary policy, i.e. economic management, involves promoting sustainable economic growth over the long term by keeping monetary and credit expansion in step with an economy's noninflationary output potential, liquidity or reserve management as a shorter time horizon. In order to maintain relative macro-economic stability, reliance is placed on liquidity management to even out the swings in liquidity growth in the banking system. (Olagunju, Adebayo, 2011)

This study enables banks and regulators to keep control to the issue of liquidity which is very important to the wellbeing of their operation as well as the economy as a whole in the country. This chapter consists of seven section that include: brief overview of banking history in Ethiopia, statement of problem, the research objective, research question and hypothesis, scope of the study, significance of the study and structure of the study.

1.2   Overview of Banking Environment in Ethiopia

The history of banking in Ethiopia dates back to the turn of the century, when, in 1905 modern banking introduces to the country. February 15, 1906 marked the beginning of banking in Ethiopia history when the first Bank of Abyssinia was inaugurated by Emperor Menelik II. According to the agreement, the bank was allowed to engage in commercial banking (Selling shares, accepting deposit and effecting payment in cheques) and to issue currency

notes. The Bank, which started operation a year after its establishment agreement was signed, opened branches in Harar, Dire Dawa, Gore and Dembi- Dolo as well as an agency office in Gambela and a transit office in Djibouti and It was a private bank whose shares were sold in Addis Ababa, New York, Paris, London, and Vienna (NBE, 2010).

Under Emperor Haile Selassie, in agreement with national Bank of Egypt, decided liquidation of the bank of Abyssinia, paid compensation to its shareholders and established the Bank of Ethiopia which was fully owned by Ethiopians, with a capital of pound Sterling 750,000. The bank started operation in 1932 and retained management staff, premises and clients of the old bank. The majority shareholders of the bank of Ethiopia were the Emperor and Political elites of the time. The bank of Ethiopian provides Central and Commercial banking service to the country. With the Italian occupation (1936-1941), the operation of the Bank of Ethiopia came toa halt, but a number of Italian financial institutions were working in the country. These were Banco Di Roma, Banco Di Napoli and Banca Nazionale DelLavora. It should also be mentioned that Barclays Bank had opened a branch and operated in Ethiopia during 1942 -43. (NBE, 2010)With the departure of the Italians and the restoration of Emperor Haile Selassie's government, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed. In 1963, the State Bank of Ethiopia split into the National Bank of Ethiopia and the Commercial Bank of Ethiopia S.C with the purpose of segregating the functions of central banking from those of commercial banking. In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution.

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

Bank continued under the same name until 1994 when it was renamed as the Development Bank of Ethiopia.

After the overthrow of the Dergue regime by the EPRDF, the Transitional Government of Ethiopia was established and the New Economic Policy for the period of transition was issued. This new economic policy replaced centrally planned economic system with a market-oriented system and ushered in the private sector. The new banking law [Proclamation no. 84/1914] was passed in January 1994. This established the minimum capital requirement for establishing a Commercial bank (Br. 10 million, US$ 1.7 million at end-1994) and capital adequacy ratio (8%of risk weighted assets). As a result, currently, the country has two public-owned and sixteen private banks, which are operating throughout the country (NBE 2013/2014).

The competition in the banking industry of Ethiopia becomes increasing from time to time as more new private domestic banks are joining to the industry. Especially, it creates competition among banks in terms of resource mobilization which leads to curiosity in liquidity management. Even, the private commercial banks vigilant the public banks to actively compete in the resource mobilization through expanding branch networks and implementation of new strategies.

Banking business is prosperous in service quality, overstretching, capital and assets strength, resource mobilization, customer bases, credit disbursement, collections and assets quality, human capital and automation development. Liquidity of banks measured by broad money supply and resources mobilized by the banking system in the form of deposit, borrowing and loan collection hiked by 55.2 percent at the end of 206/2017 and also reached Birr 233.6 billion at the end of 2016/2017. Commercial banks have opened 956 new branches in 2016/2017 alone, which raised the total number of branches to 4,257 from 3,301 a year ago. Banks have also increased deposit liabilities of the banking system to Birr 568.8 billion, reflecting 29.8 percent annual growth rate as of June 30 2016/2017.In these regard, there are many micro and macroeconomic that are internal and external factors influencing operational existence of CBs in various dimensions. So, this study is fundamental to identify and examine the determinants that influence CBs' liquidity in Ethiopia.

1.3 Statement of the Problem

Liquidity is an important determinant of financial distress; because without liquidity a bank cannot meet the deposit withdrawals and satisfy customer loans (Mervin, 1942; Beaver, 1996). That is why liquidity always comes first. Without it, a bank does not open its doors, and with it a bank may have time to solve its basic problem (Hubbard, 2000).

However,Miegs and Miegs (1999), observe that being too liquid is costly yet having too little liquidity is also risky, calling for a need for commercial banks to have a trade-off between liquidity risk and costs associated with illiquidity.

The need for liquidity management therefore, is to ensure that banks will be able to meet in full all their obligations as they fall due. According to the National Bank of Ethiopia (2016) liquidity, liquidity management is a crucial element in the management of an institution, it is therefore important for management of any banking institution to not only measure liquidity on an ongoing basis but also examine ways of how to fund liquidity requirements during distress.

From review of the literature, the author of this thesis noted that Fekadu (2016), Yimer (2016), Berihun (2015), Fola (2015), Melese (2015), Hailu (2013) and Tesfaye (2012) have studied determinants of CBs' liquidity in Ethiopia. However, their findings have numerous inconsistencies among each other, for instance, Fekadu (2016), Yimer (2016), Berihun (2015), Fola (2015), Melese (2015), Hailu (2013) and Tesfaye (2012) found that capital adequacy, bank size, non-performing loans and advances, profitability, interest rate margin, interest rate on loans and advances, money market interest rate, real GDP growth rate and general inflation rate have positive and statistically significant impact on liquidity. Whereas, Fekadu (2016), Berihun (2015), Fola (2015), Melese (2015) and Hailu (2013) found capital adequacy, bank size, real GDP growth rate and profitability to havea negative and statistically significant impact on liquidity. Fekadu (2016) and Asnake (2017) studied on the national bank's bill purchase policy and he found a negative and statistically significant impact on liquidity. Fekadu (2016), Yimer (2016), Berihun (2015), Fola (2015), Melese (2015) and Tesfaye (2012), on the other hand, found that capital adequacy, bank size, non-performing loans and advances, interest rate margin, interest rate on loans and advances, money market interest rate, real GDP growth rate and general inflation rate to have statistically insignificant impact on liquidity.

These studies did not consider some key variables such as the effect of leverage (ratio of total debt to total assets) on the liquidity problem of commercial banks in Ethiopia taking into account the recent changes in NBE's policy in relation to foreign exchange administration and devaluation of local currency. To fill this knowledge gap and to check the inconsistencies in the previous studies, the current study tries to provide real and detailed information about the determinant factors affecting liquidity of commercial banks and feasible recommendation for the impact of identified variables on the levels of liquidity for a series of 18Years (2000-2017).

The research is basically concentrated on the data available in financial statements of banks and other documents which had macroeconomic data in relation to the selected variables kept by NBE, the banks themselves and Ministry of Finance and Economic cooperation (MoFEC) covering the period of 2000-2017.

1.4 Research Objectives

1.4.1 General Objectives

The main objective of this study is to find out the determinants of liquidity of Ethiopian commercial banks which enables them to determine their liquidity requirement and ensures their ability to meet up the depositors demand or their financial obligations.

1.4.2 Specific Objectives
- ✓ To determine the effect of capital adequacy on CBs' liquidity
- ✓ To determine the effect of bank size on CBs' liquidity
- ✓ To determine the effect of profitability on CBs' liquidity
- ✓ To determine the effect of non-performing loans and advances on CBs' liquidity
- ✓ To determine the effect of leverage on CBs' liquidity
- ✓ To determine the effect of real GDP growth rate on CBs' liquidity
- ✓ To determine the effect of general inflation rate on CBs' liquidity
- ✓ To determine the effect of national bank bill purchase policy on CBs' liquidity
- ✓ To determine the effect of interest rate on loans and advances on CBs' liquidity
- ✓ To determine the effect of interest rate margin on CBs' liquidity
- ✓ To determine the effect of money market interest rate on CBs' liquidity
- ✓ To determine the effect of unemployment rate on CBs' liquidity

1.5 Research Question

This research is set out to answer the following research question:

- ✓ How do capital adequacy influence CBs' liquidity in Ethiopia?
- ✓ How do bank size influence CBs' liquidity in Ethiopia?
- ✓ How do profitability influence CBs' liquidity in Ethiopia?
- ✓ How do non-performing loans and advances influence CBs' liquidity in Ethiopia?
- ✓ How do leverage influence CBs' liquidity in Ethiopia?
- ✓ How do real GDP growth rate influence CBs' liquidity in Ethiopia?
- ✓ How do general inflation rate influence CBs' liquidity in Ethiopia?
- ✓ How do national bank bill purchase policy influence CBs' liquidity in Ethiopia?
- ✓ How do interest rate on loans and advances influence CBs' liquidity in Ethiopia?
- ✓ How do interest rate margin influence CBs' liquidity in Ethiopia?
- ✓ How do money market interest rates influence CBs' liquidity in Ethiopia?
- ✓ How do unemployment rate influence on CBs' liquidity in Ethiopia?

1.6 Scope of the Study

The scope of this study is to assess the internal and external factors affecting liquidity of seven commercial banks registered by the NBE which joined the banking industry. The reasoning behind choosing these 7 banks and calendar year is due to their availability of data and working experience for the specific duration of 2000 to 2017 namely Commercial bank of Ethiopia, Awash bank, Dashen bank, Bank of Abyssinia, United bank, Wgagen bank and Nib international bank for specific duration of 2000 to 2017 G.C.

1.7 Significance of the Study

In this study, researcher examines a series of variables by introducing internal and external factors that may significantly affect the commercial banks' liquidity. The issue of liquidity management has now got great attention in the Ethiopian banking industry. The supervisory authority has required banks to have their own liquidity policy which enforces them to monitor their funding structure and their ability to handle short term liquidity problems and provide them with a better means of assessing the present and future liquidity risk associated. Thus, this study has great contribution to the Ethiopian commercial banks to assess their liquidity requirement

and to produce their liquidity policy and to give due attention on those factors which have significant impact on bank's liquidity. It has also a great contribution to the existing knowledge in the area of factors determining commercial banks liquidity. Therefore, the study as a whole will have great contribution to the supervisory authority, policy makers, commercial banks and other researchers to gain knowledge about their impact and the relationship between the macroeconomic and bank specific factors and liquidity of commercial banks.

1.8 Limitation of the Study

The major limitation of the study was to find for a consistent time series data on the both the dependent and independent variables used in the study.

1.9 Organization of the Study

This study encompasses five chapters. The first chapter consists of background of the study, Ethiopian banking history, statement of the problem, research questions of the study, objective of the study, scope of the study, limitations of the study and significance of the study. The second chapter dwells on review of related literatures, the third chapter copes with research design and methodology and the fourth chapter offers major findings and analysis. Finally, the fifth chapter provides summary, conclusion and recommendations of the study.

2. LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature containing thoughts and ideas shared by various authors and researchers, some regulator bodies and findings of past research on internal and external factors affecting liquidity of commercial bank of Ethiopia. The chapters consists of concepts of bank liquidity, theoretical literature of determinants of bank liquidity, theoretical model, conceptual framework, review of empirical studies International and Ethiopia, and discuss the knowledge gap.

2.2 The Concept of Bank Liquidity

In Investopedia the term liquidity is referred as "the ability to convert an asset to cash quickly. It is also known as "marketability". In addition to this, the same source use a different term. "Liquidity is the degree to which an asset or security can be bought or sold in the market without affecting the asset's price. Liquidity is characterized by a high level of trading activity. Assets that can be easily buy or sold, are known as liquid assets". Robert Waldmann (2009) liquidity is described as the property of an asset which indicates that it can be converted into money quickly and with low transaction costs.

Similar to this definition the author believes that "liquidity is a property of an asset which indicates that a large amount of it can be converted into money quickly at a price close to its current price" (Waldmann 2009).

Liquidity is the property of a market in which assets are traded and large amounts of those assets can be sold and bought quickly at the current market price Waldmann (2009). If the sellers do not have the possibility to sell their liquid assets in a high market price - no one of the buyers is willing to buy them - they are going to face a serious liquidity problem. This creates problems for firms which were planning to sell such assets in order to pay liabilities. The difficulties are getting bigger, when we talk about huge organizations like banks.

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

2.3 Commercial Banks Liquidity Management Theory

This theory depends on assets and liabilities management. Liquidity management is an ongoing standardization between current assets and current liabilities for repaying short-term liabilities successfully. Balance sheet liquidity is most cash and cash equivalent assets in the CBs balance sheet. It shows assets and liabilities maturity breakdown arises from money market for providing reliable cash assets assurance and keeping depositors' confidence during bank run or disparity (Berihun, 2015).

2.3.1 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.

2.3.2 Keynes -Liquidity Preference 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.

2.3.3 Bank Liquidity Creation and Financial Fragility Theory

According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long term illiquid assets with short term liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Banks perform valuable activities on either side of their balance sheets; on the asset side, they make loans to illiquid borrowers and on the liability side, they provide liquidity on demand to depositors. As of Diamond and Rajan (1998) depositors get better access to their funds than they would if they invested directly and earned the same expected return: this is liquidity creation. Borrowing firms too can find the bank to be a more reliable source of funding than another firm or individuals: banks insure borrowers against the liquidity risk that funding will be cut off prematurely.

2.3.4 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.

A. Bank Specific Factors

Capital Adequacy and Bank Liquidity

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

Thakor (1994) shows that capital may also affect bank's asset portfolio composition, thereby affecting liquidity creation through a change in the assets mix.

As Richard Cantor (2001) definition capital adequacy is the sufficient fund to absorb losses to protect depositors, creditors, and official institutions in the interest of maintaining banking system stability. NBE-Capital adequacy framework indicates the regulatory requirements for the banking institutions to meets its obligations if they fall due, while also maintaining the confidence of customer, depositors, creditors and other stakeholders in their dealings with the institution. Ritabal-Khouri (2012) indicates a bank's financial ability to pay depositors whenever they demand their money and still have enough funds to increase the bank's assets through

additional lending. Based on the definition above, it is understood that the NBE's definition fits best since this research concerning Ethiopia. NBE provides the measurement of capital adequacy as: Total Capital Ratio = Total capital/Total Risk weighted assets.

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

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

This activity being directly related to one of the roles played by financial intermediaries (risk transformation) (Al-Khouri, 2012). The greater liquidity needs of banks, most likely for banks to incur higher losses due to the disposal of illiquid assets at available market prices rather than the desired prices to meet the customers' obligations. This however, can be absorbed via higher capital levels. Also in fact, Bhattacharya and Thakor (1993) and Coval and Thakor (2005)

emphasized the point by quoting that "bank capital absorbs risks and expands banks risk-bearing capacity". Briefly, higher capital ratios allow banks to create more liquidity. Repullo (2004) has well stated that higher bank capital allows for more efficient absorption of risk. Consecutively, Al-Khouri (2012) has also consistent findings to above which states that bank capital increases bank liquidity through its ability to absorb risk. This concludes that recent studies also agree that positive and significant relationship exist between bank capital and liquidity.

Bank size and Bank Liquidity

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

Review results presented below discuss, the relationship between bank size and liquidity.

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

According to the "too big to fail" argument, large banks would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannottaet 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 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

Bouwman2009) they do have small amount of liquidity. Hence, there can be negative relationship between bank size and illiquidity.

Profitability and Bank Liquidity

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

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

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

holding lower return liquid assets as the latter may affect a banks' ability to generate income, increase capital and extend credit.

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

Non-Performing Loan and Bank Liquidity

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

Based on the above definitions, it is understood that NPLs are loans that a bank customer fails to meet his contractual obligations on either principal or interest payments exceeding 90 days. Increase in NPLA negatively and significantly influence business performance and assets quality by distressing lending ability and confidence loss and increase liquidity problems.

Leverage and Bank Liquidity

The impact of leverage on liquid assets holdings decisions of firms is not clear-cut. On the one hand, to the extent that leverage ratio acts as a proxy for the ability of firms to issue debt.

Moreover, Baskin (1987) argues that the cost of funds used to invest in liquidity increases as the ratio of debt financing increases. This, in turn, implies a reduction in liquid assets holdings with increased debt in capital structure.

However one should note that higher debt levels could increase the likelihood of financial distress. In that case, one would expect a firm with a high debt ratio to increase its cash holdings to decrease the likelihood of a financial distress. This would induce a positive relation between leverage and cash holdings.

B. 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; 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).

The Rate of Inflation and Bank Liquidity

A growing theoretical literature describes mechanisms whereby even predictable increases in the rate of inflation interfere with the ability of the financial sector to allocate resources effectively.

More specifically, recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector (both banks and equity market) performance and therefore long-run real activity (Huybens and Smith 1998, 1999). The common feature of these theories is that there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general.

The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short term assets held by economic agents including banks will rise with the rise in inflation. Hence, there is positive relationship between increase in inflation rate and banks liquidity.

National Bank Bills and Bank Liquidity

National Bank of Ethiopia(NBE), since April 01,2011, has issued NBE bills purchase Directives, subsequent to a lifting of lending caps which has been applied for about two consecutive years (from year 2009-2011) and at the moment the NBE forced the commercial banks to apply the lending cap. It mainly pertains to purchase of Bonds (the great renaissance dam saving bond) by commercial banks from NBE (which later transferred to the Development Bank of Ethiopia) equivalent to 27% of new loan disbursement issued at a concessionary rate of three-percent (Directive No. MFA/NBEBILLS/001/2011).

This directive is confronted by private banks as it assumed to bring formidable challenges on the activity of commercial banks, particular to privately owned banks, through negatively affecting the expansion in the loan book and hence reducing earning thereof. In addition, its retroactive application and subsequent expansion of the exposure to bills is claimed to create tight liquidity position. Therefore, assessment of its impact is becoming a paramount importance. The study tries to measure the effect of such policy framework on the effect of liquidity of selected private

commercial banks using panel data from 2007-2017. Study presents a negative impact of national bank bill on bank liquidity. NBBP is used as a dummy variable in this model where one would be allocated for private banks and zero for the other government banks.

Interest Rate on Loans & Advances and Bank Liquidity

Keynesian liquidity preference theory states that when liquidity preference rises interest rates will also rise as people hold onto liquid assets (Keynes 1936). Lending rate is the bank rate that usually meets the short and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing, the availability of money in the market, tenure of the loan, the type and value of collateral, the economic sector of the loan and on the specific terms of the contract. Bank lending rate is measured by average interest rate on lending. The higher the interest rate on loans & advances is expected to encourage banks to grant more loans to customer. Therefore, interest rate on loans & advances has negative relationship with liquidity.

Interest Rate Margin and Bank Liquidity

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

Money Market Interest Rate and Bank Liquidity

Money market instruments have interest rate applicable on short term loans and advances provided for shorter maturity periods like Treasury bills (TB), commercial papers, bankers acceptances, certificates of deposit and repurchase agreements. These instruments are plausibly essential for CBs as part of reserves and borrowing collateral from central bank to minimize default risk. Though, high MMIR on such instruments encourage them to make more investment and increase liquidity position. Thus far, MMIR has positive relationship with CBs' liquidity (Pilbeam, 2005). TB is high liquid asset. It is fortnightly the only regular primary market securities in Ethiopia. Hence, MMIR is proxy weighted average yield of TB annually (28 days, 71 days and 182 days) for this study (Tesfaye, 2012).

Unemployment Rate and Bank Liquidity

Fiscal and monetary policies of government are considered as "demand management policies", because the policies study management and control of demand. The main purposes of fiscal and monetary policies are to promote production, employment, and fix prices level in economy. Meanwhile, to provide more demand causes an increase the inflation rate while the lack of demand causes temporary unemployment. An increase in the unemployment rate can be translated into an increase in non-performing loans and thus lowering bank liquidity (Trenca et al. 2015). Bank's performance increases when unemployment rate decreases (Ferrouhi, 2014). The level of unemployment is connected with demand for loans and can also act as a proxy for the general health of the economy and the negative influence means (Hackethal et al. 2010). The negative influence of the level of unemployment indicate that the healthier economy is, i.e. the lower the unemployment rate, the more liquidity is created by banks. The study by Vodova (2012) also supports the aforementioned issues by fount out bank liquidity decreases with the higher unemployment rate. However, Munteanu (2012) and Singh and Sharma (2016) found that unemployment rate had positive impact on bank liquidity and thus the impact thereon is significant for Munteanu (2012) and insignificant for Singh and Sharma (2016).

2.4 Empirical Literature on the Determinants of Liquidity

2.4.1 Reviews of International Studies

Vodova (2011) aimed to identify important factors affecting commercial banks liquidity of Czech Republic. In order to meet its objective the researcher considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis by using EViews7 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.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. The study had three main goals: discussing the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; identifying the key determinants of liquidity, and; to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic

fundamentals. Liquidity which was measured by loan-to-deposit ratio should depend on: cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio expected to have negative impact, the macroeconomic situation, where a cyclical downturn should lower banks expected transactions demand for money and therefore lead to decreased liquidity expected to have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity.

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

In a second step, it analyzed the influence of monetary policy on bank liquidity creation. The study measure the created liquidity using the calculation method set forth by (Berger and Bouwman 2007 and Deep and Schaefer 2004). To measure the monetary policy influence, the study developed a dynamic panel regression model. According to this study, following factors can determine bank liquidity: monetary policy interest rate, where tightening monetary policy expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, savings quota affect banks liquidity positively, level of liquidity in previous period has positive impact, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity.

To perform the tests of measuring liquidity and analyzing influential factors on bank liquidity the researcher used bank balance sheet data and general macroeconomic data. The control variable for the general macroeconomic influence shows that there is a positive relationship between the general health of the economy and the bank liquidity creation. The healthier the economy is the more liquidity is created. It was also found that banks with a higher ratio of interest to provision income create more liquidity. Other bank related variables, such as size or performance revealed no statistically significant influence on the creation of liquidity by the banks.

Determinants of liquidity risk of banks from emerging economies for a sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis were

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analyzed by (Bunda and Desquilbet 2008). The study was aimed to explore how the liquidity of commercial bank assets is affected by the exchange rate regime of the country in which they operate. The liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behavior of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors: total assets as a measure of the size of the bank, the lending interest rate as a measure of lending profitability, and the realization of a financial crisis, which could be caused by poor bank liquidity expected to have negative impact on banks liquidity whereas, the ratio of equity to assets as a measure of capital adequacy, the presence of prudential regulation, which means the obligation for banks to be liquid enough, the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers, and the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes are expected to have positive impact on banks liquidity.

The result of the study by Bunda and Desquilbet (2008) showed there is positive and statistically significant effect of capital adequacy, lending interest rate, public expenditure to GDP, and growth on liquidity of banks under five liquidity measures. On the other hand, the presence of prudential regulation and financial crises showed negative and significant impact on bank liquidity position. It also reviled that in hard pegs and in pure floats, commercial banks are more liquid than in intermediary regimes (bank liquidity smile). However, the effect of bank size is insignificant. Lucchetta (2007) made empirical analysis of the hypothesis that interest rates affect banks risk taking and the decision to hold liquidity across European countries.

Bank-specific and macroeconomic determinants of liquidity of English banks were studied by (Aspachs et al. 2005). The researchers used unconsolidated balance sheet and profit and loss data, for a panel of 57 UK-resident banks, on a quarterly basis, over the period 1985 to 2003.

They assumed that the liquidity ratio as a measure of the liquidity should be dependent on following factors: Probability of obtaining the support from LOLR(Lender of last resort), which should lower the incentive for holding liquid assets, interest margin as a measure of opportunity costs of holding liquid assets expected to have negative impact, bank profitability, which is according to finance theory negatively correlated with liquidity, loan growth, where higher loan

growth signals increase in illiquid assets, size of the bank expected to have positive or negative impact, gross domestic product growth as an indicator of business cycle negatively correlated with bank liquidity, and short term interest rate, which should capture the monetary policy effect with expected negative impact on liquidity.

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

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

2.4.2 Related Empirical Studies in Ethiopia

Some related studies were conducted by different researchers in Ethiopia. For example, Natnael (2013) argued that liquidity has an impact on the performance of commercial banks in Ethiopia and six factors affecting bank's liquidity were selected and analyzed. The results of regression analysis showed that short term interest rate and inflation had positive and insignificant impact on DBE's liquidity. While, NPL ratio impact on liquidity was statistically significant and has positive impact. Loan growth rate and real GDP growth rate had statistically significant effect on the liquidity of DBE and has a negative impact.

Birhaun (2015) also studied determinants of banks liquidity and their impact on profitability and the study was identified the main determinates of Ethiopian commercial banks liquidity and its impact on profitability. In order to achieve the objective a secondary sources of data were collected from eight commercial banks in the sample covering the period from 2002/03 to 2013/14 and analyzed them with panel data regression analysis.

The results of regression analysis showed that bank size and loan growth had negative and statistically significant impact on banks liquidity measured by liquid asset to total Asset. Real growth rate of gross domestic product on the basis price level, Interest rate on lending ,Non-performing loans in the total volume of loans, bank size, actual reserve ration and short term interest rate had positive and statistically.

Mekbib (2016) studied banks liquidity is measured in three ratios: liquid asset to deposit, liquid asset to total asset and loan to deposit ratios. The findings of the study revealed that, bank size, loan growth rate, ratio of non-performing loans, profitability, inflation, interest rate margin, real GDP growth rate as determinants of liquidity of commercial banks of Ethiopia. In order to achieve the objective a secondary sources of data were collected from six commercial banks in the sample covering the period from 2000 to 2015 and analyzed them with panel data regression analysis.

Alemayehu (2016) studied determinants of liquidity of commercial banks and the findings of the study show that capital strength and profitability had statistically significant and positive relationship with banks' liquidity. On the other hand, loan growth and national bank bill had a negative and statistically significant relationship with banks' liquidity. However, the relationship for inflation, non-performing loans, bank size and gross domestic product were found to be statistically insignificant. The panel data was used for the sample of eight commercial banks in Ethiopia from 2000 to 2017 year.

Fekadu (2016) examined determinants of CBs' liquidity in Ethiopia by using sampled 8 CBs panel data from 2002-2013. He was employed fixed effect model (FEM), descriptive statistics, balanced correlation and regression analysis. He was categorizing independent factors into bank specific and macroeconomic. He considered bank specific factors: bank size, capital adequacy, profitability, non-performing loans and loan growth while macroeconomic factors: gross domestic product, general inflation and national bank bill. He found capital strength and

profitability positive and significant were impacted liquidity. But, loan growth and national bank bill negative and significant were impacted liquidity. Yet, inflation, nonperforming loans, bank size and GDP were statistically insignificant impact on CBs' liquidity.

Yimer (2016) examined determinants of private CBs' liquidity in Ethiopia by using sampled 6 private CBs balanced panel data fixed effect regression model (FEM) from 2000-2015. He was analyzed bank specific and macroeconomic variables by measured liquidity with three ratios: liquid asset to deposit, liquid asset to total asset and loan to deposit ratios. He found bank size and loan growth were negatively and significantly whereas NPL, profitability and inflation were positively and significantly impacted. On the other hand, capital, interest rate margin, real GDP growth rate, interest rate on loans and money market interest rate were insignificant impacted private CBs' liquidity in Ethiopia.

Fufa (2016) examined NBE Bill Purchase impact on financial performance (Profitability and Liquidity) of private CBs in Ethiopia from 2006-2016. He was hypothesized that NBE bills purchases had negative and significant impact on profitability and liquidity of private CBs. He was adopted quantitative research approach, explanatory design and utilized secondary data of selected 6 private CBs using purposive sampling technique. He also used fixed effect regression model using E-Views 8 econometric package. He found NBE Bill Purchase negative and significant was impacted financial performance with insignificant severity. He mentioned that pre and post policy periods comparison result were revealed relatively better profitability record during policy restrictions. Bill policy was contributed positively to performance via moping excess liquidity holding by investing excess funds on earning government securities than normal liquid asset holding practice in zero earning accounts at NBE by private CBs.

Melese (2015) examined determinants of CBs' liquidity in Ethiopia by utilizing secondary data 20002013 for sampled 10 CBs. She was analyzed bank specific and macroeconomic variables by employing balanced panel fixed effect regression model (FEM). She found capital adequacy, profitability and real GDP growth rate were negatively and significantly impacted whereas bank size was positively and significantly impacted liquidity. But nonperforming loan, loan growth, inflation rate and interest rate margin were insignificantly impacted CBs' liquidity in Ethiopia.

Fola (2015) examined bank specific and macro-economic factors affected CBs' liquidity in Ethiopia for sampled 8 CBs from 2002-2013 by employing balanced fixed effect panel

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regression. He was adopted mixed methods research approach by combining documentary analysis and in-depth interviews. He found capital strength; interest rate margin and inflation were positively and significantly impacted liquidity. Yet, loan growth had negatively and significantly impacted liquidity. However, profitability, non-performing loans, bank size and GDP were insignificantly impacted CBs' liquidity in Ethiopia.

Hailu (2013) examined determinants of liquidity and its impact on profitability of Development Bank of Ethiopia (DBE). He was used Ordinary List Squire (OLS) regression model to analyze data from 19902013. He found MMIR and inflation were positively and insignificant impacted DBE's liquidity. Whereas NPL ratio was positively and significantly impacted liquidity. He also found GDP was negatively and significantly impacted liquidity. He found GDP and loan growth rate were positively impacted financial performance whereas inflation was positively but insignificant impact on financial performance.

Wolde (2013) examined NBBP policy impact on liquidity, profitability and lending capacity. He found lending capacity; liquidity and profitability of CBs were impacted by the policy. He also found bill policy was negatively affected liquidity and lending capacity and insignificantly impacted profitability.

Tesfaye (2012) examined determinants of liquidity and its impact on financial performance of CBs in Ethiopia. He was used balanced fixed effect panel regression model data for sampled 8 CBs from 2000 to 2011 on eight factors affecting CBs' liquidity. He found capital, bank size; shares of NPL in the total volume of loans, IRM, inflation rate and MMIR were positively and significantly impacted CBs' liquidity. Real GDP growth rate and loan growth were insignificantly impacted liquidity.

2.5 Summary and Literature Gaps

According to the 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 borrower's 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 and macroeconomic factors.

Unlike empirical studies, theory on bank liquidity is well documented in the literature. According to the review, most of the empirical studies done on the area of bank liquidity were done following the U.S. subprime mortgage crisis. Although liquidity problems of some banks during global financial crisis re-emphasized the fact that liquidity is very important for functioning of financial markets and the banking sector, an important gap still exists. Only few studies aimed to identify determinants of liquidity. Studies cited above suggest that commercial banks liquidity is determined both by bank specific factors (such as size of the bank, profitability, capital adequacy and factors describing risk position of the bank), macroeconomic factors (such as different types of interest rates and indicators of economic environment) as well as the central bank decisions.

Commercial banks in Ethiopia are playing economic growth and developmental partner role. Thus, the industry is under flourishing phases by hosting new entrants, branch expansions, banking technology, banking business continual changing without secondary market existence and the likes. However, as all empirical studies suggested, there are many more literature gaps regarding influential determinants of CBs' liquidity. There are very limited studies made by Tesfaye (2012), Natnael (2013), Hailu (2013), Birhanu (2015),Melese (2015), Fola (2015),Mekbib (2016),Fekadu (2016), Yimer (2016), Alemayehu (2016) and Asnake (2017) on the determinants of bank liquidity variables; they consider both internal and external factors. Their findings are inconsistent amongst each other on the same issues.

Although, these studies tried to identify the determinants of liquidity of commercial banks, recent data shows that the liquidity position of Ethiopian commercial banks has been declining year after year. These studies also did not consider some key variables such as the effect of leverage (ratio of total debt to total assets) on the liquidity problem of commercial banks in Ethiopia taking into account the recent changes in NBE's policy in relation to foreign exchange administration and devaluation of local currency. Moreover, the recent devaluation measure

taken by the national bank of Ethiopia may have a significant effect on the liquidity position in relation to extending loans and facilitating foreign trade.

To fill this knowledge gap and to check the inconsistencies in the previous studies, the current study tries to provide real and detailed information about the determinant factors affecting liquidity of commercial banks and feasible recommendation for the impact of identified variables on the levels of liquidity for series of 18Years (2000-2017).

2.6 Conceptual Framework of the Study

The conceptual framework of this study discourses bank specific and macroeconomic factors influence on CBs' liquidity in Ethiopia as elaborated in theoretical reviews and empirical studies as formulated as ensued:

CBs' Liquidity

CBs' Liquidity Model

<u>**Bank Specific Variables**</u>	<u>**Macro-Economic Variable**</u>
❖ Capital adequacy (CAP)	❖ Annual real GDP (GDP)
❖ Bank size (BSIZE)	❖ General inflation rate (INF)
❖ Profitability (ROA)	❖ National bank bill purchase (NBBP)
❖ Non-performing loans (NPL)	❖ Interest rate on loans and advances (IRLA)
❖ Leverage (LEV)	❖ Interest rate margin (IRM)
	❖ Money market interest rate (MMIR)
	❖ Unemployment rate (UER)

Figure 3.1 Conceptual Frame Work of the Study

➤ **Source: developed by own self**

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, researchers will brief about the research methodology. The researchers adapt secondary data from different resources. The data are collected from annual reports of national bank of Ethiopia (NBE) for bank specific factors. For macroeconomic factors, the data are acquired from Ministry of Finance and Economic Cooperation (MoFEC), central statistics authority (CSA) and public finance Enterprise Agency (PFEA). Method employed to carry out this research project is E-view 8.

3.2 Research Design

Before the researchers examine the types of research designs, it is very important to understand the role and purpose of research design. In order to finalize the data presentation, the researchers frame a question by developing an econometric equation to determine the entire research process. The researchers intend to use panel data model in this study. In this research paper, the researchers are using the quantitative model which is numerical. The aim of this research paper is to determine the relationship between the explanatory variables and the liquidity of commercial banks in Ethiopia. This study provides a reliable and practical evidence to verify a significant result of bank liquidity determinants.

According to Eldabi et al., (2002), a quantitative research was carried out to examine a social setting by identifying individual components and explaining the phenomenon in term of constructs and relationship between constructs. Hence, quantitative research plays a role in emphasis on methodology, procedure and statistical measures of validity. It also relies on the measurement and analysis of statistical data to produce quantifiable conclusion.

This study adopted explanatory research design to identify and examine the determinants of Commercial banks' liquidity in Ethiopia. It incorporated data obtained from audited financial statements of sampled seven CBs in Ethiopia based on data availability of eighteen years from 2000-2017 to increase number of observations. Operational ratios were computed for liquidity

measurements, leverage, capital adequacy, non-performing loan and advances and profitability for both dependent variable and independent variables from audited financial statements. Commercial banks' size was measured by their asset size. Required interest rate margin ratios were collected from National Bank Ethiopia. NBE bill purchase policy was considered as dummy variable. Macroeconomic indicator variables data: real GDP growth rate and general inflation rate were also collected from NBE and MoFEC. Literature driven research hypotheses were framed using E-views 8 econometric model. Fixed effect balanced panel data regression model was employed to finalize data presentation and analyze with explanatory research design, balanced panel research design and quantitative research approach for attaining intended boarder objective of this study. Explanatory research design is useful for identifying fundamental factors and their magnitudes. In line with Brooks (2008) balanced panel data is helpful for data traversing both time series and cross-section by quantifying time measurement and addressing wider range issues. It also helpful for reducing more complex problems exceptionally than separately either time series or cross-sectional data. It provides more explanatory data by encompassing both cross-sectional data (individual variability) and time series data (dynamic adjustments conditions). So, this study utilized explanatory research design (theory driven and secondary data) for attaining intended broader objective.

3.3 Research Approaches

According to Creswell (2009), there are three basic research approaches; these are quantitative, qualitative and mixed research approaches. The quantitative data research relies on the measurement and analysis of statistical data to produce quantifiable conclusions. Quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell, 2009). Therefore, for this study quantitative research approach is used to see the relationship between the liquidity of commercial banks and the bank specific and macroeconomic factors affecting banks liquidity in Ethiopia.

3.4 Source and Method of Data Collection

This study was employing fundamental data collection instruments for increasing consistency and finding soundness. In this study, the researchers reviewed audited financial statements of

each selected commercial banks included in the sample and macro-economic data were collected from the governing body National bank of Ethiopia (NBE) and Ministry of Finance and Economic Cooperation (MoFEC). Data collected are from secondary sources to analyze and meet the requirements of the various research objectives. The secondary data that used in this paper includes 18 years annual reports of 7commercial banks from year 2000 to year 2017 and the figures for the variables were on June 30 annually for identifying and examining determinants of commercial banks' liquidity in Ethiopia.

In this study, a literature review was provided to present the relationship between the dependent variable and the independent variables.

3.5 Study Population and Sampling Frame

In this research, the target population is commercial banks in Ethiopia. The populations of this study are seventeen CBs, one public and sixteen private, as per NBE June 30, 2017 annual report. These are Abay Bank S.C., Addis International Bank, Awash Bank, Bank of Abyssinia S.C., Berehan Bank S.C., Buna International Bank S.C., Commercial Bank of Ethiopia, Cooperative Bank of Oromia S.C., Dashen Bank S.C., Debub Global Dank, Enat Bank, Lion International Bank S.C., Nib International Bank S.C., Oromia International Bank S.C., United Bank S.C., Wogagen Bank S.C. and Zemen Bank S.C. The study was employed Population Census to have the most appropriate picture of banking industry by consideration of coexistence relationship, data collection for specific time period from entire populations and examination of small and special population groups and data availability to reach conclusion regarding general population.

Commercial Bank of Ethiopia is the only public owned bank in the populations. Hence, the sample frame comprises one public and six private CBs. These banks have at least seventeen years panel data, huge capital and assets strength, strong customer bases, large branch network, ample experience and the likes in banking industry of Ethiopia from June 30, 2000-2017. Eighteen years data were utilized to maximize number of observations, have structured balanced data availability and depict the most expected relationship between dependent variable and independent variables on 126 observations crosswise for sampled seven CBs (hence, the sample frame matrix was 7*18 equals 126 observations).

3.6 Sampling Technique and Sample Size

There are two types of sampling techniques; probability or representative sampling and non-probability or judgmental sampling. In the probability sampling, the chance or probability, of each case being selected from the population is known and is usually equal for all cases while in the non-probability sampling, the probability of each case being selected from the total population is not known (Saunders. et al, 2009). According to Bhattacherjee (2012), non-probability sampling is sampling technique in which some units of the population have zero chance of selection or where the probability of selection cannot be accurately determined rather samples are selected based on certain non-random criteria, such as quota or convenience. The sampling technique used in this research is a non-probabilistic sampling and among the non-probabilistic sampling methods, this research uses purposive sampling. As stated by Saunders et al (2009), purposive sampling is often used when working with small samples and when we wish to select cases that are particularly informative. Thus the researcher used purposive sampling by considering the availability of full data for the selected time period.

Sampling size can be defined as the number of units in a population to be studied. Researchers need to have a large sample size in order to get more accurate results and have a high likelihood of detecting a true result. Researchers have used 7 private commercial banks in Ethiopia from year 2000 until year 2017. (7CBS'*18 years data).

3.7 Data Analysis Method

This study will develop descriptive statistics and fixed effect multiple regression analysis models to infer consequence and relationship of explanatory (independent) variables over dependent variable by testing proposed hypotheses. The descriptive statistics analyzed for both dependent and independent variables to convert raw data into expressive form to obtain clear idea for time span from 2000-2017. Hence, following this steps, findings were interpreted with statistical description like mean, maximum, minimum and standard deviation. Then after, to examine correlation matrix the correlation analysis was made amid dependent and independent variables. Finally, a multiple linear regression and t-test analysis were employed to determine independent variables impact on CBs' liquidity in Ethiopia. It was also commenced Ordinary Least Square

(OLS) by utilizing E-view 8 econometric software and diagnostic tests to assure whether Classical Linear Regression Model (CLRM) assumption tests were violated or not.

3.8 Operational Variable Definitions

This part of the study conferred operational variable definitions usable in Ethiopian banking business based on preceding related studies on area as ensued

3.8.1. Dependent Variables

Bank Liquidity

CBs' Liquidity is an asset in cash or equivalent to cash or quickly and easily convertible into cash without any loss of value and available to meet money market liabilities (BCBS, 2008). As discoursed in related literature review part, this study was employed stock approach to measure, identify and develop clear ideas about CBs' liquidity by using balance sheet data. Liquidity ratios are utmost preferable standardized methods (Yimer, 2016). Hence, this study was employed two types of liquidity ratios as per NBE and previously adopted empirical studies like Yimer (2016), Singhn and Sharma (2016), Deléchat et al (2014), Chagwiza (2014), Rafique and Malik (2013), Vodova (2011, 2012, 2013) and Tesfaye (2012) as ensued.

CBs' Liquidity (L1) = Liquid Asset to Deposit and Short Term Borrowing Ratio

As per NBE directive No SBB/57/2014 "liquid asset includes cash (local and foreign currency), deposits with National bank and other local and foreign CBs having acceptance by National bank, other assets readily convertible into cash expressed and payable in Birr or foreign currency having acceptance by the National bank and other assets as the National Bank may declare to be liquid assets from time to time". Simultaneously, "deposit means sum total of demand (current), savings and fixed time deposits of CBs whereas short term borrowing is any borrowing secured from National Bank of Ethiopia or any other interbank loans with maturity period of less than one year". Unexpected withdrawal of money market commitments and obligations can be meet by liquid assets. Liquidity (L1) ratio ensures CBs money market liability payout by readily available short-term assets. CBs' liquidity plays crucial role during unexpected deposits withdrawal. This ratio give emphasis on selected funding types like customer deposit sensitivity.

Thus, the higher the ratio is the higher CBs withstand liquidity shock absorption capability will be while the lower the ratio is the higher deposit withdrawals sensitivity would be (Vodová, 2011; Yimer, 2016).

$$L1 = \frac{\text{Liquid Assets}}{(\text{Deposit} + \text{Short Term Borrowing})}$$

CBs' Liquidity (L2) = Liquid Asset to Total Asset Ratio

Commonly, CBs' liquidity shock absorption capability can be measured by liquid asset to total asset ratio. When this ratio is high, it implies CBs have liquidity shock absorption capability to meet prompt withdrawals on demand at any time in market liquidity. But, the higher this ratio implies more liquid assets were tied up in non-productive or non-earning or low income yielding assets by bearing high   opportunity costs. Hence, CBs may require maintaining optimum liquidity by adjusting trade-off between liquidity and profitability through investing excess liquid asset into high return generating investments.

$$L2 = \frac{\text{Liquid Assets}}{\text{Total Assets}}$$

3.8.2 Independent Variable

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.

Capital Adequacy and Bank Liquidity

The reason why banks hold capital is motivated by their risk transformation role; recent theories suggest that bank capital may also affect banks' ability to create liquidity. These theories produce opposing predictions on the link between capital and liquidity creation. The "financial

fragility-crowding out" theories predicts that higher capital reduces liquidity creation. Diamond and Rajan (2000, 2001) focus on financial fragility. On the other hand, "risk absorption" hypothesis, which is directly linked to the risk-transformation role of banks, higher capital enhances banks' ability to create liquidity. This insight is based on two strands of the literature. One strand consists of papers that argue that liquidity creation exposes banks to risk (e.g., Diamond and Dybvig 1983, Allen and Gale 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet the liquidity demands of customers. The second strand consists of papers that posit that bank capital absorbs risk and expands banks' risk-bearing capacity (e.g., Repullo 2004 and Thadden 2004). Combining these two strands yields the prediction that higher capital ratios may allow banks to create more liquidity. Since the expected sign of the effect of capital adequacy on liquidity is unpredictable, the hypothesis is stated as follows:

This study considered there is a positive relationship between capital adequacy & liquidity and draws the following hypothesis. Capital adequacy has positive and significant impact on bank's liquidity.

$$CAP = \frac{\text{Total capital}}{\text{Total Assets}}$$

Bank size and Bank Liquidity

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

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

Profitability and Bank Liquidity

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

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

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

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

Non-performing Loans and Bank Liquidity

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

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

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

Hence, he concluded that the reason behind scheming excess liquidity may bring about adverse outcomes increasing NPLs. Equally, Joseph, Edson, Manuere, Clifford and Michael (2012),further findings indicate that NPLs have a negative relationship towards banks performance be it liquidity or profitability. Clearly, NPLs reduce profits and liquidity of banks. Similarly, Gupta (1997) added that NPLs does affect profits of banks and eventually to liquidity crunch and hinders growth in Gross Domestic Product (GDP) (as cited in Sharma, 2005).

It is found by a number of economists that failing banks tend to be located far from the most efficient frontier because banks do not optimize their portfolio decisions by lending less than demanded (Barr et al. 1994). According to Bloem and Gorter (2001), though issues relating to non-performing loans may affect all sectors, the most serious impact is on financial institutions such as commercial banks and mortgage financing institutions which tend to have large loan portfolios. Besides, the large bad loans portfolios will affect the ability of banks to provide credit. Huge non-performing loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on banks, leading to liquidity problems. Therefore, the amount of non-performing loans has a negative impact on banks liquidity.

Leverage and Bank Liquidity

The impact of leverage on liquid assets holdings decisions of firms is not clear-cut. On the one hand, to the extent that leverage ratio acts as a proxy for the ability of firms to issue debt one would expect a negative relation between leverage and liquid assets holdings. This is because firms can use borrowing as a substitute for holding high levels of liquid assets like cash and marketable securities. Moreover, Baskin (1987) argues that the cost of funds used to invest in liquidity increases as the ratio of debt financing increases. This, in turn, implies a reduction in liquid assets holdings with increased debt in capital structure.

However one should note that higher debt levels could increase the likelihood of financial distress. In that case, one would expect a firm with a high debt ratio to increase its cash holdings to decrease the likelihood of a financial distress. This would induce a positive relation between leverage and cash holdings. According to Mureithi (2003), leverage is measured by the ratio of total debt to total assets.

$$LE = \frac{\text{Total debt}}{\text{Total Assets}}$$

Gross Domestic Product and Bank Liquidity

The researchers accept GDP as a countries financial health indicator. GDP is a macroeconomic factor affecting business operations (collection of receivables). It is concluded that GDP has negative relationship with liquidity. Banks generally expect to profit during bullish market and expect to sustain liquidity during bearish market.

Aspachs, et al (2005) has also inferred that, banks prioritize liquidity when the economy plummets, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favorable. On the other hand, the studies made by Bordo et al. (2001) suggested that during recession, it is likely for an increase in the number of loan default. This causes depositors to perceive high solvency risk and immediately tend to withdraw deposits held at financial institutions. The proxy of GDP is Economic Growth: Real GDP / Nominal GDP. The real GDP rate has negative and significant impact on banks liquidity.

GDP = Annual Real Growth Rate

The Rate of Inflation and Bank Liquidity

Inflation reflects a situation where the demand for goods and services exceeds their supply in the economy.

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

INF = Annual General Consumer Price Index (CPI)

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National Bank Bills and Bank Liquidity

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

$$NBBP = Dummy\ variable$$

Interest Rate on Loans & Advances and Bank Liquidity

It is the lending interest rate in which banks levied on borrowers. The lending interest rate on banks may vary depending on the tenure of the loan, the type and value of collateral, the economic sector of the loan etc. As a result, it is advisable to take the average. For the purpose of this study, interest rate on loans & advances is defined as interest income from loans & advances as a fraction of total loans & advances. The higher the interest rate on loans & advances is expected to encourage banks to grant more loans to customer. Based on prior studies, interest rate on loans & advances are expected to have negative relationship with liquidity and as a result the following hypothesis is drawn

$$IRLA = \frac{Interest\ rate\ on\ loans\ and\ advances}{Total\ Loans\ and\ Advances}$$

Interest Rate Margin and Bank Liquidity

Interest rate margin is the amount of interest rate paid by borrowers that force liquidity holders to part it. According to the liquidity preference theory, lenders need high interest rate which includes the interest rate margin/ liquidity premium in order to lend. Borrowers are prepared to pay interest rate margin/ a liquidity premium to lenders to induce them to lend long. The size of interest rate margin/ liquidity premium increases with the time to maturity. Therefore, as they got higher premium lenders give up their liquid money, besides the rate of interest is the price which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash. Hence, higher interest rate margin/higher liquidity premium will force banks to lend more and reduce their holding of liquid assets. Therefore, there was negative relationship between interest rate margin and banks liquidity. To proxy interest rate margin, the difference between annual

average lending rate and deposit rate was used (Brock and Suarez 2000). Interest rate margin has negative and significant impact on banks liquidity.

$$\text{IRM} = \underline{\text{Net Interest Income from Loan and Advances}}$$

Total Loans and Advances

Money Market Interest Rate and Bank Liquidity

Money market is rate of interest paid on money market instruments having less than one year maturity periods. Treasury bills are the most popular money market instrument. It is easily convertible and risk free liquid asset of CBs' in Ethiopia. It functions as bases for all other domestic money market interest rates. It has 28, 71, 180 and 364 days maturity periods NBE/TRB/001/2011 as cited by Yimer (2016). The higher MMIR is the higher CBs motivated to invest more in money market instruments. Hence, they can enhance their liquidity as well (Pilbeam, 2005). Thus, this study was employed money market interest rate as proxy annual weighted average interest rate of Treasury Bills.

MMIR= Annual weighted average interest rate of treasury bills

Unemployment Rate and Bank Liquidity

An increase in the unemployment rate can be translated into an increase in non-performing loans and thus lowering bank liquidity (Trenca et al. 2015). The level of unemployment is connected with demand for loans and can also act as a proxy for the general health of the economy and the negative influence means (Hackethal et al. 2010). The negative influence of the level of unemployment indicate that the healthier economy is, i.e. the lower the unemployment rate, the more liquidity is created by banks. The study by Vodova (2012) also supports the aforementioned issues by point out bank liquidity decreases with the higher unemployment rate. However, Munteanu (2012) and Singh and Sharma (2016) found that unemployment rate had positive impact on bank liquidity and thus the impact thereon is significant for Munteanu (2012) and insignificant for Singh and Sharma (2016). Unemployment rate is computed as percentage of the unemployed population over the total number of economically active population (CSA, 2014). The rate indicates that the number of persons who are ready (aged ten years and above) to participate or engaged in the production of goods and services. There is a negatively significant relationship between the unemployment rate and banks" liquidity.

UER= Annual unemployment workforce rate percentage of the country

3.9 Research Hypothesis

These broad research questions were motivated by the following hypotheses:

Capital Adequacy of Banks

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

H1: Capital adequacy has positive and significant impact on bank's liquidity

Bank Size

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

H2: Bank size has positive and significant impact on bank's liquidity

Profitability

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

H3: Profitability has negative and significant impact on bank's liquidity

Non-Performing Loans

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

H4: Non-performing loans has negative and significant impact on bank's liquidity

Leverage

The higher debt levels could increase the likelihood of financial distress. In that case, one would expect a firm with a high debt ratio to increase its cash holdings to decrease the likelihood of a financial distress. This would induce a positive relation between leverage and cash holdings.

H5: Leverage has positive and significant impact on bank's liquidity

Gross Domestic Product Growth

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

H6: Real GDP growth has negative and significant impact on 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.

H7: Inflation has positive and significant impact on bank's liquidity

National Bank Bill Purchase

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

H8: National bank bills has negative and significant impact on bank's liquidity

Interest Rate on Loans and Advances

Keynesian Liquidity Preference Theory was stated that when CBs hold liquid assets their liquidity preference may increases interest rates on short, medium and long-term loans and advances. Normally, it depends on borrowers' creditworthiness and business objective, money market accessibility, tenure, collateral type and value, economic sector and contractual agreement terms and conditions. Funding interest rate is determine anticipating and encouraging loans and advances granting when interest rate is high.

H9: Interest rate on loans and advances has negative and significant impact

on CBs' liquidity

Interest Rate Margin

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

Borrowers are prepared to pay interest rate margin/ a liquidity premium to lenders to induce them to lend long. The size of interest rate margin/ liquidity premium increases with the time to maturity. Therefore, as they got higher premium lenders give up their liquid money, besides the rate of interest is the price which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash. Hence, higher interest rate margin/higher liquidity premium will force banks to lend more and reduce their holding of liquid assets.

H10. Interest rate margin has negative and significant impact on banks liquidity

Money Market Interest Rate

Money market interest rate of interest paid on money market instruments having less than one year maturity periods. Treasury bills are the most popular money market instrument. It is easily convertible and risk free liquid asset of CBs' in Ethiopia. It functions as a bases for all other domestic money market interest rates. It has 28, 71, 180 and 364 days maturity periods

NBE/TRB/001/2011 as cited by Yimer (2016). The higher MMIR is the higher CBs motivated to invest more in money market instruments. Hence, they can enhance their liquidity as well.

H11: Money market interest rate has positive and significant impact on CBs' liquidity

Unemployment Rate

The main purposes of fiscal and monetary policies are to promote production, employment, and fix prices level in economy. Meanwhile, to provide more demand causes an increase the inflation rate while the lack of demand causes temporary unemployment. An increase in the unemployment rate can be translated into an increase in non-performing loans and thus lowering bank liquidity (Trenca et al. 2015).

H12: Unemployment rate has negative and significant impact on CBs' liquidity

3.10 Data Presentation Techniques

This study all relevant data were collected for each bank specific and macroeconomic dependent variables to attain main objective of identifying and examining determinants of CBs' liquidity in Ethiopia. And then all indispensable ratios were computed for dependent variable and bank specific variables. Then analyzed and interpreted them for all sampled CBs. Statistical analysis tools (descriptive statistics) and inferential statistics/multiple regression analysis (correlation and multiple linear regression analysis) were applied to test developed hypothesis and distinguish impact, causes and casual relationship among independent (explanatory) variables and dependent variable for period covering from 2000-2017. All relevant raw data were converted into comprehensive and meaningful ways by using descriptive statistics on both dependent and independent variables for sampled CBs. Then after these all were performed figure interpretations and tabulation continued by statistical description such as mean, median, maximum, minimum and standard deviation for analyzing variables data (Malhotra, 2007). Subsequently, correlation analysis among independent and dependent variables were accomplished to infer comprehended relationship followed by multiple linear regression model and t-test to examine influence of all independent variables on CBs' liquidity. The ordinary least square (OLS) together with all its relevant assumptions, classical linear regression model

(CLRM) assumptions correctness tests and fixed effect model (FEM) were commenced for diagnostic testing to gain valuable assurances on examining bank specific factors, and macroeconomic factors on sampled seven CBs' liquidity from 2000-2017. Testing fixed effect model (FEM) is useful for exhibiting different characteristics and time effect or different characteristic and no time effect and for checking autocorrelation problem exist or not in the error terms and independent variables of sampled CBs for period under investigation. Thus far, multiple linear regressions model and ordinary least square (OLS) were undertaken by using E-Views 8 econometric software package for investigating expected and/or unexpected relationship existed or not amongst determinant variables and CBs' liquidity in Ethiopia.

3.11 Regression Model specification

This study was employed balanced and structured panel data for acquiring combined observations advantages over cross sectional and time series data methodology. Using balanced panel data is helpful for discoursing and tackling more complex problems and for scrutinizing how variables and their relationships changes vigorously through over time more than time series data. It is also useful for maximizing degree of freedom and empowers testing with large CBs' dynamic behavioral information to manage multicollinarity problems which may arise from individual variables modeling by time series periods. It enables the researcher to remove biasness effect in regression results from certain variables omission. It also encompasses both cross-sectional and time-series components: cross-sectional components are sampled CBs in Ethiopia and time-series component is the time period from 2000-2017 (Brooks, 2008).

Therefore, the study employed multiple regression model analogous with Yimer (2016), Melese (2015), Rafique and Malik (2013), Vodova (2013; 2012; 2011) and Maore (2006). Hence, twelve hypothesizes were tested by using fixed effect multiple regression analysis model to control unobserved heterogeneity among cross sectional components and obtain accurate explanatory variables outcome. So, general model used for this study was expressed in the equation as ensued: $L_{it} = \alpha + \beta X_{it} + \delta_i + \varepsilon_{it}$

Where L_{it} represents the dependent variable ratios (CBs' liquidity ratio i at time t), X_{it} was explanatory variable vector of CB i at time t, α was intercept/constant term, β was coefficient

which represents explanatory variables slope, δi represents fixed effects in CB i and εit was the random error term. Subscript i represented cross-section and t represented time-series dimensions.

NBE bill purchase (NBBP) policy was dummy variables incorporated in the model as categorized by time before and after policy introduction and implementation periods and yet assigned variable 1 for the period policy applied and 0 otherwise (Deressa, 2016). So, this study was introduced underneath general models for testing twelve hypotheses and answering research questions by accompanying all independent variables as ensued:

$L1_{i,t} = \alpha_i + \beta_1(CAP_{i,t}) + \beta_2(BSIZE_{i,t}) + \beta_3(NPLA_{i,t}) + \beta_4(ROA_{i,t}) + \beta_5(LEA_{i,t}) + \beta_6(IRM_t) + \beta_7(NBBP,D_t) + \beta_8(GDP_t) + \beta_9(INF_t) + B_{10}(LEV_{i,t}) + B_{11}(UER_{i,t}) + B_{12}(MMIR_{i,t}) + \delta_i\varepsilon_{i,t}$ --(Model 1)

$L2_{i,t} = \alpha_i + \beta_1(CAP_{i,t}) + \beta_2(BSIZE_{i,t}) + \beta_3(NPLA_{i,t}) + \beta_4(ROA_{i,t}) + \beta_5(LEA_{i,t}) + \beta_6(IRM_t) + \beta_7(NBBP,D_t) + \beta_8(GDP_t) + \beta_9(INF_t) + B_{10}(LEV_{i,t}) + B_{11}(UER_{i,t}) + B_{12}(MMIR_{i,t}) + \delta_i\varepsilon_{i,t}$ …(Model 2)

Wherever: L1it: denoted CBs' liquidity measured by Liquid Asset to Deposit plus Short Term Borrowing ratio of ith CB in year "t"

L2it: denoted CBs' liquidity measured by Liquid Asset to Total Assets ratio of ith CB in year "t" CAPi, t: Capital Adequacy ratio of ith CB in year "t"

BSIZEi, t: Bank Size of ith CB in year "t"

NPLAi, t: Non-Performing Loan and Advances of ith CB in year "t"

ROAi, t: Return on Assets of ith CB in year "t"

LEAi,t: Leverage of ith CB in year "t"

IRLAt: Interest Rate on Loans and Advances of in year "t"

NBBP, Dt: National Bank Bill Purchase of ith dummy variable in year "t"

GDPt: Real Gross Domestic Product growth rate of Ethiopia in year "t"

INFt: General Inflation Rate of Ethiopia in year "t"

Dt: Dummy variable t=1 for the period after NBE bill purchase policy implementation and t=0 otherwise

δi: Fixed effects in CB i

εit: the random error term

The bank specific variables were both cross-sectional and time variant whereas and macro-economic variables were only time variant converted into panel data type for each cross-sectional unit. Model L1 and L2 liquidity ratios were employed as supported and benchmarked by favor of NBE liquidity requirement directive.

CHAPTER FOUR

4. DATA PRESENTATION AND ANALYSIS

The preceding two chapters deal with literatures related to the topic and research methodology. In this chapter, detail analyses about the descriptive statistics and regression result have been made. It has six essential sub sections. First, Fixed Effect Model (FEM) versus Random Effect Model (REM) test are made to distinguish the most applicable data model for this study; second, Classical Liner Regression Model (CLRM) diagnostic test are accomplished; third, Correlation analysis among dependent and independent variables are undergone; fourth, descriptive statistics analysis of dependent variable and independent variables are presented; fifth, fixed effect panel data multiple regression model result are described and lastly, comprehensive regressions analysis results discussions are followed based on reviewed empirical literatures and this study findings.

4.1 Choosing Fixed Versus Random Effect Model

The collected data were estimated based on the panel model, which included cross sectional and time series observations for seven commercial banks that ranges over the year 2000 to 2017. Fixed effects (EFM) and random effects (REM) models are commonly used models for the panel data. In order to choose fixed or random effect model a formal test so called hausman test was used which was based on the null hypothesis in favor of random effect model estimator. When the test is made it is important to see the p-value because the decision was made on the basis of this value, accordingly if p value is higher than 0.05 (i.e. it is insignificant) hence random effects is preferable whereas if p value is lower than 0.05 (i.e. it is significant) fixed effect is preferable (Gujarati 2004).

4.2 Testing Assumptions of Classical Linear Regression Model

After choosing the most best applicable model for this study, fixed effect model (FEM), successive phase is CLRM assumptions diagnostic test. It is very essential to ascertain whether data utilized and chosen model are appropriate or not with classical linear regression model assumptions. So, five basic assumptions are tested to confirm forecasted approaches, Ordinary Least Squares (OLS), necessary proper numbers and coefficient projected about hypothesis tests.

Hence, this study assume average value of error terms are zero, error variance is constant (homoscedastic), covariance amongst error terms are zero (non-autocorrelation), error terms are normally distributed (normality) and explanatory variables are non-correlated (non-multicollinearity) as discoursed as ensued.

4.2.1 Normality Assumption Test

It is amongst CLRM assumptions that examine whether distribution is normally dispersed or not. Appropriate normal distribution is not skewed and has kurtosis coefficient of three (3). As viewed by Bera-Jarque (BJ) test, normality test examine normality residuals and skewedness and kurtosis coefficients are zero and three respectively. Skewedness measures the distribution level is not symmetric about its mean value while kurtosis measures how fat distribution tails are. Therefore, when normality residuals are normally dispersed, the histogram should be bell-shaped and the Bera-Jarque statistics should also be insignificant which means that p-value at bottom of the normality screen should be greater than 0.05. Thus unable to reject normality null hypotheses at the 5% level (Brooks, 2008).

In this regard, as depicted in Appendix, this study employed BJ normality test for null hypothesis (error term) testing in normally distribution assumptions. The kurtosis values of model 1 and 2 are 2.914 that are almost all nearer to three. The BJ test p-values Table 4.1 of model L1 and L2 are insignificant respectively rejecting null hypothesis attributable to error terms that follows normal dispersion. Thus far, this study test results indicating that all data employed are consistent with normal distribution assumptions.

Table 4.1 Test for Normality; Bera-Jarque(BJ) test

Model 1

Series: Standardized Residuals	
Sample 2000 2017	
Observations 126	
Mean	-3.85e-19
Median	-0.006266
Maximum	0.204435
Minimum	-0.147026
Std. Dev.	0.071142
Skewness	0.441783
Kurtosis	2.914905
Jarque-Bera	4.136632
Probability	0.126398

Model 2

Series: Standardized Residuals	
Sample 2000 2017	
Observations 126	
Mean	-3.85e-19
Median	-0.006266
Maximum	0.204435
Minimum	-0.147026
Std. Dev.	0.071142
Skewness	0.441783
Kurtosis	2.914905
Jarque-Bera	4.136632
Probability	0.126398

4.2.2 Non-Multicollinearity Assumption Ttest

This test is CLRM assumptions test which focuses on testing relationship amid independent variables. Perfect collinearity exists when independent variables thoroughly has linear mix with another independent variables and can't be forecasted via OLS (Brooks, 2008). Multicollinearity may happens when correlation among independent variables is imperfectly high while influence on dependent variable decreases. All independent variables may not perfectly correlate with dependent variables while they correlate each other without perfection. Different authors were arguing how much correlation among independent variables causes multicollinearity. For instance, Hair et al (2006) argued that critical multicollinearity problem may not be caused by correlation coefficient above 0.7 in absolute value. As stated by Malhotra (2000) when correlation coefficient amid independent variables exceeds 0.75 multicollinearity problems exists. Kennedy (2008) stated correlation coefficient greater than 0.7 may causes critical multicollinearity problem which lead into inefficient estimation and less reliable outcome. Thus, all authors did not have same arguments about correlation coefficient for multicollinearity existence. Therefore, estimated correlation matrix results of twelve independent variables, Table 4.2 below, shows that highest correlation matrix value 0.628997 are registered amid NBBP and IRLA followed by 0.561506 amid BSIZE and IRLA. In line with Kennedy (2008), Hair et al (2006) and Malhotra (2000) there is no correlation if value exceeds 0.7, 0.7 and 0.75 respectively. So, this study is concluded non-multicollinearity problem observed between independent variables.

Table 4.2 Test for multicillinearity; using Correlation Matrix between Independent Variables

Correlation matrix													
	BSIZE	CAP	GDP	INF	IRLA	IRM	L1	L2	LEV	MMIR	NBBP	NPLA	ROA	UER
BSIZE	1	-0.351526	0.370509	0.319781	0.561506	-0.060433	-0.337533	-0.215525	0.153079	-0.190334	0.358797	0.180153	0.277453	0.209716
CAP	-0.351526	1	0.022041	0.059221	0.181873	0.25514	0.059019	-0.045579	-0.022529	0.209842	0.331887	-0.466357	0.3934	0.058938
GDP	0.370509	0.022041	1	0.325039	0.18874	0.132231	-0.027503	-0.01749	-0.072463	-0.573662	0.177846	-0.108551	0.507704	0.072133
INF	0.319781	0.059221	0.325039	1	0.169983	0.117195	0.110685	0.115014	-0.010116	-0.267499	0.190396	-0.086434	0.386453	-0.11592
IRLA	0.561506	0.181873	0.18874	0.169983	1	0.446442	-0.40523	-0.411355	-0.227136	0.276615	0.628997	-0.327656	0.311122	0.354487
IRM	-0.060433	0.25514	0.132231	0.117195	0.446442	1	-0.178734	-0.426552	-0.350693	0.068913	0.326185	-0.416524	0.014252	0.149233
L1	-0.337533	0.059019	-0.027503	0.110685	-0.40523	-0.178734	1	0.900998	0.110108	-0.184417	-0.302241	0.332016	-0.121019	-0.277754
L2	-0.215525	-0.045579	-0.01749	0.115014	-0.411355	-0.426552	0.900998	1	0.167091	-0.211259	-0.306586	0.494675	-0.052154	-0.27109
LEV	0.153079	-0.022529	-0.072463	-0.010116	-0.227136	-0.350693	0.110108	0.167091	1	0.051842	-0.206002	0.281964	0.044795	-0.112001
MMIR	-0.190334	0.209842	-0.573662	-0.267499	0.276615	0.068913	-0.184417	-0.211259	0.051842	1	0.163993	-0.154928	-0.207276	0.078889
NBBP	0.358797	0.331887	0.177846	0.190396	0.628997	0.326185	-0.302241	-0.306586	-0.206002	0.163993	1	-0.278808	0.242137	0.282824
NPLA	0.180153	-0.466357	-0.108551	-0.086434	-0.327656	-0.416524	0.332016	0.494675	0.281964	-0.154928	-0.278808	1	-0.340955	-0.151657
ROA	0.277453	0.3934	0.507704	0.386453	0.311122	0.014252	-0.121019	-0.052154	0.044795	-0.207276	0.242137	-0.340955	1	-0.010542
UER	0.209716	0.058938	0.072133	-0.11592	0.354487	0.149233	-0.277754	-0.27109	-0.112001	0.078889	0.282824	-0.151657	-0.010542	1

Sources: Sampled CBs Financial Statement and own computation via E-view 8

4.2.3 Heteroskedasticity Assumptiontest

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

Table 4.3Heteroskedasticitytest: White Test Result

Model L1

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.254953	Prob. F(12,113)	0.2554
Obs*R-squared	14.81725	Prob. Chi-Square(12)	0.2516
Scaled explained SS	14.0043	Prob. Chi-Square(12)	0.3004

ModelL2

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.733827	Prob. F(12,113)	0.0686
Obs*R-squared	19.59216	Prob. Chi-Square(12)	0.0752
Scaled explained SS	15.13288	Prob. Chi-Square(12)	0.2342

Thus far, as portrayed in Table 3 above white test, F-statistic, Obs.* R-squared and Scaled explained SS are provided identical conclusion by assuring no heteroscedasticity problem in both model 1 and model 2 liquidity because both models' p-values exceeded 0.05. The regression models showed error term variance are constant (not vary) or homoscedastic and there are enough objective assurances for heteroscedasticity null hypothesis test rejection in the period under investigation.

4.2.4 Autocorrelation Assumption Test

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

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

Therefore, from table 4.6 fixed effect regression result the value of Durbin-Watson stat (i.e. 1.287927) this revealed that there is autocorrelation in the data since the DW test result approaches two(2) because as per Brook (2008) stated above there is autocorrelation problem if the *DW* is near 2. To make it more convincible for the absence of autocorrelation problem a formal test so called Breusch-Godfrey was made because as stated above the Durbin-Watson tests" only for the first order autocorrelation or (i.e. it test only for one lag- value). Hence, the BG- test was made for ten lag-values and the result was given below in table 4.4, besides the full result was attached in the appendix. Since the p-value of F-stat for model L1 and model L2 are

0.0453 and 0.0004 respectively, we reject the null hypotheses since the p-value was below 5% which indicated that there is autocorrelation problem but the result is still acceptable.

Table 4.4Breusch-Godfrey (BG) test for the absence of serial autocorrelation Model L1

Model L1			
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	10.29551	Prob. F(2,3)	0.0453
Obs*R-squared	15.71099	Prob. Chi-Square(2)	0.0004

Model L2			
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	19.51676	Prob. F(2,111)	0.00000
Obs*R-squared	32.78083	Prob. Chi-Square(2)	0.00000

4.3 Descriptive Statistics of the Variables

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

Hence, table 4.5 below presented the descriptive statistics values of the study variables that were both dependent and independent variables for the study period and all variables comprised 126 observations. The study used the dependent variable which measures the liquidity of sampled commercial banks and twelve independent variables were included both bank specific and macro-economic variables. Bank specific variables were capital adequacy, nonperforming loan, bank size, profitability, and leverage while the remaining three variables; real GDP rate, the general inflation rate, interest rate on loans and advances, money market interest rate, unemployment rate, national bank bill purchase and interest rate margins" were macro-economic variables of the study. Mean value shows the average value of all sampled banks in each variable; whereas the minimum and maximum values of each variable from all sampled banks were shown in the minimum and maximum statistics respectively. Sample variation from the

mean was shown in the standard deviation statistics which is the square root of variance and normally good if it is low.

Table 4.5 Descriptive statistics of dependent and independent variables summary

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
BSIZE	8.687894	8.75635	12.86	5.0626	1.550802	0.173631	3.010869	126
CAP	0.134005	0.12765	0.2595	0.0162	0.044585	0.492078	3.194498	126
GDP	0.087788	0.1035	0.1264	-0.021	0.038615	-1.589094	4.573341	126
INF	0.118626	0.10135	0.364	-0.1057	0.111114	0.572174	3.434518	126
IRLA	0.101134	0.0991	0.156	0.0508	0.02236	0.325911	2.588704	126
IRM	0.049136	0.0453	0.1317	0.0095	0.021381	1.635296	6.639136	126
L1	0.390868	0.38085	0.7373	0.0827	0.134964	0.253206	2.694522	126
L2	0.323654	0.3136	0.5941	0.0781	0.112789	0.394533	2.856617	126
LEV	0.119366	0.104156	0.33	0.042992	0.04754	1.26786	5.130089	126
MMIR	0.012877	0.01235	0.033	0.0004	0.008492	0.673837	2.992533	126
NBBP	0.330988	0.0000	1	0.0000	0.468568	0.723518	1.540621	126
NPLA	0.04529	0.031669	0.2897	0.0000	0.046991	3.181688	13.85919	126
ROA	0.03287	0.0345	0.0568	-0.0229	0.012572	-0.912538	4.998188	126
UER	0.084552	0.054	0.5222	0.05	0.107338	3.793631	15.60659	126

Sources: Sampled CBs Financial Statement and own computation via E-view 8

The mean value of financing loopholes is 39% as measured by models L1 implies on average CBs' liquidity is 39% during study period in Ethiopia. It is above 15% minimum regulatory liquidity requirement as per NBE directive No. SBB/57/2014. The maximum liquidity was 73.73% in NIB during the year 2000 while the minimum liquidity was 8.27% in CBE during the year 2015 measured by models L1. The standard deviations value is 13.49% shows liquidity dispersion from mean value ranging between 25.51% and 52.49% for all sampled CBs in Ethiopia. The positive sign of model L1 financing gap reveals the existence of excess liquid assets over and above deposit and short term borrowing.

Similarly, the mean value of financing loophole is 32.36% measured by model L2 implies on average CBs' liquidity is 32.36% during study period. The maximum liquidity was 59.41% in CBE during the year 2004 while minimum liquidity was 7.81 % in CBE during the year 2015 measured by model L2. The standard deviations value 11.27% indicates liquidity dispersion from mean value ranging between 21.09% and 43.63% for all sampled CBs in Ethiopia. The positive sign of model L2 financing gap reveals existences of excess liquid assets above total assets amount. The Liquid Assets to Total Assets ratio (models L2) mean value 32.36% is also more than 15% NBE minimum requirement. When this ratio is too high, it indicates CBs may have adequate liquidity to cover any unforeseen fund requirement whereas when it is too low, it indicates they can't earn required liquidity. Relatively model L1 mean value is more than model L2 implying on average there are higher deposit amount volatile and short term borrowings are tied up in liquid assets as compared with model L2 of CBs in Ethiopia.

Capital adequacy (CAP) is proxy total capital to total assets ratio. Its mean value 13.40% shows on average only 13.40% of total assets amount is covered by CAP while the remaining 86.60% financed from external sources which implies all sampled CBs are highly dependent on external sources arisen from deposit mobilization and other sources. However, the mean value is exceeded 8% international standards. The maximum CAP 25.95% was registered by NIB during the year 2000 while the minimum CAP 1.62% was registered by CBE in the year 2002. The standard deviations value 4.45% indicates minimal CAP dispersion from mean value ranging between 8.95% and 17.85% for all sampled CBs in Ethiopia. Minimum 1.62% CAP existence may expose them for liquidity shortage even if their average CAP 13.40% is good by exceeding NBE and international requirements standard.

The CBs' size (BSIZE) is proxy measured by natural logarithm of total assets (LnTOA). Natural logarithm is employed to minimize deviations between maximum and minimum values. The mean value of BSIZE is 868.78% which implies average total assets size of sampled CBs in Ethiopia during this study period. The maximum total asset size value 1,286.00% was recorded by CBE during the year 2016 whereas the minimum total asset size value 506.26% was recorded by NIB during the year 2000 midst sampled CBs in Ethiopia. The standard deviations value

155.50% shows somehow less BSIZE dispersion from mean value ranging between 713.28% and 1,024.28% for all sampled CBs in Ethiopia.

Profitability (ROA) is proxy measured by return on assets expressed as net income before tax and provision to total assets ratio. The average ROA mean value3.28% indicates for each one birr investment made by sampled CBs in Ethiopia, they are generating 0.0328 cents return during the period under examination. It is much more dependent on loans and advances created or provided to borrowers. The maximum profit 5.68% was earned by WB during the year 2011 while profit loss of 2.29% was incurred by CBE in the year 2002 by revealing it had been suffered 0.0229 cents loss per one birr investment. Standard deviations value 1.25% implies smaller amount of ROA depression from mean value ranges between 2.03%.

Non-performing loans and advances (NPLA) is proxy measured by provision for loan losses to total outstanding loans and advances ratio. NPLA is the actual deteriorate assets quality amount. Provision for loan losses is the forecasted amount based on outstanding loans and advances quality deterioration. The mean value 4.52% of provision for loan losses shows on average 4.52% provision for loans losses held for each outstanding loans and advances or for each 1 birr outstanding loans and advances provided to customers 0.0452 cents provision is held by sampled CBs in Ethiopia during this study periods. It is forecasted amount kept by sampled CBs to minimize loan and advances quality losses. The maximum provision 28.97% was held by CBE during the year 2003 while the minimum provision 0. % was held by UB in the year 2001. The standard deviations value 4.69% indicates provision dispersion from mean value ranging between -0.17% and 9.21% for all sampled CBs in Ethiopia in this study periods. The maximum value 28.97% depicts higher amount of provision required to minimize unforeseen credit risk exposure as per NBE Assets Classification and Loan Provisioning directive no SBB43/2008 by all sampled CBs in Ethiopia in the periods.

Leverage is proxy measured the ratio of total debt to total assets. The mean value is11.93% shows mean LEV 11.93% changes on average LEV in the total loan portfolio. The maximum LEV33% was registered during the year 2009 while minimum LEV 4.29% was occurred during the year 2002. The standard deviation value is 4.75% which shows presence of LEV variation from mean ranges amid 7.18% and 16.68% in each year from 2000-2017.

Real GDP growth rate (GDP) is proxy annual real GDP rate. It measures economic performance of the country. Its mean value is8.77% which reveals on average market values of all final goods and services produced in Ethiopian economy is 8.77% for the last 18 years from 2000-2017. The maximum GDP value 12.64% was recorded during the year 2005 while the minimum failed production value -2.1% was recorded during the year 2003. The standards deviation is 3.86% shows insignificant difference from mean GDP in economic growth ranges between 4.91% and 12.63% in each year under this study.

General inflation rate (INF) is proxy measured by annual percentage general Consumer Price Index (CPI) change. The mean value is 11.86% shows mean CPI% changes on average INF in the country. It is increasing by 11.86% during each year under considerations more than average 8.77% GDP of Ethiopia. The maximum INF 36.4% was registered during the year 2009 while minimum INF -10.57% was occurred during the year 2002. The standard deviation value is 11.11% which shows presence of moderate INF variation from mean ranges amid 0.75% and 22.97% in each year from 2000-2017.

National bank bill purchase (NBBP) policy is dummy variable applicable only to private CBs at the rate of 27% on loans and advances provided to their customers. Its mean value33.09% indicates for each 1 birr loans and advances provided to customers they are purchasing 0.3309cents amount of bill. The maximum NBBP policy value with no doughty is 100% whereas its minimum value is 0% for all private CBs. Standard deviation values 46.85% indicates high NBBP variation from mean value ranges between -13.76% and 79.94% for only sampled six private CBs in Ethiopia during this study period.

Interest rate on loans and advances (IRLA) is proxy measured by interest rate on loans and advances to total outstanding loans and advances ratio. Its mean value10.11% indicates on average lending cost charged from customer by sampled CBs. The maximum lending cost15.6% was charged by CBE in the year 2016 whereas minimum lending cost 5.08% was charged by NIB in the year 2000. The standard deviations value 2.23% shows minimal cost of borrowing depression from mean value ranging between 7.88% and 12.34% charged from customers by all sampled CBs in Ethiopia during this study periods.

Interest rate margin (IRM) is proxy measured by net interest income from loans and advances to total outstanding loans and advances ratio. Its mean value 4.91% reveals on average for each 1

birr loans and advances lending to customers, sampled CBs are earning 0.0491 cents during this study period. The maximum IRM 13.17% was earned by UB in the year 2016 whereas minimum IRM 0.95% was earned by CBE in the year 2002. The standard deviations value 2.13% shows slight IRM variation from mean value ranging between 2.78% and 7.04 earned by all sampled CBs in Ethiopia.

Money market interest rate (MMIR) mean value1.28% indicates per one birr investment made on Treasury Bills (TB). Hence, NBE is charging on average 1.28% interest rate sampled CBs during study period. The maximum TB MMIR 3.3% was charged by NBE during the year 2000 while the minimum TB MMIR 0.04% was charged in the year 2006. The standard deviations value 0.84% indicates below one percent minimal borrowing cost depression from mean value ranging between 0.44% and 2.12% TB MMIR for all sampled CBs in Ethiopia.

From macroeconomic determinants indicator perspective, this study employing real GDP growth rate, general inflation rate and unemployment rate as independent variables that influence CBs' liquidity in Ethiopia. They are equally applicable for all chosen CBs as discoursed as ensued.

Unemployment rate (UER) is proxy annual percentage of unemployed workforce. Its mean value is 8.45% which reveals on average unemployed workforce during this study period.

Maximum UER 52.22% was occurred during year 2015 whereas minimum UER 5% was occurred during the year 2013. The standard deviation is 10.73% reveals fewer unemployed workforce dispersion from average UER ranges amid -2.28% and 19.18% during each year under investigations earned by all sampled CBs in Ethiopia.

4.4 Results of the Regression Analysis

In this section the results of fixed effect regression model were presented. The regression results have their own implications, and hence beta indicates each variable's level of influence on the dependent variable which may has a coefficient of negative or positive. P-value indicates at what percentage or precession level of each variable is significant and R2 values indicate the explanatory power of the model and in this study adjusted R2 value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models. Therefore, the results of fixed effect regression model in this study were presented in table 4.6 below.

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

Model estimation result

Dependent variable: L1 =**Total panel (balanced) observations: 126**

Table 4.6 Model 1 estimation result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.352866	0.143994	2.45055	0.0159
BSIZE	-0.028941	0.019351	-1.49557	0.1377
CAP	0.529328	0.336001	1.57538	0.1181
GDP	0.242889	0.32873	0.73887	0.4616
INF	0.304502	0.091926	3.312483	0.0013***
IRLA	3.398307	0.999913	3.398601	0.001***
IRM	-4.875076	0.893557	-5.455812	0.00000***
LEV	0.21071	0.256655	0.820987	0.4135
MMIR	-1.915308	1.83286	-1.044983	0.2984
NBBP	-0.086963	0.033304	-2.611197	0.0103**
NPLA	1.953724	0.28651	6.819034	0.000***
ROA	0.137615	1.133152	0.121444	0.9036
UER	-0.092125	0.088004	-1.046821	0.2975
Cross-section fixed (dummy variables)				
R-squared	0.585952	Mean dependent var		0.390868
Adjusted R-squared	0.516299	S.D. dependent var		0.134964
S.E. of regression	0.093866	Akaike info criterion		-1.755767
Sum squared resid	0.942754	Schwarz criterion		-1.328074
Log likelihood	129.6133	Hannan-Quinn criter.		-1.582009
F-statistic	8.412446	Durbin-Watson stat		1.287927
Prob(F-statistic)	0			

***, **, * represent the level of significance at 1%, 5% and 10% respectively

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

L1=0.352865729543-0.0289413798124*BSIZE+0.529328477815*CAP+0.242888809616*GDP

+ 0.304501695357*INF + 3.3983066176*IRLA - 4.8750763671*IRM + 0.210710330606*LEV

-1.91530750147*MMIR-0.0869626933209*NBBP+1.95372444255*NPLA+

0.13761474554*ROA - 0.0921248379995*UER + [CX=F]

Table 4.7 Model L 2 estimation result

Total panel (balanced) observations

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.334687	0.117958	2.83735	0.0054
BSIZE	-0.030867	0.015852	-1.947134	0.0541*
CAP	0.225178	0.275246	0.818098	0.4151
GDP	0.203172	0.26929	0.754473	0.4522
INF	0.260088	0.075304	3.453849	0.0008***
IRLA	2.622541	0.819111	3.201692	0.0018***
IRM	-3.051343	0.731985	-4.168585	0.0001***
LEV	0.235543	0.210247	1.120316	0.2651
MMIR	-2.02693	1.501446	-1.349986	0.1799
NBBP	-0.052822	0.027282	-1.936149	0.0555*
NPLA	1.787508	0.234704	7.616006	0.000***
ROA	0.098865	0.928258	0.106506	0.9154
UER	-0.068192	0.072092	-0.945907	0.3463
R-squared	0.602153	Mean dependent var		0.323654
Adjusted R-squared	0.535226	S.D. dependent var		0.112789
S.E. of regression	0.076893	Akaike info criterion		-2.154666
Sum squared resid	0.632644	Schwarz criterion		-1.726972
Log likelihood	154.7439	Hannan-Quinn criter.		-1.980907
F-statistic	8.997101	Durbin-Watson stat		1.216994
Prob(F-statistic)	0.000000			

***, **, * represent the level of significance at 1%, 5% and 10% respectively

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

L2 = -0.0494188221194*BSIZE + 0.11987585881*CAP + 0.19998782026*GDP + 0.277803179074*INF + 1.87597446585*IRLA - 2.09028079421*IRM + 0.15165684073*LEV - 2.87103078172*MMIR - 0.00702542605681*NBBP + 1.35562819626*NPLA + 0.165913104227*ROA - 0.0619788837808*UER + 0.558992184916

According to table 4.6 fixed effect regression results, adjusted R2 has the value of 58.59% which revealed that the explanatory power of the model was good. The value (i.e. 58.59%) could be interpreted as; the variations of liquidity in Ethiopian commercial banks 58.59% were explained by CAP, NPL, SIZE, PROF, LG, GDP, INF, and IRM whereas the rest 41.40% variation of liquidity in Ethiopian commercial banks were explained by neither bank specific nor macroeconomic variables used in this study rather it goes to the error term. Generally, the value of adjusted R2 in this study indicated good model specification. Also, the overall test of significant F statistics shows that the model was good enough fitted and statistically significant at 1% level (i.e. p-value = 0.000).

In general, the above table 4.6 indicated that; out of the total eight explanatory variables of the study two of them were statistically significant at 1% level (i.e. CAP and SIZE) while PROF and GDP were significant at 5% level. The rest four variables had no statistically significant impacts on liquidity of Ethiopian commercial banks for the period between 2007-2013. Real GDP growth rate was the only macroeconomic variable that significantly affected liquidity, but the rest four variables were go to bank specific variables; this indicated that most statistically significant variables that affected liquidity of Ethiopian commercial banks were from bank specific factors.

4.5 Discussions of the Regression Results

Capital Adequacy and Bank Liquidity

In this study, sampled CBs' capital is measured by equity capital to total assets ratio. It was hypothesized that capital adequacy influence positively and significantly CBs' liquidity in Ethiopia. Thus, as fixed effect multiple regression analysis model result reveals, CAP is positive and statistically insignificant influence on CBs' liquidity in Ethiopia measured by model L1. The positive coefficient sign value 0.529328indicates existence of positive relationship among CAP

and CBs' liquidity, Table 4.7 above, which implies when CAP increases by 1 birr CBs' liquidity increases by 0.52 cents by keeping all other variables constant.

Therefore, positive relationship amid CAP and CBs' liquidity is consistent with assumption of CBs having reliable CAP will have reliable liquidity as per risk absorption theory. It is also in light of this study hypothesis (H1) and Singhn and Sharma (2016), Raeis et al (2016), Fekadu (2016), Fola (2015), Moussa (2015), Mugenyah (2015) and Vodova (2013) on Czech and Slovak and Hungarian CBs finding results. On the other hand, capital adequacy has positive and statistically insignificant influence on CBs' liquidity in Ethiopia with coefficient value 0.225178with p-value 0.4151, Table 4.8 above, measured by model L2. Positive coefficient sign indicates existence of positive relationship among CAP and CBs' liquidity measured by model L2 implying that when CAP power increases by 1 birr liquidity increases by 0.22 cents insignificantly by keeping, all other variables constant. Insignificance relationship between CAP and liquidity may be when the former increase by 1 birr the later increase nearer to zero minimally due to presence of smaller liquid assets in total asset components, much more illiquidity or more long term investments existence in each sampled CBs. CAP statistically and insignificantly influence CBs' liquidity result is contrary to this study hypothesis (H1) but has identical positive coefficient sign. So, hypothesis that stated capital adequacy has positive and statistically significant influence on CBs' liquidity in Ethiopia is rejected as per model L1 and model L2.

Thus, CAP has positive and statistically insignificant influence on CBs' liquidity measured by model L1 and model L2 , Table 4.7 and Table 4.8 above, is contrary to this study hypothesis (H1) is rejected.

Bank Size and Bank Liquidity

Bank size is proxy natural logarithm of total assets (LnTOA) and hypothesized (H2) it has positive and statistically significant influence on CBs' liquidity in Ethiopia. But, the result reveals BSIZE has negative and statistically significant influence on CBs' liquidity in Ethiopia with coefficient value -0.028941and -0.030867with p-value 0.1377and 0.0541measured by model L1 and L2 respectively. The negative coefficient sign in both models shows existence of opposite association among BSIZE and liquidity. These results shows one birr increase in BSIZE

lead into 0.028 and 0.03 cents decrease in liquidity measured by model L1 and L2 respectively, all other variables constant.

BSIZE statistically and insignificantly influence CBs' liquidity result is contrary to this study hypothesis (H2) as per model L1 and significantly influence CBs' liquidity as per model L2 but has identical negative coefficient sign. Thus, BSIZE significantly influence the CBs' liquidity measured under model L2 but with opposite sign as per the table 4.8 above, is in agreement with is study hypothesis (H2) is not rejected.

Then, this study regression result of model L2 are in line with Singhn and Sharma (2016), Yimer (2016), Melese and Laximikantham (2015), Berihun (2015),Vodová (2013) on Czech and Slovak CBs, Vodova (2013) on CBs in Poland, Vodova (2013) on CBs in Hungary, Choon et al (2013), Karlee et al (2013), Vodová (2011) on CBs in Czech and others studies.

By and large, regression results of model L1 and L2 indicates CBs' liquidity in Ethiopia decreases when BSIZE increases. Thus, the hypothesis (H2) that states bank size that has significantly influence with opposite sign on CBs' liquidity in Ethiopia is not rejected.

Profitability and Bank Liquidity

Profitability of CBs is proxy measured by return on assets and hypothesized (H3) that profitability has positive and statistically significant influence on CBs' liquidity in Ethiopia.

On the other hand, the regression analysis result reveals that ROA has positive and statistically insignificant influence on CBs' liquidity in Ethiopia with coefficient value 0.137615 with p-value 0.9036 and 0.098865with p-value 0.9154 measured by model L1 and model L2 respectively is contrary to this study expectation. This shows 1% change in ROA lead into 13.8% and 9.88% change in CBs' liquidity in Ethiopia in same direction with coefficient value measured under model L1 and model L2 respectively by keeping all other variable constant.

Hence, positive relationship between ROA and CBs' liquidity indicates that an increase in the former will increase the later. Loans and advances are main sources of CBs' profitability which encourage for high volume lending to earn high profit. And thus, they increase loans and advances provision (long term illiquid assets), however, will deceases their liquid asset exposure in opposite direction. The contrasting influence of CBs' liquidity assets increases was stated that "although more liquid assets increase the ability to raise cash on short-notices, they also reduce the ability of management to commit credibly an investment strategy that protects investors"

which ultimately reduce CBs capacity to raise external finance. More generally, the regression analysis result of model L1and model L2 is inconsistent with these study expectations (H3), Fola (2015), Vodova (2013) CBs in Poland and Vodova (2012) CBs in Slovakia, Elahi (2017), Fekadu (2016), Yimer (2016), Melese and Laximikantham (2015), Choon et al (2013), Karlee et al (2013), Vodova (2013) and Vodová (2012). So, this study hypothesis (H3) that states profitability has negative and statistically significant influence on CBs' liquidity is rejected.

Non-Performing Loan and Bank Liquidity

Non-performing loans and advances is proxy provision for loan losses to total outstanding loans and advances ratio and hypothesized (H4) that percentage share of non-performing loans and advances in total loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia. Regression analysis result reveals NPLA has positive and statistically significant at 1% confidence level influencing CBs' liquidity with coefficient value 1.953724and 1.787508with p-value 0.000and 0.0000 measured by model L1 and L2 respectively. The positive coefficient sign indicates existence of positive relationship between NPLA and CBs' liquidity in Ethiopia measured by model L1 and L2 respectively. The NPLA positive and statistically significantly influence on CBs' liquidity is contrary to this study hypothesis (H4) in terms of sign.

Therefore, these results indicates that 1% change in NPLA will has 195.37 % and 178.75 % change in CBs' liquidity measured by model L1 and L2 respectively, by keeping all other variables constant. These findings of positive relationship between NPLA and liquidity reveal that when CBs have massive NPLA, they may refrain from extending loans and advances to borrowers. Their holding more liquidity have opportunities costs and low return. Increase in NPLA measures assets quality may significantly influence the whole banking industry. When NPLA is enormous, it shows illiquidity and banking industry efficiency problem in turn lead banking system to failure by reducing liquidity through loss of depositors and financier's confidence. NPLA has positive and statistically significant influence on CBs' liquidity in Ethiopia is consistent with Yimer (2016), Rafique and Malik (2013), Choon et al (2013), Hailu (2013), Tesfaye (2012), Vodová (2011) and others studies whereas contrary to this study expectation (H4). This hypothesis (H4) that stated percentage share of NPLA in total loans and

advances has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Leverage and Bank Liquidity

Leverage is proxy the ratio of total debt to total assets and hypothesized that leverage has positive and statistically significant influence on CBs' liquidity in Ethiopia. Thus, the regression analysis results reveals that leverage has positive and statistically insignificant influence on CBs' liquidity with coefficient value 0.21071 and 0.235543 and with p-value 0.4135 and 0.2651 measured by model L1 and L2 respectively. The positive coefficient value implies that 1% change in leverage ratio push towards 21% and 23.5% units increase in CBs' liquidity measured by model L1 and L2 respectively, by keeping all other variables constant.

Leverage ratio acts as a proxy for the ability of firms to issue debt one would expect a negative relation between leverage and liquid assets holdings. This is because firms can use borrowing as a substitute for holding high levels of liquid assets like cash and marketable securities. Moreover, Baskin (1987) argues that the cost of funds used to invest in liquidity increases as the ratio of debt financing increases. This, in turn, implies a reduction in liquid assets holdings with increased debt in capital structure.

However one should note that higher debt levels could increase the likelihood of financial distress. In that case, one would expect a firm with a high debt ratio to increase its cash holdings to decrease the likelihood of a financial distress. This would induce a positive relation between leverage and cash holdings. According to Mureithi (2003), leverage is measured by the ratio of total debt to total assets. So, this study hypothesis (H5) that states leverage has positive and statistically significant influence on CBs' liquidity is rejected.

GDP Rate and Bank Liquidity

The GDP is proxy annual real growth rate and hypothesized that real GDP growth rate has negative and statistically significant influence on CBs' liquidity in Ethiopia. Thus, the regression analysis results reveals that GDP has positive and statistically insignificant influence on CBs' liquidity with coefficient value 0.242889 and 0.203172 and with p-value 0.4616 and 0.4522 measured by model L1 and L2 respectively. The positive coefficient value implies that a single unit increase in GDP push towards 24.28% and 20.31% units increase in CBs' liquidity

measured by model L1 and L2 respectively, by keeping all other variables constant. This relationship impact may be due to an increase in nationals' income and economic growth of the country. It may increases the bankability of society through deposit financing to CBs as a result of which their liquidity may increase too. The statistically insignificance association existence may be indicator of increase in nations' economic income has no that much influence surpassing survival income by saving money to CBs. When excess income is utilized for consumption CBs deposit gathering sachems may decreases liquidity creation and holding.

GDP statistically and significantly influence CBs' liquidity result is in agreement with this study but contrary in terms of sign with hypothesis (H6) as per model L1 and insignificantly influence CBs' liquidity as per model L2 but has identical positive coefficient sign. Thus, GDP significantly influence the CBs' liquidity measured under model L1 with positive coefficient sign as per the table 4.7 above, is in agreement with is study hypothesis (H6) is not rejected.

However, the finding results are inconsistent with this study expectation (H6) but in agreement with Fekadu (2016), Yimer (2016), Fola (2015), Chagwiza (2014), Vodová (2013) on CBs in Hungary, Vodova (2012) on CBs in Slovakia, Munteanu (2012), Tesfaye (2012) and Vodová (2011) on CBs in Czech findings. Therefore, this study hypothesis (H6) that states GDP has negative and statistically significant influence on CBs' liquidity in Ethiopia is rejected.

Inflation Rate and Bank Liquidity

The general inflation rate of the country is proxy annual general Consumer Price Index (CPI) and hypothesized that general inflation rate has negative and statistically significant influence on CBs' liquidity in Ethiopia. Thus, the regression analysis result reveals that general INF has positive and statistically significant at 1% confidence level influence on CBs' liquidity with coefficient value 0.304502 and 0.260088 with p-value 0.0013 and 0.0008 measured by model L1 and L2 respectively and consistent with this study expectation (H7). These positive coefficient sign implies existence of positive relationship between general INF and CBs' liquidity in Ethiopia. Yet, 1% change in general INF have 30.45 % and 26.00 % change in CBs' liquidity as measured by model L1 and L2 respectively, by keeping all other variables constant, in same direction. When prices of goods and services increase then CBs interest rate may increase substantially while purchasing power of money decreases as well. They may be pressurized to

mobilize more deposit from the public as a result they may encourage for more liquidity creation but fear investing more for long term. When general inflation increase CBs' liquidity increases. The positive relationship amid general INF and CBs' liquidity is in accordance with the theory that states during inflationary economy period CBs refrain from long term investment and prefer holding risk free liquid asset, providing small amount of loans and advances and investing on most profitable short term money market instruments through an economic agents to increase their liquidity instantaneously.

However, findings are consistent with this study expectation (H7) in terms of significance with Yimer (2016), Singhn and Sharma (2016), Raeis et al (2016), Fola (2015), Vodova (2013) on CBs in Poland and Tesfaye (2012) findings. So, this study hypothesis (H7) that states general INF influence has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

NBE-Bills Purchase and Bank Liquidity

National bank bill purchase policy is proxy as dummy variable (1 for bill purchase enforcement time periods 0 otherwise) by reason of non-existence periods before policy introduction and unequally applicability amidst private and public CBs like CBE not enforced by the policy. It was hypothesized that NBBP has negative and statistically significant influence on CBs' liquidity in Ethiopia. So, the regression analysis results reveals NBBP has negative and statistically significant at 5% and 10% confidence level influence on CBs' liquidity with coefficient value -0.086963 and p-value 0.0103measured by model L1, Table 4.7 above, and consistent with expectation (H8). But, NBBP has negative and statistically significant influence on CBs' liquidity as measured by model L2 with coefficient value -0.052822 and p-value of 0.0555, Table 4.8 above, which is consistent with expectation (H8) of this study.

Therefore, in accordance with model L1 and model L2 regression analysis result, one birr investment in NBBP has 8.69 % and 5.3% decreases in CBs' liquidity exposure respectively. This may be due to presence of minimal or small amount of loans and advances delivery to borrowers and fewer levels of liquid assets and higher total assets amount. Hence, NBBP, except CBE, is enforcing all private CBs to invest on Government bond 27% of their total loans and advances at the rate of 3% interest rate for five years. When need arises, for instance, liquidity problem, they can't access easily and utilize for discharging payment and settlement transactions. They are indebted for 1 birr loans and advances provided to borrowers' 27 cents investment on

NBBP government bond. Likewise, this study model L1 and L2 regression analysis results is consistent with Fekadu (2016), Fufa (2016), Sebsebie (2014) and Wolde (2013) findings and hypothesis that stated NBBP has negative and statistically significant influence on CBs' liquidity is not rejected. Both models that is L1 and L2 result shows that NBBP has negative and statistically significant influence on CBs' liquidity is consistent.

Interest Rate on Loans & Advances and Bank Liquidity

Interest rate on loans and advances is proxy percentage of interest rate on loans and advances to total outstanding loans and advances. It was hypothesized (H9) that interest rate on loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia. Regression analysis result reveals that IRLA has positive and statistically significant at 10% and 5% confidence level influence on CBs' liquidity in Ethiopia with coefficient value 3.398307 and 2.622541 with p-value 0.001 and 0.0018 measured by model L1 and L2 respectively. These positive coefficient signs in both models imply that 1% increase in IRLA may significantly increase 339.83 % and 262.25% of CBs' liquidity in Ethiopia measured by model L1 and L2 respectively. This direct positive relationship happen when CBs increase IRLA then their borrowers may not offer loans and advances from them as a result of which large amount of loans and advances (illiquid assets) delivery may decreases and hence, they holding large volume liquidity. However, the positive relationship between IRLA and CBs' liquidity is contrary to finance theory which states increase in IRLA motivate CBs to involve more in lending activities as a result they reduce liquid assets holding quota. So, this study finding are consistent with expectation (H9), Berihun (2015), Malik and Rafique (2013), Vodova (2013) on CBs in Hungary, Vodova (2013) on CBs in Poland, Munteanu (2012) and Vodová (2011) findings. Yet, hypothesis that states IRLA has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Interest Rate Margin and Bank Liquidity

Interest rate margin is proxy difference between interest income from loan and advances as percentage of the total loan and advances and the interest paid out on deposit as a percentage of total deposits or net interest income to total outstanding loans and advances ratio and

hypothesized that interest rate margin has negative and statistically significant influence on CBs' liquidity in Ethiopia. The regression analysis results indicates IRM has negative and statistically significant at 1% confidence level influence on CBs' liquidity in Ethiopia with coefficient value -4.875076 and -3.051343 and p-value 0.00000 and 0.0001 measured by model L1 and L2 respectively, consistent with expectations (H10). The negative coefficient sign values shows 1% change in IRM may lead into 487.50% and 305.13% change in CBs' liquidity measured by model L1 and L2 respectively in opposite direction, all other variables constant. The negative IRM impact on CBs' liquidity reveals low IRM discourage CBs involvement in loaning, paying more interest expenses for money savers and hence, vulnerability for holding low return more liquid assets. It is opposite to liquidity preference theory which stated money lenders require high IRM.

Generally, this study finding result is in agreement with Elahi (2017), Vodova (2013) on CBs in Hungary, Vodova (2013) on CBs in Poland, Tesfaye (2012) and Vodová (2012) on CBs in Poland findings. And hence, the hypothesis (H10) that states interest rate margin has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Money Market Interest Rate and Bank Liquidity

Money market interest rate is proxy annual weighted average interest rate on Treasury Bills (TB) and hypothesized that MMRI has positive and statistically significant influence on CBs' liquidity in Ethiopia. Though, this study regression analysis results reveals that MMRI has negative and statistically insignificant influence on CBs' liquidity with coefficient value -1.915308 and -2.02693 with p-value 0.2984 and 0.1799 measured by model L1 and L2 respectively. The result is contrary with expectation (H11) measured by model L1 and model L2. Negative coefficient sign reveals 1% increase in MMIR may lead to 191.53% and 202.70% decrease in CBs' liquidity measured by model L1 and L2 respectively. When MMIR increase CBs may encourage investing more on money market TBs which push them for depressing liquidity and vulnerability for liquidity risk. So, the negative coefficient sign in both model L1 and L2 indicates that MMIR on TBs has opposite relationship with CBs' liquidity and also opposite to theory that states high MMIR encourage CBs to invest more on money market instruments for enhancing liquidity. So, this study results are not in agreement with expectations (H11), Subedi and Neupane (2013), Vodova (2013) on CBs in Hungary, Tesfaye (2012) and Lucchetta (2007) findings. Thus,

hypothesis that states money market interest rate has positive and statistically significant influence on CBs' liquidity in Ethiopia is rejected.

Unemployment Rate and Bank Liquidity

An unemployment rate (UER) is proxy annual workforce unemployment rate percentage of the country and hypothesized as UER has negative and statistically significant influence on CBs' liquidity in Ethiopia. Thus, regression analysis result portrays that UER has negative and statistically insignificant influence on CBs' liquidity contrary to this study expectation (H12). The negative coefficient sign -0.092125 and -0.068192with p-value 0.2975 and 0.3463 measured by model L1 and L2 respectively implies that existence of negative relationship between UER and CBs' liquidity with minimal impact. Hence, 1% increase in UER will have 9.21% and 6.81% decreases in CBs' liquidity. This may be because when unemployed workforce of the country increase from time to time and failed creating new job opportunities, no one depositor save money in the CBs. So, they can't easily create liquidity through deposit mobilizations hem and can't distribute liquidity adequately. Perhaps, high UER may decreases capital and liquidity creation activities of CBs during distressed economic situations as well.

Thus, this study findings are consistent with negative coefficient sign whereas inconsistent in terms of insignificance level with expectation (H12). On the other hand, findings are consistent with Singhn and Sharma (2016), Bhati et al (2015), Vodova (2013) on CBs in Hungary, Munteanu (2012) and Vodova (2012) on CBs in Slovak findings. So, hypothesis (H12) that states UER has negative and statistically significant influence on CBs' liquidity in Ethiopia is rejected.

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter consists of the overall conclusion of the entire research and summary of statistical analysis. Besides that, it also provides the discussion of the major findings and implication of the study. Lastly, researchers also suggest some recommendations for future researchers, based on the findings, and conclusion.

5.2 Summary of Findings

This study was regressed dependent variable, CBs' liquidity and independent variables: Bank specific and Macroeconomic variables of sampled seven CBs for the period 2000-2017 by employing E-view 8 econometric software. Balanced panel data descriptive statistics, correlation analysis and fixed effect model (FEM) multiple regression analysis were employed on sampled CBs using model L1 and L2. Hence, the findings revealed that BSIZE, NPLA, IRM, IRLA, NBBP and INF are found to be statistically significant. This reveals that all these variables are key drivers of determinants of CBs' liquidity in Ethiopia. Whereas CAP, LEV, ROA GDP, MMIR, and UER are found to be statistically insignificant influence on CBs' liquidity.

5.3 Conclusions

This study was identified and examined determinants of CBs' liquidity in Ethiopia. Therefore, in accordance with the major findings mentioned above, the ensued are concluded.

❖ Capital Adequacy (CAP) has positive and statistically insignificant influence on CBs' liquidity in Ethiopia. This positive relationship reveals when capital increases the liquidity may also increase, all other factors constant. It is consistent with the assumption that states CBs' having reliable capital will have reliable liquidity. So, it can be concluded that when CBs' have adequate capital they can create, distribute and hold enough liquidity by considering capital as buffer and financing means.

❖ Bank size (BSIZE) has negative and statistically significant influence at 10% confidence level on CBs' liquidity in Ethiopia. This reveals existence of opposite association among

BSIZE and CBs' liquidity in Ethiopia subject to "too big to fail" hypothesis. Big CBs consider themselves as big and failed holding enough liquid assets. They are encouraged by inherent guarantee access advantages like easy deposit mobilization, money market financing and invest in short term risky assets to reduce funding cost and liquidity risks. Thus, it can be concluded the "too big to fail" concept may push CBs for moral hazard behavior and unnecessary liquidity shortage exposures.

❖ Profitability (ROA) has positive and statistically insignificant influence on CBs' liquidity in Ethiopia. This reveals ROA and liquidity have positive relationship implying significant increase in ROA lead into significant increase in CBs' liquidity in Ethiopia, all other variables constant. Holding liquid assets enforces CBs for high opportunity costs and earn low return. Therefore, it can be concluding that ROA influence positively CBs' liquid assets holding.

❖ Non-performing loans and advances (NPLA) has positive and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. NPLA and liquidity have direct positive relationship by revealing that when CBs have massive NPLA amount, they may refrain from spreading loans and advances to borrowers and hold more low return liquidity with high opportunities costs. When NPLA is enormous, it shows illiquidity, efficiency problems and liquidity position reduction of CBs which in turn lead to bank run and banking industry and financial system failure. It can be conclude that increase in NPLA will significantly influence CBs, banking industry and financial system.

❖ Leverage (LEV) has positive and statistically insignificant influence on CBs' liquidity in Ethiopia. Leverage and liquidity have direct positive relationship which implies that increase in leverage ratio push towards a units increase in CBs' liquidity, by keeping all other variables constant.

 A bank with a high leverage requires more liquidity to settle periodic interest payments and the maturity value of the debt. The results indicate that the higher the leverage the higher the liquidity of the commercial banks. This is consistent with the hypothesized positive relationship between leverage and liquidity of commercial banks.

❖ Real GDP growth rate has positive and statistically insignificant influences on CBs' liquidity in Ethiopia. This positive relationship may arises when countrywide income increase together with economic growth bankable citizen will increases depositing to CBs through which

liquidity may increase largely. The presence of statistically insignificance relationship may be an indicator of nations' economic income increase which may not adequately surpasses survival incomes to save money to CBs. So, it can be concluded that if excess income is utilized for consumption without made savings then CBs' liquidity creation and holding may not be increased adequately.

❖ General inflation rate (INF) has positive and statistically significant influence at 1% confidence level on CBs' liquidity. This revels that when goods and services prices increases then interest rate increase and at the same time purchasing power of money decreases. CBs may be pressurized to mobilize more deposit from the public and they also motivate to create more liquidity but may fear investing for long term periods. Similarly, during inflationary economy period they refrain from long term investment, prefer holding risk free liquid asset, provide small amount of loans and advances and invest in short term money market instruments through an economic agents and then CBs increase liquidity. It can be concluded that an increase in general INF will increases CBs' liquidity.

❖ National bank bill purchase (NBBP) policy has negative and statistically significant influence at 10% confidence level on CBs' liquidity in Ethiopia. This reveals NBBP and CBs' liquidity have negative relationship by implying investment increase in the former lead into decrease in the later. NBBP, except CBE, is enforcing all private CBs to invest on Government bond 27% of total loans and advances at the rate of 3% interest rate for five years. And also when need arises, for instance, liquidity problem, they can't access easily and utilize for discharging payment and transaction settlement purposes. Thus, it can be concluded that NBBP may deceases CBs' liquidity position.

❖ Interest rate on loans and advances (IRLA) has positive and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. This shows interest rate on loans and advances (IRLA) and CBs' liquidity have positive relationship by implying that an increase of the former significantly increases the later. When CBs increase IRLA, borrowers may not be welling to borrow loans and advances from them. As a result loans and advances deliver will decrease and hence, they will hold high opportunity cost and low return assets more liquidity. Hence, it can be concluded that increase in IRLA significantly increase CBs' liquidity holding.

❖ Interest rate margin (IRM) has negative and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. This reveals IRM and CBs' liquidity have negative relationship. This implies low IRM may discourage CBs from spreading loans and advances and make them paying more interest expenses to money savers. There is also vulnerability for holding low return more liquid assets opposite to liquidity preference theory that states lenders require high IRM. So, it can be concluded that low IRM influence negatively CBs lending and increase liquidity holding costs.

❖ Money market interest rate (MMIR) has negative and statistically insignificant influence on CBs' liquidity in Ethiopia. This show MMIR and CBs liquidity have negative relationship by implying that increase of the former will decrease the later. In this case when MMIR increases, CBs may encourage investing more on money market TBs which push them depresses their liquidity position and vulnerability to liquidity risk. So, it can be concluded that increase in MMIR may weaken CBs' liquidity position and vulnerability for liquidity risk.

❖ Unemployment rate (UER) has negative and statistically insignificant influence on CBs' liquidity. When unemployed workforce increase from time to time and the country failed creation of new job opportunities, no one will deposit money in CBs. Therefore, they can't easily access and create liquidity through deposit mobilization and distribute liquidity adequately at required level. Similarly, high UER also decease capital and liquidity creation and distribution activities of CBs during distressed economic situations as well. Thus, it can be conclude that increase in UER will have insignificant impact on CBs' liquidity in Ethiopia.

5.4 Recommendations

In light of the major finding obtained from the results, the following recommendations were made and possible recommendations can be advisable to CBs' management, NBE, MoFEC, PFEA and further researchers as ensued.

Commercial Banks Management

❖ Commercial banks in Ethiopia should establish and practice robust asset liability management system such as comprehensive liquidity management policy and strong Asset

Liability Management Committee (ALCO) in order to control or mitigate liquidity risk arising from bank-specific factors. This could help commercial banks strengthening its internal control of liquidity risk management at the acceptable level.

❖ Significant key drivers of liquidity should be focused and reengineering the institutions along with these indicators could improve the efficient management of liquidity position of the commercial banks in Ethiopia.

❖ External factors have influence on liquidity of Ethiopian banks so all commercial banks in Ethiopia that they cannot ignore the macroeconomic indicators when strategizing to improve on their position of liquidity. Thus, banks in Ethiopia should not only be concerned about internal structures and policies/procedures, but they must consider both the internal environment and the macroeconomic environment together in developing their strategies to efficiently manage their liquidity position.

National bank of Ethiopia

❖ On the other hand, less development in financial system might contributes for liquidity problem of the commercial banks in Ethiopia. Thus, all stakeholders including banks as well as government should strive for building strong financial system in the country.

❖ Since beginning of NBE-bill purchase, the liquidity of private commercial banks has been significantly in declining trend and thus the NBE should reconsider its policy and respective directives on reducing the percentage of NBE-bill purchase or allow banks NBE-bill purchase cap or total escape this activity.

Provide guidance on adequate liquidity creation, distribution, positions and its risk management so that CBs can stabilize, enhances and safeguards banking industry from bankruptcy and run-off by managing liquidity determinants.

Ministry of Finance and Economic Cooperation and Public Finance Enterprise

❖ Establish appropriate strategic policy that facilitate CBs' liquidity creation, distribution and holding position, minimize failure risks and bring prompt banking industry development and growth.

❖ Draw equally applicable policy for all private and public CBs can increases financial soundness, strength, competiveness, development and growth of liquidity and its risk management.

Researchers

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

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APPENDIXIES

APPENDIX A: Raw Input Data

S. No.	Bank Name	Year	Independent Variable										
			1	2	3	4	5	6	7	8	9	10	
n			CAP	NPLA	BSIZE	ROA	GDP	INF	IRLA	IRM	NBBP	LEV	M
1	AIB	2000	0.1344	0.0313	6.632	0.0303	0.034	0.0536	0.1119	0.0467	0.0000	0.0430	0
1	AIB	2001	0.1367	0.0339	6.8101	0.0198	0.0742	-0.0035	0.1016	0.0376	0.0000	0.0534	0
1	AIB	2002	0.1178	0.0377	7.0139	0.0171	0.0163	-0.1057	0.0958	0.038	0.0000	0.0639	0
1	AIB	2003	0.1042	0.055	7.2449	0.0128	-0.021	0.1092	0.0725	0.0263	0.0000	0.0847	0.
1	AIB	2004	0.1011	0.0772	7.4787	0.0198	0.1173	0.0735	0.0719	0.0271	0.0000	0.1143	0
1	AIB	2005	0.1042	0.062	7.708	0.0247	0.1264	0.0613	0.0729	0.0334	0.0000	0.0952	0
1	AIB	2006	0.1073	0.0491	7.9909	0.0247	0.1154	0.1058	0.0732	0.0365	0.0000	0.1056	0.
1	AIB	2007	0.1227	0.0434	8.2506	0.0247	0.1179	0.1582	0.0854	0.0519	0.0000	0.0742	0.
1	AIB	2008	0.1293	0.0464	8.4806	0.0247	0.1119	0.253	0.0917	0.0426	0.0000	0.0734	0.
1	AIB	2009	0.1171	0.055	8.7676	0.0247	0.1004	0.364	0.1019	0.044	0.0000	0.1088	0.
1	AIB	2010	0.1297	0.0471	8.9803	0.0247	0.1057	0.028	0.0964	0.0291	0.0000	0.2464	0.
1	AIB	2011	0.1411	0.0364	9.2219	0.0247	0.114	0.181	0.099	0.0273	1.0000	0.1987	0.
1	AIB	2012	0.1466	0.027	9.3874	0.0247	0.087	0.341	0.1215	0.0401	1.0000	0.1902	0.
1	AIB	2013	0.1511	0.023	9.6063	0.0247	0.099	0.135	0.1155	0.0437	1.0000	0.2135	0.
1	AIB	2014	0.1374	0.0227	9.9049	0.0247	0.1035	0.081	0.1187	0.0402	1.0000	0.2232	0
1	AIB	2015	0.1402	0.0174	10.0804	0.0247	0.104	0.077	0.1171	0.0432	1.0000	0.1468	0.
1	AIB	2016	0.1392	0.0153	10.2959	0.0247	0.0800	0.0969	0.1244	0.0505	1.0000	0.1480	0.
1	AIB	2017	0.14354	0.02315	9.18483	0.0247	0.0989	0.13103	0.09825	0.038901	1.0000	0.2277	0.0
2	BOA	2000	0.1713	0.0153	6.5765	0.0247	0.034	0.0536	0.0766	0.0393	0.0000	0.1044	0
2	BOA	2001	0.1853	0.0262	6.7979	0.0247	0.0742	-0.0035	0.1048	0.058	0.0000	0.0988	0
2	BOA	2002	0.1217	0.0568	7.0405	0.0247	0.0163	-0.1057	0.0972	0.0408	0.0000	0.0988	0
2	BOA	2003	0.1163	0.0766	7.1952	0.0247	-0.021	0.1092	0.0766	0.0366	0.0000	0.1035	0.
2	BOA	2004	0.1457	0.0759	7.3683	0.0247	0.1173	0.0735	0.1008	0.0538	0.0000	0.0980	0
2	BOA	2005	0.1531	0.0494	7.629	0.0247	0.1264	0.0613	0.0851	0.0505	0.0000	0.0856	0
2	BOA	2006	0.1718	0.0311	7.9494	0.0247	0.1154	0.1058	0.0841	0.0572	0.0000	0.0900	0.
2	BOA	2007	0.1384	0.0469	8.1304	0.0247	0.1179	0.1582	0.0876	0.0514	0.0000	0.0801	0.
2	BOA	2008	0.1017	0.0889	8.3594	0.0247	0.1119	0.253	0.0896	0.0511	0.0000	0.0871	0.
2	BOA	2009	0.1132	0.0983	8.6082	0.0247	0.1004	0.364	0.1018	0.0531	0.0000	0.0846	0.
2	BOA	2010	0.1156	0.0741	8.7451	0.0247	0.1057	0.028	0.083	0.0355	0.0000	0.0884	0.
2	BOA	2011	0.1156	0.0333	8.8926	0.0247	0.114	0.181	0.1122	0.0441	1.0000	0.0744	0.
2	BOA	2012	0.1363	0.0257	9.0167	0.0247	0.087	0.341	0.1276	0.0468	1.0000	0.0682	0.
2	BOA	2013	0.1307	0.0598	9.2232	0.0247	0.099	0.135	0.1058	0.0384	1.0000	0.0549	0.

2	BOA	2014	0.1753	0.0551	9.3305	0.0247	0.1035	0.081	0.1451	0.0495	1.0000	0.0577
2	BOA	2015	0.1538	0.0152	9.5228	0.0247	0.104	0.077	0.1445	0.0495	1.0000	0.0541
2	BOA	2016	0.1477	0.0137	9.7308	0.0247	0.08	0.0969	0.137	0.0534	1.0000	0.0635
2	BOA	2017	0.134101	0.05413	8.22663	0.0247	0.08741	0.11819	0.10349	0.047588	1.0000	0.0679
3	CBE	2000	0.0858	0.139	9.8949	0.0247	0.034	0.0536	0.0966	0.0415	0.0000	0.2075
3	CBE	2001	0.0614	0.1838	9.9753	0.0247	0.0742	-0.0035	0.0926	0.029	0.0000	0.2030
3	CBE	2002	0.0162	0.2455	10.0054	0.0247	0.0163	-0.1057	0.0601	0.0095	0.0000	0.1985
3	CBE	2003	0.0753	0.2897	10.0941	0.0247	-0.021	0.1092	0.0783	0.0201	0.0000	0.1939
3	CBE	2004	0.0654	0.2437	10.2391	0.0247	0.1173	0.0735	0.0817	0.0176	0.0000	0.1894
3	CBE	2005	0.0603	0.2117	10.4094	0.0247	0.1264	0.0613	0.0676	0.0173	0.0000	0.1921
3	CBE	2006	0.0644	0.1767	10.4871	0.0247	0.1154	0.1058	0.0918	0.0188	0.0000	0.1690
3	CBE	2007	0.117	0.1423	10.6795	0.0247	0.1179	0.1582	0.1062	0.0208	0.0000	0.1464
3	CBE	2008	0.1175	0.0613	10.8281	0.0247	0.1119	0.253	0.0889	0.0255	0.0000	0.1631
3	CBE	2009	0.1172	0.0311	10.9922	0.0247	0.1004	0.364	0.1128	0.0366	0.0000	0.1831
3	CBE	2010	0.1014	0.0185	11.2143	0.0247	0.1057	0.028	0.1142	0.0332	0.0000	0.1644
3	CBE	2011	0.0799	0.0245	11.6463	0.0247	0.114	0.181	0.1134	0.0317	0.0000	0.1699
3	CBE	2012	0.0829	0.0221	11.9755	0.0247	0.087	0.341	0.1076	0.0368	0.0000	0.1870
3	CBE	2013	0.0769	0.0261	12.1915	0.0247	0.099	0.135	0.1333	0.0413	0.0000	0.1654
3	CBE	2014	0.0724	0.0275	12.3901	0.0247	0.1035	0.081	0.1375	0.0395	0.0000	0.1476
3	CBE	2015	0.064	0.0264	12.6236	0.0247	0.104	0.077	0.1505	0.0441	0.0000	0.1209
3	CBE	2016	0.0606	0.0272	12.86	0.0247	0.08	0.0969	0.156	0.0451	0.0000	0.1102
3	CBE	2017	0.085612	0.09819	11.2019	0.0247	0.08741	0.11819	0.10524	0.029906	1.0000	0.1305
4	DB	2000	0.1017	0.0338	6.7627	0.0247	0.034	0.0536	0.0901	0.0405	0.0000	0.1182
4	DB	2001	0.1036	0.0322	7.0031	0.0247	0.0742	-0.0035	0.098	0.0426	0.0000	0.1160
4	DB	2002	0.0983	0.031	7.3038	0.0247	0.0163	-0.1057	0.0883	0.0335	0.0000	0.1120
4	DB	2003	0.0784	0.0387	7.5964	0.0247	-0.021	0.1092	0.0647	0.0313	0.0000	0.1120
4	DB	2004	0.0852	0.0373	7.8925	0.0247	0.1173	0.0735	0.0692	0.0345	0.0000	0.1098
4	DB	2005	0.0918	0.0323	8.1374	0.0247	0.1264	0.0613	0.0726	0.0407	0.0000	0.1006
4	DB	2006	0.1142	0.0265	8.422	0.0247	0.1154	0.1058	0.0765	0.0468	0.0000	0.1029
4	DB	2007	0.1211	0.0248	8.7063	0.0247	0.1179	0.1582	0.0802	0.0487	0.0000	0.1052
4	DB	2008	0.1239	0.0232	8.9655	0.0247	0.1119	0.253	0.0959	0.0492	0.0000	0.1210
4	DB	2009	0.119	0.023	9.1832	0.0247	0.1004	0.364	0.0977	0.0458	0.0000	0.0924
4	DB	2010	0.1172	0.0218	9.4217	0.0247	0.1057	0.028	0.0956	0.0268	0.0000	0.0879
4	DB	2011	0.126	0.0199	9.5929	0.0247	0.114	0.181	0.0971	0.0275	1.0000	0.0970
4	DB	2012	0.1415	0.0215	9.7711	0.0247	0.087	0.341	0.1105	0.0369	1.0000	0.0929
4	DB	2013	0.1343	0.0225	9.8908	0.0247	0.099	0.135	0.1152	0.0351	1.0000	0.0937
4	DB	2014	0.1507	0.0178	9.9971	0.0247	0.1035	0.081	0.121	0.0358	1.0000	0.0766
4	DB	2015	0.1475	0.0168	10.1171	0.0247	0.104	0.077	0.1227	0.0395	1.0000	0.0818
4	DB	2016	0.1429	0.0171	10.2603	0.0247	0.08	0.0969	0.1199	0.0372	1.0000	0.0861
4	DB	2017	0.151955	0.01536	10.32	0.0247	0.08741	0.11819	0.09501	0.038376	1.0000	0.0823
5	NIB	2000	0.2595	0	5.0626	0.0247	0.034	0.0536	0.0508	0.0177	0.0000	0.3300

5	NIB	2001	0.1994	0.0048	5.8171	0.0247	0.0742	-0.0035	0.0905	0.053	0.0000	0.1970	0
5	NIB	2002	0.1948	0.0123	6.2804	0.0247	0.0163	-0.1057	0.0895	0.0452	0.0000	0.1890	
5	NIB	2003	0.1458	0.04	6.7856	0.0247	-0.021	0.1092	0.0673	0.0384	0.0000	0.1810	0.
5	NIB	2004	0.1468	0.0382	7.1285	0.0247	0.1173	0.0735	0.0712	0.0428	0.0000	0.1731	0
5	NIB	2005	0.1368	0.0415	7.457	0.0247	0.1264	0.0613	0.0733	0.0443	0.0000	0.1645	0
5	NIB	2006	0.1495	0.0386	7.6143	0.0247	0.1154	0.1058	0.0725	0.044	0.0000	0.1431	0.
5	NIB	2007	0.1715	0.0341	7.866	0.0247	0.1179	0.1582	0.0809	0.0508	0.0000	0.1162	0.
5	NIB	2008	0.1728	0.0379	8.2025	0.0247	0.1119	0.253	0.0993	0.0645	0.0000	0.1595	0.
5	NIB	2009	0.1608	0.046	8.4777	0.0247	0.1004	0.364	0.1142	0.0733	0.0000	0.1625	0.
5	NIB	2010	0.1632	0.039	8.6946	0.0247	0.1057	0.028	0.1046	0.0479	0.0000	0.1553	0.
5	NIB	2011	0.1734	0.0412	8.8695	0.0247	0.114	0.181	0.1203	0.0557	1.0000	0.1102	0.
5	NIB	2012	0.1934	0.0271	9.0211	0.0247	0.087	0.341	0.1169	0.058	1.0000	0.1100	0.
5	NIB	2013	0.1915	0.025	9.1209	0.0247	0.099	0.135	0.1256	0.0763	1.0000	0.0900	0.
5	NIB	2014	0.1886	0.0215	9.2824	0.0247	0.1035	0.081	0.1055	0.0702	1.0000	0.0800	0
5	NIB	2015	0.1707	0.0152	9.4922	0.0247	0.104	0.077	0.1288	0.0835	1.0000	0.0984	0.
5	NIB	2016	0.1669	0.018	9.6697	0.0247	0.08	0.0969	0.1519	0.0894	1.0000	0.0562	0.
5	NIB	2017	0.165961	0.03204	8.0576	0.0247	0.08741	0.11819	0.09783	0.056176	1.0000	0.0785	0.0
6	UB	2000	0.2416	0.0114	5.1818	0.0247	0.034	0.0536	0.0909	0.0748	0.0000	0.1036	0
6	UB	2001	0.2403	0.0075	5.6454	0.0247	0.0742	-0.0035	0.097	0.0818	0.0000	0.1033	0
6	UB	2002	0.2018	0.0123	6.1225	0.0247	0.0163	-0.1057	0.1043	0.0752	0.0000	0.1029	0
6	UB	2003	0.1495	0.0241	6.4646	0.0247	-0.021	0.1092	0.0655	0.0528	0.0000	0.1026	0.
6	UB	2004	0.1068	0.0391	6.8711	0.0247	0.1173	0.0735	0.0703	0.0466	0.0000	0.1022	0
6	UB	2005	0.1002	0.0388	7.3505	0.0247	0.1264	0.0613	0.0776	0.0521	0.0000	0.0774	0
6	UB	2006	0.1072	0.0289	7.6926	0.0247	0.1154	0.1058	0.0707	0.0606	0.0000	0.1176	0.
6	UB	2007	0.1442	0.0301	7.9863	0.0247	0.1179	0.1582	0.0865	0.065	0.0000	0.1292	0.
6	UB	2008	0.1205	0.0268	8.4415	0.0247	0.1119	0.253	0.092	0.0755	0.0000	0.1043	0.
6	UB	2009	0.086	0.0309	8.8731	0.0247	0.1004	0.364	0.0976	0.0759	0.0000	0.1111	0.
6	UB	2010	0.0885	0.0365	9.1238	0.0247	0.1057	0.028	0.096	0.0766	0.0000	0.0906	0.
6	UB	2011	0.1004	0.0277	9.3312	0.0247	0.114	0.181	0.1034	0.0823	1.0000	0.0981	0.
6	UB	2012	0.1201	0.0233	9.363	0.0247	0.087	0.341	0.127	0.1078	1.0000	0.1056	0.
6	UB	2013	0.1175	0.0186	9.396	0.0247	0.099	0.135	0.1277	0.1195	1.0000	0.0715	0.
6	UB	2014	0.1162	0.0144	9.633	0.0247	0.1035	0.081	0.1413	0.1215	1.0000	0.0757	0
6	UB	2015	0.1152	0.0122	9.7459	0.0247	0.104	0.077	0.1382	0.128	1.0000	0.0606	0.
6	UB	2016	0.1194	0.013	9.9129	0.0247	0.08	0.0969	0.1437	0.1317	1.0000	0.1251	0.
6	UB	2017	0.077185	0.03128	8.20629	0.0247	0.08741	0.11819	0.10175	0.083982	1.0000	0.1316	0.0
7	WB	2000	0.0973	0.0267	6.2422	0.0247	0.034	0.0536	0.0992	0.0322	0.0000	0.0834	0
7	WB	2001	0.0995	0.0436	6.3682	0.0247	0.0742	-0.0035	0.1105	0.0505	0.0000	0.0862	0
7	WB	2002	0.0991	0.0493	6.4708	0.0247	0.0163	-0.1057	0.1034	0.0468	0.0000	0.0912	0
7	WB	2003	0.1046	0.0508	6.7901	0.0247	-0.021	0.1092	0.0736	0.0352	0.0000	0.0912	0.
7	WB	2004	0.1132	0.0583	7.0388	0.0247	0.1173	0.0735	0.0894	0.052	0.0000	0.0941	0
7	WB	2005	0.1114	0.0509	7.3877	0.0247	0.1264	0.0613	0.0798	0.0429	0.0000	0.0916	0

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7	WB	2006	0.1129	0.0483	7.7227	0.0247	0.1154	0.1058	0.0753	0.0462	0.0000	0.1000	0.
7	WB	2007	0.148	0.0441	8.1548	0.0247	0.1179	0.1582	0.0858	0.0455	0.0000	0.1014	0.
7	WB	2008	0.1804	0.0592	8.3248	0.0247	0.1119	0.253	0.1015	0.05	0.0000	0.1341	0.
7	WB	2009	0.1987	0.0609	8.5406	0.0247	0.1004	0.364	0.1106	0.059	0.0000	0.1082	0.
7	WB	2010	0.2221	0.0397	8.6556	0.0247	0.1057	0.028	0.0999	0.0454	0.0000	0.1336	0.
7	WB	2011	0.206	0.0463	8.9948	0.0247	0.114	0.181	0.1082	0.0441	1.0000	0.0950	0.
7	WB	2012	0.2325	0.0342	9.0297	0.0247	0.087	0.341	0.1239	0.0481	1.0000	0.1180	0.
7	WB	2013	0.2091	0.0234	9.249	0.0247	0.099	0.135	0.1248	0.0509	1.0000	0.0975	0.
7	WB	2014	0.2178	0.0207	9.3275	0.0247	0.1035	0.081	0.1433	0.0805	1.0000	0.0889	0
7	WB	2015	0.2018	0.0165	9.526	0.0247	0.104	0.077	0.1406	0.0526	1.0000	0.1040	0.
7	WB	2016	0.1965	0.0137	9.6921	0.0247	0.08	0.0969	0.1364	0.0542	1.0000	0.1424	0.
7	WB	2017	0.24508	0.0303	8.4835	0.0247	0.0874	0.1182	0.1062	0.0492	1.0000	0.171	

APPENDIX B: Regression Result Model L1 and Model L2

Dependent variable: L1
Total panel (balanced) observations: 126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.352866	0.143994	2.45055	0.0159
BSIZE	-0.028941	0.019351	-1.49557	0.1377
CAP	0.529328	0.336001	1.57538	0.1181
GDP	0.242889	0.32873	0.73887	0.4616
INF	0.304502	0.091926	3.312483	0.0013
IRLA	3.398307	0.999913	3.398601	0.001
IRM	-4.875076	0.893557	-5.455812	0.00000
LEV	0.21071	0.256655	0.820987	0.4135
MMIR	-1.915308	1.83286	-1.044983	0.2984

	Coefficient	Std. Error	t-Statistic	Prob.
NBBP	-0.086963	0.033304	-2.611197	0.0103
NPLA	1.953724	0.28651	6.819034	0.000
ROA	0.137615	1.133152	0.121444	0.9036
UER	-0.092125	0.088004	-1.046821	0.2975

Cross-section fixed (dummy variables)			
R-squared	0.585952	Mean dependent var	0.390868
Adjusted R-squared	0.516299	S.D. dependent var	0.134964
S.E. of regression	0.093866	Akaike info criterion	-1.755767
Sum squared resid	0.942754	Schwarz criterion	-1.328074
Log likelihood	129.6133	Hannan-Quinn criter.	-1.582009
F-statistic	8.412446	Durbin-Watson stat	1.287927
Prob(F-statistic)	0		

The level of significance at 1%, 5% and 10%

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

Model L 2 estimation result

Total panel (balanced) observations 126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.334687	0.117958	2.83735	0.0054
BSIZE	-0.030867	0.015852	-1.947134	0.0541
CAP	0.225178	0.275246	0.818098	0.4151
GDP	0.203172	0.26929	0.754473	0.4522
INF	0.260088	0.075304	3.453849	0.0008
IRLA	2.622541	0.819111	3.201692	0.0018
IRM	-3.051343	0.731985	-4.168585	0.0001
LEV	0.235543	0.210247	1.120316	0.2651
MMIR	-2.02693	1.501446	-1.349986	0.1799
NBBP	-0.052822	0.027282	-1.936149	0.0555
NPLA	1.787508	0.234704	7.616006	0.000
ROA	0.098865	0.928258	0.106506	0.9154
UER	-0.068192	0.072092	-0.945907	0.3463

R-squared	0.602153	Mean dependent var	0.323654
Adjusted R-squared	0.535226	S.D. dependent var	0.112789
S.E. of regression	0.076893	Akaike info criterion	-2.154666
Sum squared resid	0.632644	Schwarz criterion	-1.726972
Log likelihood	154.7439	Hannan-Quinn criter.	-1.980907
F-statistic	8.997101	Durbin-Watson stat	1.216994
Prob(F-statistic)	0.000000		

The level of significance at 1%, 5% and 10%

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

APPENDIX C: Breusch-Godfrey Serial Correlation LM Test Result of Model L1 and Model L2

Breusch-Godfrey (BG) test for the absence of serial autocorrelation Model L1

Model L1

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	10.29551	Prob. F(2,3)	0.0453
Obs*R-squared	15.71099	Prob. Chi-Square(2)	0.0004

Source: E view 8 output and own computation

Model L2

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	19.51676	Prob. F(2,111)	0.00000
Obs*R-squared	32.78083	Prob. Chi-Square(2)	0.00000

Source: E view 8 output and own computation

APPENDIX D: Hetroskedasticity Test: White Test of Model L1 and Model L2
Model L1

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.254953	Prob. F(12,113)	0.2554
Obs*R-squared	14.81725	Prob. Chi-Square(12)	0.2516
Scaled explained SS	14.0043	Prob. Chi-Square(12)	0.3004

Source: E view 8 output and own computation

Model L2

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.733827	Prob. F(12,113)	0.0686
Obs*R-squared	19.59216	Prob. Chi-Square(12)	0.0752
Scaled explained SS	15.13288	Prob. Chi-Square(12)	0.2342

Source: E view 8 output and own computation

Appendix E: Normality Test of Model L1 and Model L2

Model L1

| Series: Standardized Residuals |
| Sample 2000 2017 |
| Observations 126 |
Mean	-3.85e-19
Median	-0.006266
Maximum	0.204435
Minimum	-0.147026
Std. Dev.	0.071142
Skewness	0.441783
Kurtosis	2.914905
Jarque-Bera	4.136632
Probability	0.126398

Model L2
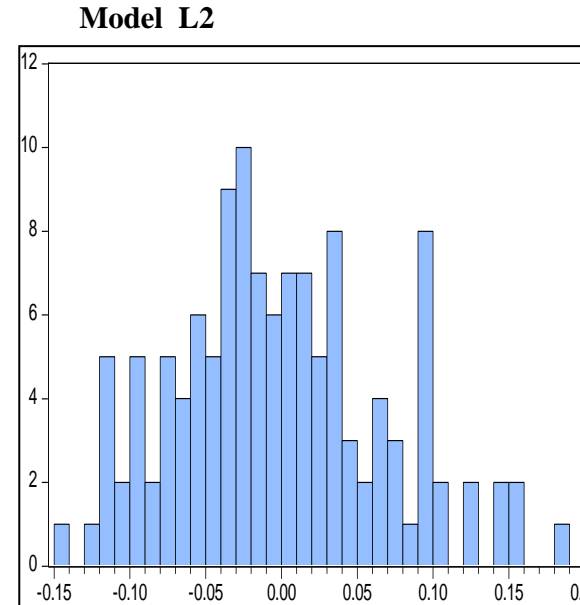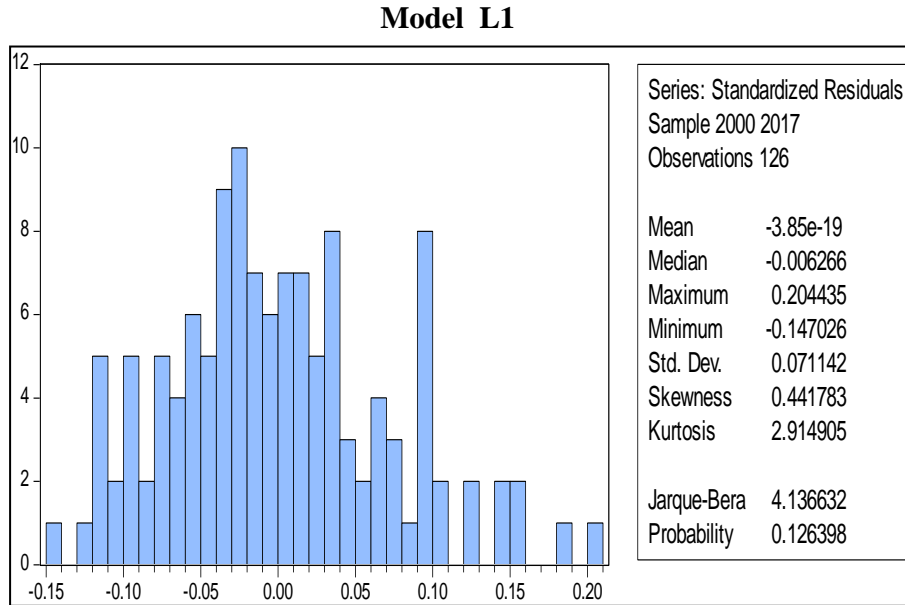
Source: E view 8 output and own computation   *Source: E*

view 8 output and own computation

Appendix F: Descriptive Statistics of Dependent and Independent Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
BSIZE	8.687894	8.75635	12.86	5.0626	1.550802	0.173631	3.010869	126
CAP	0.134005	0.12765	0.2595	0.0162	0.044585	0.492078	3.194498	126
GDP	0.087788	0.1035	0.1264	-0.021	0.038615	-1.589094	4.573341	126
INF	0.118626	0.10135	0.364	-0.1057	0.111114	0.572174	3.434518	126
IRLA	0.101134	0.0991	0.156	0.0508	0.02236	0.325911	2.588704	126
IRM	0.049136	0.0453	0.1317	0.0095	0.021381	1.635296	6.639136	126
L1	0.390868	0.38085	0.7373	0.0827	0.134964	0.253206	2.694522	126
L2	0.323654	0.3136	0.5941	0.0781	0.112789	0.394533	2.856617	126
LEV	0.119366	0.104156	0.33	0.042992	0.04754	1.26786	5.130089	126
MMIR	0.012877	0.01235	0.033	0.0004	0.008492	0.673837	2.992533	126
NBBP	0.330988	0.0000	1	0.0000	0.468568	0.723518	1.540621	126
NPLA	0.04529	0.031669	0.2897	0.0000	0.046991	3.181688	13.85919	126

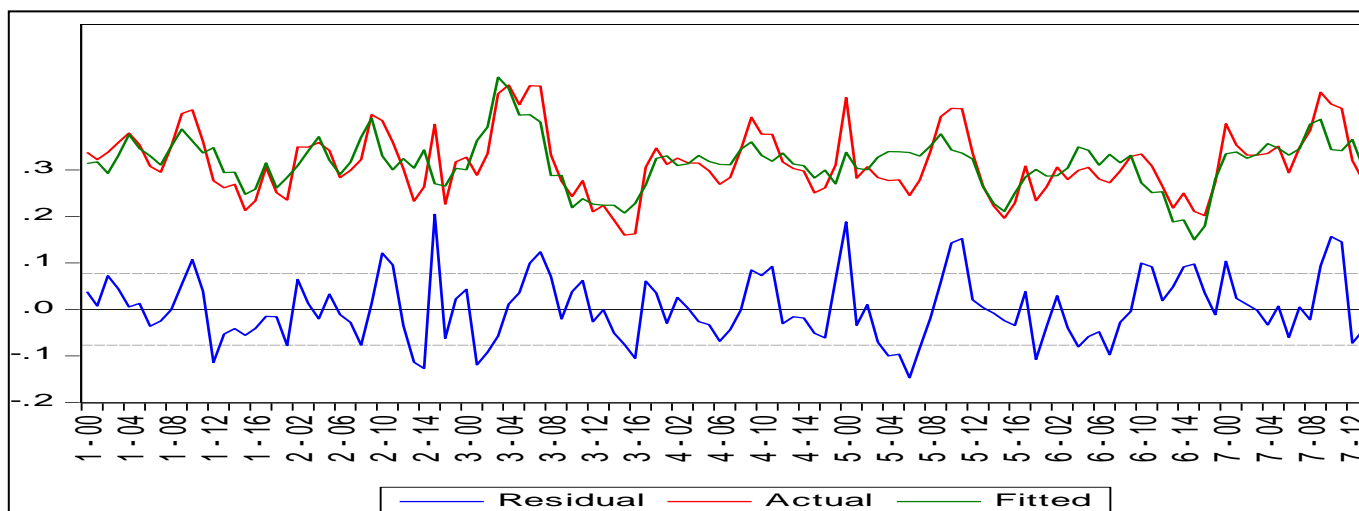|							
ROA	0.03287	0.0345	0.0568	-0.0229	0.012572	-0.912538	4.998188	126
UER	0.084552	0.054	0.5222	0.05	0.107338	3.793631	15.60659	126

Sources: Sampled CBs Financial Statement and own computation via E-view 8

Appendix G: Correlation Matrix between Dependent and Independent Variables

Correlation matrix

	BSIZE	CAP	GDP	INF	IRLA	IRM	L1	L2	LEV	MMIR	NBBP	NPLA	ROA	UER
BSIZE	1	-0.351526	0.370509	0.319781	0.561506	-0.060433	-0.337533	-0.215525	0.153079	-0.190334	0.358797	0.180153	0.277453	0.20971
CAP	-0.351526	1	0.022041	0.059221	0.181873	0.25514	0.059019	-0.045579	-0.022529	0.209842	0.331887	-0.466357	0.3934	0.05893
GDP	0.370509	0.022041	1	0.325039	0.18874	0.132231	-0.027503	-0.01749	-0.072463	-0.573662	0.177846	-0.108551	0.507704	0.07213
INF	0.319781	0.059221	0.325039	1	0.169983	0.117195	0.110685	0.115014	-0.010116	-0.267499	0.190396	-0.086434	0.386453	-0.1159
IRLA	0.561506	0.181873	0.18874	0.169983	1	0.446442	-0.40523	-0.411355	-0.227136	0.276615	0.628997	-0.327656	0.311122	0.35448
IRM	-0.060433	0.25514	0.132231	0.117195	0.446442	1	-0.178734	-0.426552	-0.350693	0.068913	0.326185	-0.416524	0.014252	0.14923
L1	-0.337533	0.059019	-0.027503	0.110685	-0.40523	-0.178734	1	0.900998	0.110108	-0.184417	-0.302241	0.332016	-0.121019	-0.27775
L2	-0.215525	-0.045579	-0.01749	0.115014	-0.411355	-0.426552	0.900998	1	0.167091	-0.211259	-0.306586	0.494675	-0.052154	-0.2710
LEV	0.153079	-0.022529	-0.072463	-0.010116	-0.227136	-0.350693	0.110108	0.167091	1	0.051842	-0.206002	0.281964	0.044795	-0.11200
MMIR	-0.190334	0.209842	-0.573662	-0.267499	0.276615	0.068913	-0.184417	-0.211259	0.051842	1	0.163993	-0.154928	-0.207276	0.07888
NBBP	0.358797	0.331887	0.177846	0.190396	0.628997	0.326185	-0.302241	-0.306586	-0.206002	0.163993	1	-0.278808	0.242137	0.28282
NPLA	0.180153	-0.466357	-0.108551	-0.086434	-0.327656	-0.416524	0.332016	0.494675	0.281964	-0.154928	-0.278808	1	-0.340955	-0.15165
ROA	0.277453	0.3934	0.507704	0.386453	0.311122	0.014252	-0.121019	-0.052154	0.044795	-0.207276	0.242137	-0.340955	1	-0.01054
UER	0.209716	0.058938	0.072133	-0.11592	0.354487	0.149233	-0.277754	-0.27109	-0.112001	0.078889	0.282824	-0.151657	-0.010542	

Source: E view 8 output and own computation

Appendix H: Banks in Ethiopia

S. No.	Commercial Bank Name	Year of Establishment	Ownership
1.	Development Bank of Ethiopia	1909	Public
2.	Commercial Bank of Ethiopia	1963	Public
3.	Awash International Bank	1994	Private
4.	Dashen Bank	1995	Private
5.	Bank of Abyssinia	1996	Private
6.	Wegagen Bank	1997	Private
7.	United Bank	1998	Private
8.	NIB International Bank	1999	Private
9.	Cooperative bank of Oromia	2004	Private
10.	Lion International Bank	2006	Private
11.	Oromia International Bank	2008	Private
12.	Zemen Bank	2008	Private
13.	Bunna International Bank	2009	Private
14.	Birhan International Bank	2009	Private
15.	Abbay Bank	2010	Private
16.	Addis International Bank	2011	Private
17.	Debub Global Bank	2012	Private
18.	Enat Bank	2013	Private

Source: NBE June 30, 2017 annual report and CBs' Audited Financial Statements