

# Determinants of Commercial Banks Liquidity in Ethiopia

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(MSc) in Banking and Finance

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## Statement of Declaration

I declare that this thesis is my work and all sources of materials used for this research have been fully acknowledged .This thesis has been submitted in partial fulfillment of the requirement for the degree of master's science (MSC) in banking and finance.

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## **School of Graduate Studies**

This is to certify that the thesis prepared by Wassihun Tamene, entitled: Determinants of Commercial Banks Liquidity in Ethiopia and submitted in partial fulfillment of the requirements for the degree of Master of Science in banking and Finance complies with the Regulations of the University and complies the accepted standards with respect to originality and quality.

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## **Abstract**

*Liquidity creation is the main concerns of commercial banks because banks are mainly involved in deposit mobilizing and lending which have direct impact on their liquidity. Hence, this study examines determinants of commercial banks liquidity in Ethiopian. The data covered the period from 2000-2018 G.C for the sample of selected seven commercial banks. Quantitative research approach and explanatory Research design were adopted in carrying out this research. Secondary data were collected from the selected seven commercial banks using purposive sampling technique and macro- economic data are collected from Ministry of Finance and Economic Development (MOFED). The study used both descriptive and inferential statistics. Mean and standard deviation were used as descriptive statistics, where as correlation and panel regressions were used from inferential statistics using Eviews-9. The findings of the study shows that Loan growth, Inflation, Non-performing loan gross domestic product, and Bank size have negative and statistically significant impact on liquidity. Interest rate spread, and asset quality have positive and statistically significant impact on liquidity. The study suggests that focusing and reengineering the banks alongside the key internal drivers could enhance the liquidity position of the commercial banks in Ethiopia. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the internal environment and the macroeconomic environment together in developing strategies to improve the liquidity position of the banks On the other side the policy maker, NBE has to consider the existing economic conditions and promote favorable environment to the development of the financial sector.*

**Key words:** Ethiopian commercial banks, determinants of liquidity, internal factor, macroeconomic factor.

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## ACRONYMS AND ABBREVIATIONS

<b>AIB:</b>	Awash International Bank S.C.
<b>AQ:</b>	ASSET Quality
<b>BOA:</b>	Bank of Abyssinia S.C.
<b>CAR:</b>	Capital Adequacy Ratio
<b>CBE:</b>	commercial bank of Ethiopia
<b>CLRM:</b>	Classical Linear Regression Model
<b>CPI:</b>	Consumer Price Index
<b>DB:</b>	Dashen Bank S.C.
<b>DW:</b>	Durbin-Watson
<b>FEM:</b>	Fixed Effect Model
<b>FERF:</b>	Foreign exchange Rate fluctuations
<b>GDP:</b>	Gross Domestic Product
<b>HP:</b>	Hypotheses
<b>INF:</b>	General inflation rate
<b>IRS:</b>	Interest Rate Spread
<b>LG:</b>	Loan growth
<b>MoFED:</b>	Ministry of Finance and Economic Development
<b>NBE:</b>	National Bank of Ethiopia
<b>NIB:</b>	Nib International Bank S.C.
<b>NPL:</b>	Non-performing loans
<b>OLS:</b>	Ordinary Least Square
<b>REM:</b>	Random Effect Model
<b>UB:</b>	United Bank S.C.
<b>WB:</b>	Wegagen Bank S.C.

# CHAPTER ONE

## INTRODUCTION

This chapter begins with discussing background of the study that gives some insight on the issues of *Determinants of Commercial Banks Liquidity in Ethiopia*. After giving some insight on the issues statement of the problem part that shows the direction of the study, justifies the reason to carry out this study. Following this, both general and specific objectives of the study, the research hypothesis those tested against the econometric results are presented. Lastly, the subsequent section presents significance of the study, scope and limitation of the study, and organization of the paper, and ethical issues respectively.

### 1.1 Background of the Study

Banks play an important function in the economy of any country. They are the main intermediaries between those with excess money (depositors) and those individuals and investors requiring money for their investment. Banks have at least the following functions: lending money, depositing others' money, transferring money locally or globally and working as paying agent (Simeneh, 2012). To perform the intended function as financial intermediary and related functions, bank has to maintain its liquidity without jeopardizing its profitability.

Amengor (2010) stated that the liquidity in commercial bank represents the ability to meet fund its obligations by the contract at the time of maturity, which includes lending and investment commitments, withdrawals, deposits, and accrued liabilities. Banks are often evaluated on their liquidity, or their ability to meet cash and collateral obligations without incurring substantial losses and with the capacity of its generating profit. Asset's liquidity can be used to describe how quickly, easily and costly it convert in to cash (Berger, 2009).

Liquidity is defined as “the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses”(Bank for International Settlements ,2008).The financial sector in Ethiopia has been experiencing major transformation on its operating environment following the downfall of the Dergue Regime. On top of this, sixteen private commercial banks have been opened during the last twenty years. The competition in the banking industry of Ethiopia becomes increasing from time to time as more new private

domestic banks are joining 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 are vigilant of the public banks to actively compete in the resource mobilization through expanding branch networks and implementation of new strategies.

The issue of determinants of bank's liquidity was studied by various researchers and shows that, bank liquidity is influenced by both bank specific and macroeconomic factors (Schooner & Talyor 2011 cited in van Ommeren 2017). However, those factors which have statistically significant impact on liquidity in one country may not be replicated in another country. In the context of Ethiopian banks, to the best knowledge of the researcher, In light of the above, a lot of research work has so far taken place concerning the issue of determinants of bank liquidity. For instance, Rauch et al. (2009) and other several studies like Shen et al. (2009) and Vodova (2011) have shown that bank liquidity is influenced by both internal and external factors. However, these studies were based on data from other countries and their findings may not be applicable to the Ethiopian banking sector. Moreover, those literatures by themselves provide contradictory conclusions for they were based on different models and methodologies. In the context of Ethiopia, to the knowledge of the researcher, there appears to be only one work on the assessment of determinants of the banks' liquidity which was conducted by Tseganesh (2012). The study conducted by her examined determinants of liquidity of commercial banks in Ethiopia, by adopting a quantitative approach only, overlooked some important variables that can significantly affect Ethiopian banks' liquidity. Moreover, her conclusions were also dependent on secondary data solely or used documentary survey only as data collection methods. Furthermore, the study adopts a quantitative approach only without considering a lot of its limitations.

Due to the unexpected shock and grievous loss in financial institutions, absence of capital markets and interbank borrowing; reviewing determining determinants of liquidity is vital for a better understanding on the concept of liquidity risk in relation with other financial risks. Then, without hesitation financial institutions liquidity is utterly crucial to the economic excellence of a country.

## **1.2 Overview of Banking System in Ethiopia**

Bank of Abyssinia was the first bank established in Ethiopia based on the agreement between Ethiopian government and National bank of Egypt in 1905 with a capital of 1 million shillings. However, bank of Abyssinia was closed at in 1932 by Ethiopian government under Emperor

Haile Selassie and replaced by Bank of Ethiopia with a capital of pound sterling 750,000.

Following the Italian occupation between 1936-1941, the operation of bank of Ethiopia ceased whereas the departure of Italian and restoration of Emperor Haile Selassie's government established the state bank of Ethiopia in 1943. However, State bank of Ethiopia was separated into National bank of Ethiopia and commercial bank of Ethiopia S.C. to separate the responsibility of national bank from commercial banks in 1963. Then, on December 16, 1963 as per proclamation No.207/1955 of October 1963 commercial bank of Ethiopia control all commercial banking activities (Fasil and Merhatbeb, 2009).

Following the declaration of socialism in 1974, the government extends the extent of its control over the whole economy and nationalized all large corporations. Accordingly, Addis bank and commercial bank of Ethiopia share company were merged by proclamation No.84 Of August 2, 1980 to form single commercial bank in the country until the establishment of private commercial banks in 1994. To this end, financial sector were left with three major banks namely; National bank of Ethiopia, commercial bank of Ethiopia and Agricultural and development bank during the socialist government. However, following the departure of Dergue regime, Monetary and Banking proclamation of 1994 established the National bank of Ethiopia as a legal entity. Following this, the Licensing and supervision of banking business proclamation No.84/1994 laid down the legal basis for investment in banking sectors (Habtamu, 2012).

Currently, banking sectors in Ethiopia are showing progressive developments in terms of number of branches, total assets, human resource utilization and the like relative to other African developing countries. This indicates as Ethiopia categorized under banked country with limited outreach (Tseganesh, 2012).

### **1.3. Statement of Problem**

Liquidity risk is the possibility that over a specific time period, the bank will become unable to settle obligations with immediacy. Banks are playing a pivotal role in channeling funds from depositors to investors' constantly. In the banking industry Liquidity can be taken as a fundamental concern to the financial strength of financial institutions. It underlines the development and progression of banks as it ensures the proper functioning of financial markets (Sekoni, 2015).

However, commercial banks liquidity can be taken as one of the crucial factors contributing to the severity of banking crises. In contemporary world, many banks have faced liquidity problems mainly due to mismanagement of liquidity. The liquidity position of banks as a major issue became apparent in the aftermath of the worldwide financial crunch, which resulted in a number of major commercial banks with serious liquidity issues went bankrupt (Bhati, Zoysa, &Jitaree, 2012). Both investors and borrowers are concerned about liquidity (Diamond et al., 2015).

Many profitable banks faced difficulties in managing their own funds due to the misunderstanding of liquidity risk (Munteanu, 2012). Similarly, some banks in spite of having a lot of assets, the sudden withdrawals and the lack of liquid funds lead to a huge loss as a result of taking out emergency loans. Thus, mistakes in liquidity planning and implementation affect bank operations and might exhibit a long term effect on the economy (Edem, 2017). This may affect a bank's earnings and capital and in extreme circumstances may result in the collapse of an otherwise solvent bank (Njeri, 2014; Kashif et al., 2013). Liquidity handling system of the private banks in Ethiopia is affected by many challenges such as failing to attract new retail or wholesale to deposit, an imbalance in loan and deposit and challenges of cash flow forecasting risk (Edem, 2017).

Liquidity problems have hit the banking industry since mid-November of last year. The liquidity crunch has caused glitches in the inter-bank settlement process at the central bank and complicated the withdrawing of large amounts of money from bank branches. To alleviate the problem, the National Bank of Ethiopia (NBE) has recently availed 14.5 billion Br in loans to banks. Furthermore, the regulator demanded commercial banks submit details on their loans and cash flows. Mild liquidity problems occasionally happen in the industry due to seasonal factors. What makes this time different is the severity of the problem, pushing the regulator to demand the detailed lending activities of the banks. For the cause of the problem, we have to look to none other than poor liquidity management of banks and the passivity of the central bank (NBE 2019).

Between 2018 and 2019, liquid assets (cash in hand and payment settlement accounts with the NBE) which are actively used for day-to-day operations of banks, declined considerably. They went down to 7.6% from 14.3% of deposits due to a surge in lending activities. The reduction of the balance of payment and settlement accounts was also sharp enough to have gotten the attention of the bank executives and the regulator, plummeting to 1.7% from 5.9% of deposits. The decline was not an isolated case of a few banks, but it happened across the industry. The decrease in the liquidity level could be observed as early as June 2019. As economic activity

slowed down, and the demand for cash decreased between June and September as always, the problem was not felt. After October when economic activities picked up and demand for cash began to increase (for instance, the money supply outside banks increased by 16.4% between the first and third quarters of the 2018/19 fiscal year, similar to the same period in the preceding year) due to seasonal factors such as the harvest of crops, payment of taxes and dividends, the liquidity problem started to emerge (NBE report, 2019).

The liquidity measure provides suggestions about the level of liquidity on which the commercial banks are operating. The first approach, liquidity ratio, uses different balance sheet ratios and it is easy to compute whereas, the second approach, funding gap, is the difference between inflows and outflows which is difficult to measure because it is more data intensive and there is no standard technique to forecast inflows and outflows. Most academic literatures prefer liquidity ratio due to more standardized method and therefore, this study is intended to use liquidity ratios, to measure liquidity of commercial banks, due to the availability of data. This ratio is used in different researchers like (Anamika Singhn , Anil Kumar Sharma, 2015, 2016), (Mekibeb, 2016) and (Vodova, 2011).

The focus of many empirical studies carried out on the commercial banking industry of Ethiopia was on examinations of factors influencing the profitability of banks, and limited attention was given to consider determinants of banks liquidity. Studies made by Worku (2006) and Semu (2010) on the determinates of bank performance and profitability, indicated the presence of excess\*- liquidity held by commercial banks in Ethiopia. Moreover, in the country, a rapidly growing industry is the banking sector. Only one study have gone beyond this to look at the factors determining any of the explanatory variables in a separate study lest to consider both in a single study by considering both internal and external factors. In the context of Ethiopia, to the knowledge of the researcher only one related study conducted by Tseganesh (2012) which tried to identify the impact of some bank-specific and macroeconomic variables of Ethiopian banks liquidity. The study made by Tseganesh (2012) overlooked some important variables that can significantly affect liquidity of the Ethiopian banking industry. Even existing works of literature on determinants of banks liquidity did not show accurately what determines the liquidity of banks in Ethiopia. It was still arguing issue among different researchers. Moreover, the liquidity analysis of banks in Ethiopia was made by previous researchers largely on long aged banks and less attention was given to the banks that were emerged on later periods. The current study, therefore, aimed at investigating the effect of firm-specific and macro-economic determinants of liquidity of Ethiopian commercial banks by giving equal attention to newly emerged and long aged banks. The research is basically concentrated on the data available in financial statements

of banks and other documents which had macro economic data in relation to the selected variables kept by NBE, the banks themselves and Ministry of Finance and Economic Development (MoFED) covering the period of 2000-2018.

## **1.4. Objective of the study**

### **1.4.1 General objective**

To determine the factors that affects the liquidity of commercial banks in Ethiopia.

### **1.4.2 Specific objective**

Specifically, this study addresses the following objectives;

- To investigate the impacts of banks specific determinant factors on banks liquidity of Ethiopian commercial banks.
- To analyze the influences of macroeconomics specific determinant factors on banks liquidity of Ethiopian commercial banks.

## **1.5. Hypothesis of the study**

Based on the empirical evidence, reviewed on chapter two, the following testable hypothesis is formulated:-

**H<sub>1</sub>:** Capital adequacy has positive impact on commercial banks liquidity.

- *Capital ratio also another indicator of liquidity, According to Bourke (2010) capital ratio and liquidity has positive relationship with profitability.*

**H<sub>2</sub>:** Asset quality has negative impact on commercial banks liquidity.

- *Asset quality also another indicator of liquidity, According to dawit badeg (2016) asset quality and liquidity have positive relationship with profitability*

**H<sub>3</sub>:**Size of the Bank has positive impact on commercial banks liquidity.

- *In the study carried by Berger (2005), there is positive correlation between liquidity and size of bank. Bank size measures its general capacity to undertake its intermediary function.*

**H<sub>4</sub>:** Interest Rate Spread has negative impact on commercial banks liquidity.

- *In the study carried by Negugi (2001), Future inflation rate or purchasing power of the money might be influenced by the price situations of interest rate.*

**H<sub>5</sub>:** Non-performing loans has negative impact on commercial banks liquidity.

- *In the study carried by Owolabi, (2011), Nonperforming loans (NPLs) are loans that are outstanding both in its principal and interest for a long period of time contrary to the terms and conditions under the loan contract.*

**H<sub>6</sub>:** Real GDP growth has positive impact on commercial banks liquidity.

- *In the study carried by Azeze, (2014), GDP is measured by the annual real growth rate of gross domestic product and it is hypothesized to affect banking liquidity negatively.*

**H<sub>7</sub>:** Inflation rate has Negative impact on commercial banks liquidity.

*In the study carried by Kimari (2013), Inflation has negative relationship with real money market rate, Treasury bill rate, and time deposit (liquidity).*

**H<sub>8</sub>:** Loan Growth has negative impact on commercial banks liquidity.

- *In the study carried by Al-Khoury (2012), Study loan growth is measured by the annual growth rate of outstanding gross loans & advances of the bank and negatively affects liquidity.*

**H<sub>9</sub>:** Foreign exchange rate fluctuations negative impact on commercial banks liquidity.

- *In the study carried by Creswell (2013, Foreign exchange rate fluctuations negative impact on commercial banks liquidity.*

## **1.5 Scope of the study**

The scope of the study was restricted to the assessment of the internal and external factors affecting bank liquidity of all commercial banks registered by the NBE. As a result, it includes the governments owned commercial banks namely, Commercial bank of Ethiopia and the six leading private commercial banks in the country in terms of their year of establishment and market share. The reason behind choosing these seven banks is due to their availability of data, number of branches and geographical coverage, and working experience for the specific duration of 2000 to 2018 namely, Commercial Bank of Ethiopia, Awash International Bank S.C, Dashen Bank S.C, Bank of Abyssinia S.C, Wegagen Bank S.C, United Bank S.C and Nib international bank S.C.

## **1.6. Significance of the study**

The study has great contribution knowledge for researcher in the area of determinants of commercial banks liquidity in the context of Ethiopia. As a whole will have great contribution to the supervisory authority, policy makers, commercial banks and other researchers to gain knowledge about the impact and relationship between the bank specific and macro-economic factors that affect liquidity of commercial banks. Moreover, the study would also have a great contribution to the existing knowledge in the areas of factors affecting commercial banks liquidity. Hence, 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, this study will provide them with a better means of assessing the present and future liquidity risk associated. Thus, this study will have 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.

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

This thesis is adjusted to fit its objectives of determinants of commercial banks liquidity in the context of Ethiopia within the limits of specified time and possibility. The researcher decided to limit this study to the commercial banks found in Ethiopia namely commercial bank of Ethiopia, Awash international bank, bank of Abyssinia, Wegagen bank, United bank, Nib International bank and Dashen bank that were registered by NBE before 2000. These banks were selected since they are senior banks and are expected to have more experience on economical activities. Besides, this study considers, capital adequacy ratio, asset quality, size of bank, interest rate spread, non performing loan, gross domestic product, loan growth, inflation rate, and foreign exchange fluctuate rate for the decision and analysis of data. To this end, this study covers a panel data of these banks over the period 2000 to 2018. Thus, this study is limited to both bank specific and macroeconomic determinants of liquidity's of Commercial banks in Ethiopia between the above mentioned periods and absence of audited financial data of 2019 from national bank of Ethiopia.

### **1.8 Ethical Issues**

Almost all the financial institutions have strict policy implications on the confidentiality of their data. They can pay the ultimate price for the breach of this duty of confidentiality. Disclosing of information by employees to a third party can expose the institution to potential legal conflict. Due to this ethical issue, they are fearful in disclosure of such information. However, this fear was addressed by explaining the core of the study to the information providing agents with the assurance that the data will be handled professionally through formal letter. Therefore, before data collection, permission is obtained from the management body of all the selected commercial banks through formal letter. The formal letter was taken from Jimma University specifically from the research and graduate studies office of business and economics collage and then given to those bank managements and all other concerned office to undertake the tasks freely and confidentially.

## **1.9. Organization of the study**

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

## **Chapter Two: Literature Review**

### **Introduction`**

This chapter informs both the theoretical and empirical foundation upon which the ideas and opinions developed in its study were constructed and discusses the variables that influence the safety and soundness of commercial bank in terms of liquidity in Ethiopia. The chapter review 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.

### **2.1 What is liquidity at a bank?**

Liquidity can be defined as the ability of a financial institution to meet all legitimate demands for funds (Yeager, 1989). According to (Zewadi, 2013) Liquidity indicates the ability of the bank to meet its financial obligations in a timely and effective manner. There should be adequacy of liquidity sources compared to present and future needs, and availability of assets readily convertible to cash without undue loss. (Rudolf, 2009), emphasizes that, the liquidity expresses the degree to which a bank is capable of fulfilling its respective obligations. And also Liquid assets are those that can be converted to cash quickly if needed to meet financial obligations; examples of liquid assets generally include cash, deposit in central bank or to other banks and government debt (alemayehu2016).

According to business dictionary, liquidity is a measure of the extent to which a person or organization has cash to meet immediate and short-term obligation or assets that can be quickly converted to do this. Liquidity can also be measure of the ability and ease with which assets can be converted to cash. Liquid assets are those that can be converted to cash quickly if needed to meet financial obligations; examples of liquid assets generally include cash, central bank reserve and government debt. To remain viable, a financial institution must have enough liquid assets to meet its short term obligations, such as withdrawals by depositors. The transformations of liquid liabilities (deposit) in to risky liquid (illiquid) assets in the form of loans capitalizing on their maturity mismatch expose them to liquidity risk (Diamond and Dybving, 1983: Jeinson, 2008).In order to lessen the maturity gap between assets and liabilities or the inherent illiquidity, banks can adequately manage the liquidity risk underlying their balance sheet structure by holding a buffer of liquid asset. Moore (2009:9) explained that “a bank needs to

hold liquid assets to meet the cash requirements of its customers... if the institution does not have the resource to satisfy its customers' demand, then it either has to borrow on the interbank market or the central bank". It follows therefore that a bank unable to meet its customers' demands leaves itself exposed to a run and more importantly, a systemic lack of confidence in the banking system. The liquidity position of a given bank is determined by its holding of cash and other readily available marketable assets, as well as by its funding structure and the amount and type of contingent liabilities that may come due over a specific horizon.

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

## **2.2 Theoretical literature of the determinants of bank liquidity**

Globally, the adequacy of liquidity plays very crucial roles in the successfully functioning of all business firms. However, the issue of liquidity though important to other business, it most important to banking institution and that explain why banks show cash and other liquid securities in their balance sheet statement annually. Unlike other conventional firms, banks assets are arranged in terms of the most liquid assets beginning with cash. With respect to finance & financial institutions liquidity defined by different authors: the ability of financial institution to meet all legitimate demands for funds (Yeager and Seitze, 1989), the ability of a bank to fund increase in assets and meet obligation as they come due, without incurring unacceptable losses (Bank for International Settlement, 2008), and liquidity is the amount of capital that is available for meeting short-term obligation (Kimberly Amadeo, 2013).

According to Nwaezeaku (2006), liquidity in banking measures the availability of cash and the rate at which current assets are converted into cash to meet ordinary and extra – ordinary request. Several scholars have viewed liquidity as a measure of bank's bargaining power and strength. One of the views is that, the more effective a deposit money bank is in managing its

liquidity, the stronger its ability to provide loan able funds. Adequate liquidity enables a bank to meet three risks namely: **Time risk** (which is the ability to compensate for non-repayment of funds. That is, if the borrower defaults their commitment at a specific time), **funding risk** (which signifies the ability to replace net out flows of funds, either via usual withdrawals of retail deposits or non renewal of wholesale funds), **lending risk** (which denotes ability to meet occasional withdrawals of funds from cogent customers). Two most widely used approaches to measure liquidity risk of banks are by liquidity gap/flow approach and liquidity ratio/stock approach. The liquidity gap approach adapts the variation between assets and liabilities both currently and future periods. A positive liquidity gap Means for deficit, requiring for liabilities to be increased (Bessis, 2009). The liquidity gap treats liquid reserves as a reservoir: the bank computes the required liquidity by comparing inflows and outflows during a specified period. On the other hand, liquidity ratio uses various ratios to identify liquidity tendency. The various ratios label for immediate viable source of funding. This indeed entitles portfolio of assets that can be sold off without any excitement and also adequate amounts of stable liabilities. Most importantly, ready credit line with other financial institutions. Various authors like Moore (2010), Rychtárik (2009), or Praet and Herzberg (2008) have also provided similar understandings with liquidity ratios such as liquid assets to total assets, liquid assets to deposits and short term financing, loans to total assets and loans to deposits and short term borrowings (as cited in Vodová, 2011).

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

### **2.2.1 Sources of bank's liquidity**

Financial institution can mobilizes resources through new deposits, maturing assets, borrowed funds and/or using the discount window (borrowing from the central bank). However, financial institution may encounter liquidity risk. According to (Rochet, 2008), the three sources of liquidity risk are; on the liability side, there is a large uncertainty on the volume of withdrawals of deposits or the rolled-over of inter-bank loans, on the asset side, there is an uncertainty on the volume of new requests for loans that a bank will receive in the future, and off-balance sheet items, like credit lines and other commitments taken by the bank. Some of the mechanisms to insure liquidity crises are: banks hold buffer of liquid assets on the asset side of the balance sheet 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. The second strategy is, banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. The last strategy is that, the central bank typically acts as a Lender of Last Resort/LOLR to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage (Aspachs et. al. and Tiesset, 2005).

## **2.3. Factors affecting Liquidity position of commercial banks**

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 nonperforming loan, 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 GDP, interest rate margin\spread, exchange rate fluctuation and inflation rate, reserve requirement among others.

### **A. Bank specific factors**

#### **2.2.1 Capital adequacy and bank liquidity**

Patheja (1994) has defined bank capital as common stock plus surplus plus undivided profits plus reserves for contingencies and other capital reserves. In addition since a bank's loan-loss 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. Ritab al-Khour(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

$$\text{Capital adequacy} = \frac{\text{Total capital}}{\text{Total Risk weighted assets}}$$

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 (Gorton and Winston 2000).

### **2.2.2 Asset Quality**

Asset quality is one of the most importance elements in determining the overall financial health of bank. Asset quality based on loan used to determine the performance of banks based on how well a manager control its loan. Loan is the one of the main sources of income for banking sector. Because it generates significance return from interest of loans, due to this fact banks should performance a better asset quality control to achieve their objective (Tobias and Themba 2011). To compute the asset quality of commercial banks utilized the following formula.

$$\text{Asset Quality} = \frac{\text{Loan Loss Provision}}{\text{Total Loans}}$$

### **2.2.3 Bank size and bank liquidity:**

The size of the bank also plays a role on how the banks will not only perform but also in attaining dominance in the banking industry (Ahmend and Ahmed, 2010). Large banks may exploit economies of scale and this enables them acquire more client and undertaking in more transactions which translate to more returns. Additionally, the large banks tend to be more trusted by the customers and this implies more clients will opt to invest in them as opposed to the smaller ones. Also, in case risk occurs, the larger banks are in a position to mitigate it and be affected minimally whereas the smaller banks will be highly prone to dissolution and insolvency. This has seen most small banks to endeavor to expand their business and market values. Therefore bank size a positive impact on the liquidity of commercial banks.

**Bank size=logarithm of total asset**

### **2.2.4 Loan growth and bank liquidity.**

The loans and advances portfolio is the largest asset and the predominate source of revenue of banks. According to (Diamond and Rajan, 2005), lending is the principal business activity for banks. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. The amount of liquidity held by banks is heavily influenced by loan demand and it is the base for loan growth (Pilbeam, K, 2005). If demand for loans is weak, then the bank tends to hold more liquid assets whereas, if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable. Therefore, loan growth has negative relationship with bank liquidity.

### **2.2.5 Non-performing loans and bank liquidity:**

Non-performing loans are loans and advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment term of the loan or advance is in question (NBE, 2008). According to (Ghafoor, 2009), non-Performing loans are loans that a bank customer fails to meet his/her contractual obligations on either principal or interest payments exceeding the scheduled repayment dates. Thus, 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. The banking systems play the central role of mobilizing and allocating resources in the market by channeling fund from surplus economic units to deficit economic units. This activity of transforming short term deposit to long term loans and advances will generate most profits for banks. However, it involves high risk and eventually if not managed properly will leads to high amount of non-performing loans. The increased on non-performing loan reflects deteriorated asset quality, credit risk and its inefficiency in the allocation of resources. According to (Bloem and Gorter, 2001), though non-performing loans may affect all sectors, the most serious impact is on financial institutions which tend to have large loan portfolios. On the other hand, large volume of non-performing loans portfolio will affect the ability of banks to provide credit and leads to loss of confidence and liquidity problems. Therefore, the amount of non-performing loans has a negative impact on bank's liquidity.

$$\text{NPL ratio} = \frac{\text{NPLs}}{\text{Gross loan outstanding}}$$

## **B. Macro-economic (external) determinant factors influencing banks liquidity.**

The operations or the performance of financial institutions can be affected by external determinant factors which are not related to banks management like that of economic and legal environments. Those factors are beyond the control of banks management and influence the banks operation from the side of external to the bank environments (Aburime, 2005) and (Al-Temami, 2010). Those external (macro-economic) determinant factors are:

### **1. Real GDP or annual gross domestic product**

There is high demand for bank loan at the conditions of economic boom than that of recession time (Anderias and Gabrielle, 2009) and (Belayneh, 2011). As they proved in their studies, there is positive relationship between banks financial performance and real GDP. As GDP of the countries increase the demand of lending from bank is also increase. The Gross Domestic Product (GDP) in Ethiopia expanded 7.60 percent in 2016 from the previous year. GDP Annual Growth Rate in Ethiopia averaged 5.72 percent from 1981 until 2016, reaching an all time high of 13.90 percent in 1986 and a record low of -11.10 percent in 1984 (NBE, 2016). Ethiopia is one of the poorest countries in the world. Most of the populations rely on subsistence agriculture and foreign aid. Yet, Ethiopia is amongst the fastest growing non-oil economies in

the world. Government reforms succeeded in opening the economy to foreign direct investments and resulted in expansion of commercial agriculture and manufacturing industry. However, systemic trade deficits, under-developed financial system and unemployment are Ethiopia's main economic constraints (NBE, 2016).

## **2. Rate of inflation.**

High income as well as higher costs are directly associated with high inflation. Inflation is expected to have positive relationship with banks financial performance. Several economists found that the countries which have inefficiency small banking sector and equity market have the problems with high inflation rate. The bank reduces to provide loans to private sector as inflation rate is become increased. Banks to ration credit is induced by sufficiency of high rate of inflation (H.B and BruceC, 2006). Inflation also has an impact on return on asset and banks profitability. Lower return on asset is the result of high inflation rate. Inflation has negative relationship with real money market rate, Treasury bill rate, and time deposit rate.

## **3. Exchange rates fluctuation and bank liquidity:**

The value of a local currency against a unit of the foreign currency is termed as the exchange rate. The exchange rate is not fixed asset tends to vary based on the particular currencies and also the particular time or period. Certain currencies will have a higher value than others, but when the value decreases it is termed as to depreciate. There are many factors that result in changes in the exchange rates and this includes mainly the balance between demand and supply in the foreign market. These changes occur spontaneously and always seem almost difficult to predict. The changes result in the organizations performance and liquidity as well. This is however limited largely to those organization undertaking mainly in international transactions or currencies as the locally based ones will be impacted minimally (Nyandema and Langat, 2016). As such high exchange rates will make most foreign investors shun from making any transactions at that particular time. The banks will be affected in the similar way as depreciation in the local currency will mean reduced transactions such as savings and borrowing resulting in reduced returns and it has negatively affect liquidity of commercial banks.

## **4. Interest rate spread and bank liquidity:**

The interest rates comprise the amount charged by the banks during lending. This varies with the type of bank and the amount being borrowed (Manyoet al, 2016). High interest rates tend to discourage people from borrowing and opting to invest more while low interest rates tend to encourage more loans being acquired. This may be exploited by the regulatory bodies when they want to either increase or decrease cash inflow by the banks. In a similar way, the interest

rates may also determine the currency values. The interest rates are directly proportional to the demand in that increase in demand will tend to increase the value of the currency which implies that liquidity of commercial bank depends on the spread of interest rate.

## **2.3 Empirical Literature on the Determinants of Liquidity**

### **2.5.1 Reviews of International Studies**

Vodova (2011) aimed to identify important factors affecting commercial banks liquidity of Czech Republic. In order to meet its objective the researcher considered bank specific and macroeconomic data over the period from 2001 to 2009 and analyzed them with panel data regression analysis by using EViews7 soft ware package. The study considered four firm specific and eight macroeconomic independent variables which affect banks liquidity. The expected impact of the independent variables on bank liquidity were: capital adequacy, inflation rate and interest rate on interbank transaction/money market interest rate were positive and for the share of non-performing loans on total volume of loans, bank profitability, GDP growth, interest rate on loans, interest rate margin, monetary policy interest rate/repo rate, unemployment rate and dummy variable of financial crisis for the year 2009 were negative whereas, the expected sign for bank size was ambiguous (+/-). The dependent variable (i.e. liquidity of commercial banks) was measured by using four liquidity ratios such as liquid asset to total assets, liquid assets to total deposits and borrowings, loan to total assets and loan to deposits and short term financing.

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

An empirical study made by Fadare (2011), on the banking sector liquidity and financial crisis in Nigeria with the aim of identifying the key determinants of banking liquidity in Nigeria, and assessing the relationship between determinants of banking liquidity and financial frictions within the economy. It was employed a linear least square model and time series data from 1980 to 2009 The study found that only liquidity ratio, monetary policy rate and lagged loan-to

deposit ratio were significant for predicting banking sector liquidity. Secondly, it showed that a decrease in monetary policy rate, liquidity ratios, volatility of output in relation to trend output, and the demand for cash, leads to an increase in current loan-to-deposit ratios; while a decrease in currency in circulation in proportion to banking sector deposits; and lagged loan-to-deposit ratios leads to a decline in current loan-to-deposit ratios. Generally, the result suggested that during periods of economic or financial crises, deposit money banks were significantly illiquid relative to benchmarks, and getting liquidity monetary policies right during these periods is crucial in ensuring the survival of the banking sector.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. The study had three main goals: discussing the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; identifying the key determinants of liquidity, and; to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic fundamentals. Liquidity which was measured by loan-to-deposit ratio should depend on: cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio expected to have negative impact, the macroeconomic situation, where a cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity expected to have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity.

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

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

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.

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

### **2.5.2 Related empirical studies in Ethiopia**

Some related studies were conducted by different researchers in Ethiopia. Specifically, Worku (2006) argued that liquidity has an impact on the performance of commercial banks in Ethiopia

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

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

## **2.6. Summary and Knowledge gap**

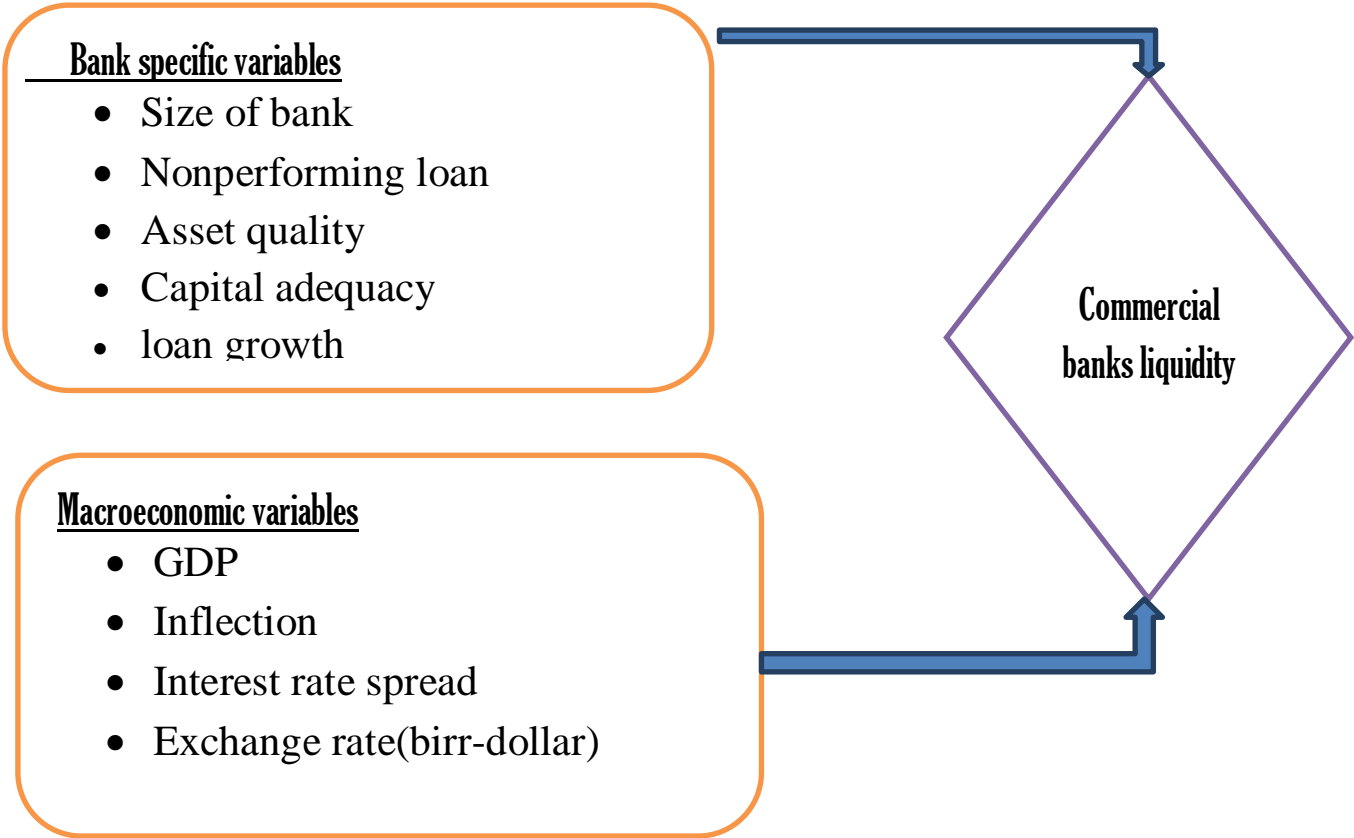
In line with the above theoretical as well as empirical reviews, liquidity is important to all business specially for banking industry since their function is creation of liquidity both on the asset and liability side of their balance sheet. It also revealed that banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors. While this study will be focus on some of the bank specific and macroeconomic factors affecting liquidity. Theory on bank liquidity is well documented unlike empirical studies. According to the review, most of the empirical studies done on the area of bank liquidity were done following the U.S. subprime mortgage crisis. Although liquidity problems of some banks during global financial crisis re-emphasized the fact that liquidity is very important for functioning of financial markets and the banking sector, an important gap still exists in the empirical literature about liquidity and its measurement. Only few studies aimed to identify determinants of liquidity. Studies cited above suggest that commercial banks' liquidity is determined both by bank specific factors (such as size of the bank, profitability, capital adequacy and factors describing risk position of

the bank), macroeconomic factors (such as different types of interest rates and indicators of economic environment) as well as the central bank decisions. There are also very limited number of studies appears to include profitability as an explanatory variable for bank liquidity and to the knowledge of the researcher there is only three empirical studies done regarding to determinants of banks liquidity in Ethiopia. Since the banking industry is in the growth stage with opening of new banks and the absence of active secondary stock exchange in the country, it is important to notify the important determinants of banks liquidity and its impact on financial performance by making empirical investigation to already established banks. Therefore, the study investigated some of bank specific and macroeconomic factors affecting banks liquidity other than the study made by Tseganesh(2012);Mekibeb(2016) and Assfaw(2019).

**2.7. Conceptual Framework**

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

Fig. 2.1 Relation between liquidity and its determinants



## **Chapter Three**

### **Research Design & Methods**

This study aims to examine the determinant factors that affect the liquidity of commercial banks in Ethiopia. Accordingly, this chapter discussed the research procedure that is used to carry out this study. In case, it starts by discussing research design followed by the nature and instruments of data collection and sampling design. The subsequent section presents and discusses method of data process and analysis. Finally, definition of study variables with their measurement and model specifications are presented.

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

The study is use explanatory research design. According to Muranaga and Ohsawa(2012), a explanatory types of research design is important for a research types if the dependent variable affected by several independent variables. Based on this liquidity can be affected by several determinate factors. While the explanatory part of the study designed to use correlation as well as multiple regression analysis. According to Lucchetta, (2007) a correlation as well as regression research design is a procedure in which subjects' score on multiple variables and indicates casual relationships. The study also used to cross-sectional design in which data was gathered just once over the period 2000 to 2018 and cross sectional study used to determine the interrelationship between the variables under consideration among the different commercial banks of Ethiopia. The explanatory type of research design was found to be suited for this study. The reason was the support of numerous literatures on the relevant studies where they employ quantitative methods approach and explanatory research design to investigate their research problems and verify their hypothesis.

#### **3.2 Source and Method of Data Collection**

In order to carry out any research activity information should be gathered from proper sources. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul, L 2006). Secondary data was obtained from the audited annual financial statements of the concerned commercial banks in Ethiopia and annual report issued by NBE. These data include bank specific and macroeconomic factors. Bank-specific and industry specific data was sourced from annual reports and statement of accounts of the selected banks. However, data on



macroeconomic variable were sourced from annual report bulletins published by the National Bank of Ethiopia (NBE).

### **3.3. Study Population & Sampling Frame**

The study population includes all commercial banks in Ethiopia. According to NBE report, at the end of June 30, 2018 there are sixteen privately owned commercial banks and one publicly owned commercial banks. The sampling frame for drawing the sample includes those privately and public owned commercial banks having at least nineteen years of experience as of June 30, 2018. Those banks are Commercial Bank of Ethiopia (CBE) which is public owned bank, Dashen Bank S.C (DB), Awash Bank S.C (AB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Abay Bank (AB), Addis International Bank (ADIB), Debub Global Bank (DGB) and Enat Bank (EB). As a result of it nineteen years of data (2000 to 2018) has been taken. The rationale for using nineteen years of data was to increase the number of observation.

### **3.4. Sampling Technique & Sample Size**

Sample design deals with sample frame, sample size and sampling technique. Sampling is a technique of selecting a suitable sample for the purpose determining parameters of the whole population. Population is the list of elements from which the sample may be drawn (Tegene, 2016). A sample is drawn to overcome the constraints of covering the entire population with the intent of generalizing the findings to the entire population. For some researches, it is possible to collect data for the entire population as it can be manageable and data is available, while for some other researches data is collected on sample base. Sampling provides a valid alternative when it is impractical to survey the entire population and when there is budget and time constraint to surveying the entire population (Saunders et al, 2009). 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 Bhattacharjee (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. In Ethiopia, there are seventeen commercial banks of which one of them are publicly owned and sixteen of them are privately owned. In order to have balanced panel data for nineteen years, those private commercial banks which have less than nineteen years in operation are not selected for this study. Therefore, six private commercial banks were selected and commercial bank of Ethiopia from public own bank it was possible to draw a relationship among variables using 133 observations (7 banks x 19 year's data). Accordingly, the sample size of this study target population is 7 banks with 133 observations.

### **3.5. Methods of Data Analysis**

After the data were collected, it was organized and financial ratios were computed for each bank of each bank specific variables. And then, the next step was analyzing and interpreting them accordingly to achieve the stated objectives. In this study two type of statistical analysis was used to test the proposed hypotheses. These are descriptive statistics and inferential statistics analysis to see the effect (relationship) of explanatory or independent variables on the dependent variable. The descriptive statistics of both dependent and independent variables were calculated over the sampled periods. This helps to convert the raw data in to a more meaning full form which enables the researcher to understand the ideas clearly. And then interpret with statistical description including standard deviation, mean, minimum & maximum and Furthermore, various diagnostic tests such as normality, heteroscedasticity, autocorrelation and multicollinearity test were conducted to decide whether the model used in the study is appropriate and to fulfill the assumption of classical linear regression model Then, correlation analyses between dependent and independent variables were made and finally panel regression analysis was used to determine the relative importance of each independent variable in influencing liquidity of Ethiopian big asset commercial banks. To conduct this, the researcher uses statistical tools EVIEW-9 software. To this end, the researcher used fixed effect regression model analysis to examine the effect of each explanatory variable on liquidity of commercial bank in

Ethiopia. The researcher has also performed diagnostic tests to ensure whether the assumptions of the linear regression model are violated or not.

### **3.6. Variable Definition & Hypotheses of the Study**

This study is focused on identifying the determinants of banks liquidity in Ethiopian commercial banks through testing the hypotheses regarding to the relationships between liquidity of banks and bank specific and macroeconomic factors affecting it. It is apparent that the most significant task is to select the appropriate explanatory variables. As it was discussed in the literature review part, some determinant factors which have positive relation with liquidity in one country may have negative relation with other country and some determinant factors which have significant impact on liquidity in one country may not have significant impact on liquidity in another country. Though various bank specific and macrocosmic variables were conducted in the previous studies made worldwide, in this study some variables (bank specific and macroeconomic) were included. The study also considered which determinate factors could influence the liquidity of banks in the Ethiopia private commercial banks context. Therefore, the following variables were selected based on Ethiopian context and previous relevant studies. The description and operational definition of selected variables is discussed here under.

#### **3.6.1. Dependent Variables**

**Liquidity of Banks:** Bank for International Settlements (2008) defines liquidity as “the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses”. Liquidity can also be defined as a measure of the relative amount of asset in cash or which can be quickly converted into cash without any loss in value available to meet short term liabilities. As it was discussed in the literature, there are two methods of measuring liquidity of banks which are liquidity ratios (stock approach) and liquidity gap (flow approach). The liquidity gap is the difference between assets and liabilities whereas liquidity ratios are various balance sheet items ratios which identify liquidity trends. The liquidity measure provides suggestions about the level of liquidity on which the commercial banks are operating. The first approach, liquidity ratio, uses different balance sheet ratios and it is easy to compute whereas, the second approach, funding gap, is the difference between inflows and outflows which is difficult to measure because it is more data intensive and there is no standard technique to forecast inflows and outflows. Most academic literatures prefer liquidity ratio due to a more standardized method and therefore, this study is intended to use liquidity ratios, to measure liquidity of commercial banks, due to the availability of data. It is also adopted by NBE and

previous researchers, such as Vodova(2011, 2012, 2013), Tseganesh(2012), Rafique& Malik (2013) and Chagwiza, (2014).

$$\text{Liquidity} = \frac{\text{current asset}}{\text{current liability}}$$

According to NBE establishment proclamation (No. 591) liquidity asset of banks includes cash on hand, deposit in other bank, and short term government securities that are acceptable by NBE as collateral (for instance Treasury bill).

A **company's liquidity** indicates its ability to pay debt obligations, or current liabilities, without having to raise external capital or take out loans. **High liquidity means** that a **company** can easily meet its short-term debts while low **liquidity** implies the opposite and that a **company** could imminently face bankruptcy( Alemayehu 2016).

A **good liquidity** ratio is anything greater than 1. It indicates that the company is in **good** financial health and is less likely to face financial hardships. The **higher** ratio, the **higher** is the safety margin that the business possesses to meet its current liabilities.

### 3.6.2. Independent Variables

This section describes the independent variables that are used in the econometric model to estimate the dependent variable i.e. liquidity of commercial banks.

#### **Capital Adequacy of Banks (CAR)**

Capital is the amount of own fund available to support the bank's business and act as a buffer in case of adverse situation (Athanasoglou et al. 2005). Capital of a bank includes paid up capital, undistributed profit (retained earnings), legal reserve or other reserves and surplus fund which are kept aside for contingencies. Regulators in most countries define and monitor CAR to protect depositors, thereby maintaining confidence in the banking system. Though capital adequacy ratio is measured by the ratio of total capital to risk weight asset, in some literatures it can be also measured by the ratio of capital to total asset and then in this study, the proxy for capital adequacy is the ratio of total capital of the bank to total asset of the bank. This ratio measures how much of bank's asset are funded with owner's funds and is a proxy for the capital adequacy of a bank by estimating the ability to absorb losses. As it is discussed in the literature review part, there are two opposing theoretical views regarding to the relationship between banks liquidity and capital adequacy. Some previous studies such as the "financial fragility-crowding out" theories predicts that higher capital reduces liquidity creation (Diamond and Rajan (2000, 2001) and hence, there is negative relationship between capital adequacy and bank liquidity whereas, Al-Khoury (2012) found that, bank capital increases bank liquidity through its

ability to absorb risk and thus the higher is the bank's capital ratio, the higher is its liquidity creation. This study considered there is a positive relationship between capital adequacy & liquidity and draws the following hypothesis.

$$\text{CAR} = \frac{\text{Totalcapital}}{\text{TotalRiskweightedassets}}$$

**H<sub>1</sub>:** *Capital adequacy has positive impact on commercial banks liquidity*

**Asset Quality:** Asset Quality is taken as one of the influencing factors of banks liquidity. It determines the quality of bank loans. Good asset quality is essential for the build-up of liquidity as this enhances the banks' capability to fulfill its obligations on the liability side in a time us manner. The study of Assfaw (2018) and Melese (2015) measured it by the ratio of provisions of a loan to total loan provided and the lower the loan loss provision to total loan ratio indicate the quality of the asset of the bank is relatively better than the other banks. In the study of Sudirman (2015), asset quality has a positive effect on liquidity of banks, i.e. the greater asset quality ratio is, the greater liquidity ratio is or the worse asset quality of a bank is, the more liquid the bank will be. But, there is a negative relationship between asset quality measured by non-performing loan/total loan and liquidity. This means the growth of nonperforming loan reduces the level of liquid assets of banks (Mazreku, Morina, Misiri, Spiteri,&Grima, 2019; Tibebu, 2019).

$$\text{Asset Quality} = \frac{\text{Loan Loss Provision}}{\text{TotalLoans}}$$

**H<sub>2</sub>:** *Asset quality has negative impact on commercial banks liquidity.*

**Size of the Bank (SB):** Size of the bank is measured by Natural log of total assets of private commercial banks. (Bonner and Zymek, 2013), and (Delechat .C, Henao.C, Mathoora .P and Vtyurina .S., 2012), stated that bank size negatively affects liquidity, yet its impact is significant. Large sized banks are able to arrange funds from external sources whereas small banks need to maintain sufficient liquidity. It means that with an increase in bank size, liquid buffer of banks decreases. Large banks may exploit economies of scale and this enables them acquire more client and undertaking in more transactions which translate to more returns which leads more liquid.

**Size of the bank = Log total asset**

**H<sub>3</sub>:** *Bank size has positive and significant impact on bank's liquidity.*

**Loan Growth of the Bank (LG):** According to NBE directive No. SBB/43/2008, loans & advances means any financial asset of a bank arising from a direct or indirect advances fund by a bank to a person that is conditioned on the obligation of the person to repay the fund on a

specified date or on demand with interest. Loans & advances are the major earning asset of the bank. Loans & advances are granted to customer from the amount collected from depositors of the bank. In this regard, when banks transform short term deposits to long term loans, which have a maturity mismatch, they will be vulnerable to liquidity problem. Therefore, the increase in loan means increase in illiquid assets and decrease in short term/liquid assets. As it was discussed in the literature review part, it is expected that, there is a negative relationship between bank loan growth and liquidity. For this study loan growth is measured by the annual growth rate of outstanding gross loans & advances of the bank and the following hypothesis is drawn.

$$LG = \frac{\text{Total Credit}}{\text{Deposit}}$$

**H4:** *Loan growth has negative and significant impact on bank's liquidity*

**Non-performing Loans (NPL):** Non-performing loans means loans & advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment term of the loan or advance is in question (NBE directive No SBB/43/2008). The rise of non-performing loan portfolios in banks significantly contributed to financial distress in the banking sector. Non-performing loans are the main contributor to liquidity risk, which exposes banks to insufficient funds for operations. As loans & advances are the major portion of bank's asset, when they become non-performing, it will affect both profitability and liquidity of the bank.

For the purpose of this study, the proxy for non-performing loans is the share of non-performing loans on total volume of loans & advances. Based on prior studies, it is expected that there is a negative relationship between non-performing loans and liquidity of the bank and as a result the following hypothesis is drawn.

$$\text{NPL ratio} = \frac{\text{NPLs}}{\text{Gross loan}}$$

**H5:** *The share of non-performing loans in the total volume of loans & advances has negative and significant impact on bank's liquidity.*

**Gross Domestic Product (GDP):** GDP is an indicator of the economic health of a country as well as the gauge of a country's standard of living. It is the measurement of level of economic activity of a country. According to previous studies, when the economy is at boom or goes out of recession, economic units including banks are optimistic and increase their loans & advances and as a result decrease their holding of liquid assets. On the other hand, during recession, business operations reduce borrowers' capability to service their obligations which increases

bank are NPLs and eventually decrease bank's liquidity. For the purpose of this study, GDP is measured by the annual real growth rate of gross domestic product and it is hypothesized to affect banking liquidity negatively.

**H6:** *Real GDP growth rate has negative and significant impact on bank's liquidity.*

**Inflation (INF):** Another important macroeconomic variable which may affect liquidity of banks is the inflation rate. During inflation, the central bank can raise the cost of borrowing and reduce the credit creating capacity of commercial banks. 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 performance. During inflation, it is expected that, banks will make fewer loans and the amount of liquid or short term assets held by economic agents including banks will rise. On the other hand, during inflation the cost of living will rise and deposits are expected to be reduced and as a result liquidity will be affected negatively. For the purpose of this study, inflation is measured by the annual general consumer price index and a negative relationship between inflation rate and banks liquidity is expected.

**H7:** *Inflation rate has negative and significant impact on bank's liquidity.*

**Interest rate spread:** Interest Rate Spread measured by deference of lending and deposit interest rate. The interest rates comprise the amount charged by the banks during lending. This varies with the type of bank and the amount being borrowed (Manyo et al, 2016). High interest rates tend to discourage people from borrowing and opting to invest more while low interest rates tend to encourage more loans being acquired.

**H8:** *Interest rate spread has negative and significant impact on bank's liquidity.*

**Foreign exchange Rate fluctuations:** Foreign exchange Rate fluctuations (Ethiopia Birr changes against the United States Dollar). There are many factors that result in changes in the exchange rates and this includes mainly the balance between demand and supply in the foreign market which affects liquidity of Ethiopian private commercial banks.

**H9:** *foreign exchange rate fluctuations have negative and significant impact on bank's liquidity.*

**Table: 3.1.** Description of the variables and their expected relationship Symbol Operational Definition Source.

Variables	Symbol	Measurement	Expected sign
<b>Dependent</b>			
Liquidity ratios	LIQ	The ratio current asset to current liability.	NA
<b>Independent</b>			
Capital Adequacy of Banks	CAR	Share of equity on total asset	+
Asset Quality	AQ	loan losses provisions to total loans ratio	-
Bank size	BS	Natural logarithm of bank total asset.	+
Loan growth	LG	Annual change in to loan	-
Nonperforming loan	NPL	Nonperforming loan to gross loan ratio	-
Gross Domestic Product	GDP	Yearly real Growth rate of gross domestic product	-
Inflation	INF	Yearly general consumer price index	-
Interest rate spread	IRS	Interest rate comprises the amount charged by bank during leading.	-
Foreign exchange Rate fluctuations	ERF	Change in exchange rate (usd-birr)	-

### 3.7. Model Specification

As it was discussed in the research design section of this study, the nature of data used is a balanced panel data which was deemed to have advantages over simple cross sectional and time series data. Panel data involves the pooling of observations on the cross sectional over several time periods (Brooks 2008). The panel data or longitudinal data comprises of both cross-sectional elements and time-series elements; the cross-sectional element is reflected by the sample of Ethiopian commercial banks and the time-series element is reflected in the period of study (2000-2018). This study, considered whether the use of the particular variable makes economic sense in Ethiopian commercial banks context. The regression model used for this study was adopted from Vodova(2011,2012, 2013), Tseganesh(2012), Rafique& Malik (2013),Assfaw(2019). Thus, the following equation indicated the general model for this study.

$$Lit = \alpha + \beta X_{it} + \delta_i + \epsilon_{it}$$



where  $Lit$  is one of the three liquidity ratios for bank  $i$  in time  $t$ ,  $Xit$  is a vector of explanatory variables for bank  $I$  in time  $t$ ,  $\alpha$  is constant,  $\beta$  are coefficient which represents the slope of variables,  $\delta_i$  denotes fixed effects in bank  $I$  and  $\varepsilon_{it}$  is the error term. The subscript  $I$  denote the cross-section and  $t$  representing the time-series dimension.-Therefore the general models which incorporate all of the variables to test the determinants of bank's liquidity were:

- $Lit = \alpha + \beta_1 (CARit) + \beta_2 (AQit) + \beta_3 (BSit) + \beta_4 (LGAit) + \beta_5 (NPLit) + \beta_6 (GDPit) + \beta_7 (INFit) + \delta_i IRSit + \delta_i FERFit + \varepsilon_{it}$ .

- Capital Adequacy of Banks (CAR)
- Asset Quality(AQ)
- Bank size (BS)
- Loan growth (LG)
- Nonperforming loan(NPL)
- Gross Domestic Product (GDP)
- Inflation (INF)
- Interest rate spread(IRS)
- Foreign exchange Rate fluctuations(FERF)
- **Where:**
  - **$Lit$ :** represents the bank's liquidity measured by liquid asset to deposit & short term borrowing ratio of  $i$ th bank on year “ $t$ ”
  - **$CAR it$ :** is capital adequacy ratio of  $i$ th bank on the year “ $t$ ”
  - **$AQit$ :** is the Asset Quality of  $i$ th bank on the year “ $t$ ”
  - **$BSit$ :** is the natural logarithm of bank asset of  $i$ th bank on the year “ $t$ ”.
  - **$LGit$ :** is the Annual change in to loan of  $i$ th bank on the year “ $t$ ”.
  - **$NPLit$ :** is Nonperforming loan to gross loan ratio of  $i$ th bank on the year “ $t$ ”.
  - **$GDPit$ :** is the real gross domestic product growth of Ethiopia on the year “ $t$ ”.
  - **$INFIt$ :** is the inflation rate in Ethiopia on the year “ $t$ ”.
  - **$IRSit$ :** is the Interest rate comprises the amount charged by bank during leading “ $t$ ”.
  - **$FERFit$**  is Change in exchange rate (usd-birr), $t$

## **CHAPTER FOUR**

### **DATA ANALYSIS PRESENTATION AND INTERPRETATION**

This chapter deals with analysis of the finding and discussion of the result in order to achieve research objectives and set a base for conclusion. This chapter presents the study findings of the Determinants of Commercial Banks Liquidity in Ethiopia between the years 2000 and 2018. The chapter is made up of four sections. Section 4.1 presents the descriptive statistics. Section 4.2 discusses the correlation between variables. Section 4.3 presents the regression results of the factors that influence banks' liquidity.

#### **4.1 Introduction**

In this chapter, the researcher used seven commercial banks in Ethiopia over nineteen years, which is from 2000 to 2018. The data extracted by the researcher were obtained from annual reports from each bank for bank specific independent variables. As for macroeconomic factors, the data is extracted from NBE and MoFED. The researcher used E-views 9 software to analyze this research findings and data. Further, the researcher carried out relevant diagnostic testing to identify for any presence of econometric problems using E-views 9. No doubt, E-views 9 were reliable to provide an accurate output in analyzing descriptive statistics, correlations and regressions. In the preceding chapters important literatures relating to the topic were reviewed that gives enough understanding about the topic and used to identify knowledge gap on the area. To meet the broad research objective and to answer research questions and to test research hypotheses under it the research design used for this study also discussed in the preceding chapter.

#### **4.2 Descriptive statistics**

This section presents the descriptive statistics of dependent and explanatory variables used in this study. The dependent variable used in this study was liquidity (response variable)(LIQ), Bank Size (BS), Capital Adequacy (CAR), Asset quality (AQ), Non- Performing Loan (NPL), loan Growth (LG), Gross domestic product (GDP), Inflation (INF), Foreign Exchange rate Fluctuation (FERF) and Interest Rate spread (IRS).

### 4.2.1. Descriptive Statistics analysis

Table 4.1 shows the summary descriptive results for all the variables used in the study such as mean, maximum, minimum, standard deviation.

**Table 4.1: Summary of descriptive statistics of study variables over the period of 2000-2018**

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
LIQ	133	0.210132	0.070125	0.079075	0.360534
NPL	133	0.031634	0.017790	0.000000	0.098273
USD_BIRR1	133	15.53972	6.943961	8.140000	26.20000
LG	133	0.318383	0.346583	-0.099880	2.559322
IRS	133	0.076522	0.020237	0.038027	0.120318
INF	133	0.114955	0.109151	-0.106000	0.364000
GDP	133	0.089285	0.037941	-0.021000	0.126000
CAR	133	0.149058	0.042341	0.064251	0.294393
BS	133	8.344504	1.320182	4.962845	10.64483
AQ	133	0.028327	0.009362	0.001963	0.048583

**Source:** own computation from NBE via Eview.9

As Table 4.1 depicts, the mean value of liquidity is 0.21 which shows that percentage of liquidity is 21 % which is above the minimum requirement of National bank Of Ethiopia (NBE) which is 15% and having 0.07 (below minimum requirement of NBE) of minimum and 0.36 maximum values (above minimum requirement of NBE) with the standard deviation of 0.07. These mean as a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same for all banks in the sample. The National Bank of Ethiopia uses this ratio as the measurement of banks liquidity level and the liquidity requirement directive is based on this ratio. As per NBE directive number SBB/57/2014 issued by the National Bank of Ethiopia, any licensed commercial banks are required to maintain liquid asset of not less than fifteen percent (15%) of its net current liabilities (which includes the sum of demand deposits, saving deposits, time deposits and similar liabilities with less than one-month maturity). Accordingly the result shows the all summery statistical above the minimum liquidity requirement standard of the supervisory authority which is currently 15%. In general, the higher this ratio signifies that the bank has the capacity to absorb liquidity shock and the lower this ratio indicates the banks increased sensitivity related to deposit withdrawals.

Non-Performing Loan ratio measured by Nonperforming loans divided by total loan ranges from .00 up to 0.098273 with mean of 3.16% .This indicates that Commercial banks in Ethiopia incurred 9.8% NPLs from its total loan. According to Ethiopian context, the banking sectors are required to maintain the ratio of NPLs at least below 5% (NBE, 2008). However, as indicated above in table 4.1, the NPLs of commercial banks in Ethiopia are more than the required hold. Thus, NPLs problem are still serious for commercial banks in Ethiopia.

The exchange rate had a mean of Birr 15.5 per USD with minimum of 8.1 Birr per USD, and maximum of Birr 26.2 Birr per USD and the standard deviation of Birr 6.9 per USD. These indicated that the exchange value is 26.2 during the 2018 and minimum value 8.1 during 2000 in commercial banks.

Loan growth is measured by the annual growth rate of total loans & advances of a bank. The mean value of the variable loan growth 31.8 % with maximum and minimum values of 2.55 and -0.099 respectively. In terms of loan growth sample banks were highly different with the standard deviation of 0.34.

Interest Rates spread had a minimum of 0.03, maximum of 0.12, standard deviation of 0.02 and a mean of 7.6 percent. Interest Rates spread (margin) have high value during the year of 2018 by 0.12 different between depositor and creditor and have minimum Interest Rates margin of 0.03 during 2000 in commercial banks in Ethiopia.

The inflation or average price of goods and service on the basis of inflation in the country over the sample period was recorded an average of 0.11. The rate of inflation was highly dispersed which exhibits higher dispersion larger than its mean value over the periods under study towards its mean with standard deviation of 0.1 This clearly shows that there was a bit more variations in terms of cost of living as it measured by inflation consumer price index.

The other external factor is economic growth showed GDP in Ethiopia during 2000-2018 of the mean 0.08, with a -0.02 and 0.12 minimum and a maximum of respectively and the standard deviation for was 0.03 during the period of 2000 to 2018.

As it is shown on table 4.1 below, the average capital adequacy ratio of the studied banks were 0.149 with the maximum and minimum CAR of 0.06 and 0.29 respectively. The standard deviation of 0.04 for CAR reveals that, there was dispersion towards the mean capital adequacy ratio. Capital adequacy is measured by the ratio of regulatory capital to risk-weighted assets and accordingly a minimum of 8% is required. The average result of CAR implies above the minimum requirement set by the NBE. The higher this ratio entails the capability of the bank to absorb losses from its own capital.

The commercial bank size (BS) 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 BS is 834.4504 which imply average total assets size of sampled commercial banks in Ethiopia during this study period. The maximum total asset size value 1,064.483% was recorded by CBE during the year 2018 whereas the minimum total asset size value 496.2845% was recorded by NBE during the year 2000 midst sampled commercial banks in Ethiopia. The standard deviations value 132.0182 % shows somehow less BS dispersion from mean value for all sampled commercial banks in Ethiopia.

Asset quality (AQ) based on loan used to determine the performance of banks based on how well a manager control its loan in commercial banks in Ethiopia. As table 4.1 asset qualities mean 0.028 with minimum 0.01 and maximum 0.04. That shows commercial banks performance of investment or return from loan is on average 0.028 and these performance efficiency maximum during 2018 is 0.04 and minimum value during 2000 is 0.01 efficiency of commercial banks in Ethiopia.

#### **4.2.2. Correlation Matrix**

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. The values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that the two variables are perfectly related in a positive linear sense; while a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense. A correlation coefficient of 0, on the other hand indicates that there is no linear relationship between two variables (Brooks, 2008). The correlation matrix in table 2 predicts the likely relationship among variables in the study. (Cooper and Schindler, 2009) state that all correlation coefficient variables which have more than 0.8 should be corrected because of multicollinearity problem. (Mashotro, 2007) argued that correlation coefficient of 0.75 can be correlation coefficient of explanatory variables. Therefore, in this study there is no explanatory variable which is more than 0.75 correlation coefficients. So, there is no multicollinearity problem.

**Table 4. 2: Correlation matrix of the dependent and independent variables**

	LIQ	NPL	USD_BIRR1	LG	IRS	INF	GDP	CAR	AQ	BS
LIQ	1.000000	-0.486309	-0.466130	-0.068033	-0.456013	-0.102347	-0.304572	-0.065263	-0.176291	-0.608167
NPL		1.000000	-0.398616	-0.280387	-0.358267	0.203710	0.068272	-0.438593	-0.171716	-0.159679
USD_BIRR1			1.000000	-0.060073	0.588550	0.064989	0.195634	0.283749	0.276460	0.540583
LG				1.000000	-0.233675	-0.257570	-0.186879	0.094745	0.169964	-0.380578
IRS					1.000000	0.205365	0.316310	0.268146	0.293256	0.755912
INF						1.000000	0.305343	0.028058	0.334615	0.348022
GDP							1.000000	-0.057808	0.563631	0.506736
CAR								1.000000	0.292521	-0.100967
AQ									1.000000	0.341951
BS										1.000000

**Source:** own computation from NBE via Eview.9, 2020

Table 4.2 indicate that there was a negative correlation between liquidity and all explanatory variable, USD\_BIRR, LG ,IRS, INF ,NPL,GDP, CAR , AQ and BS A correlation coefficient indicates that the independent variables are perfectly related in a Negative linear sense with liquidity , bank size had the highest negative correlation coefficient with liquidity of -0.60. This indicates correlation coefficient of independent variables is perfectly related in a negative linear sense with liquidity.

The above correlation analysis shows only the direction and degree of associations between variables, it does not allow the researcher to make cause and effect inferences regarding the relationship between the identified variables, is simply stated that there is evidence for a linear relationship between the two variables and that movements in variables are on average related to an extent given by the correlation coefficient. Thus, in examining the effects of selected independent variables on bank liquidity. The econometric regression analysis which is discussed in the forthcoming section of the paper gives assurance to overcome the shortcomings of correlation analysis.

### 4.3 Tests for the Classical Linear Regression Model (CLRM) Assumptions

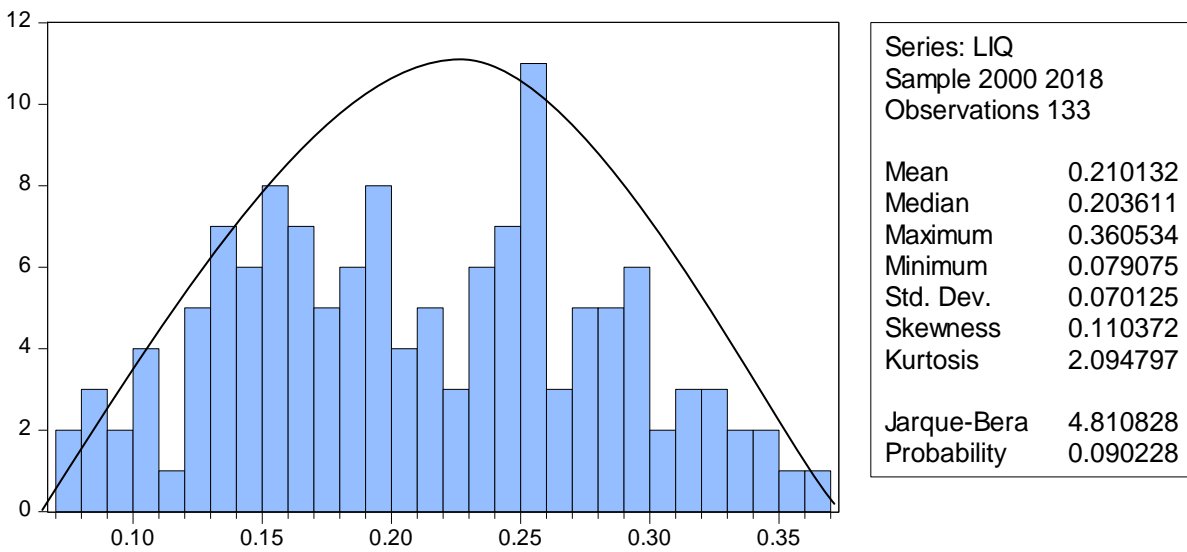
In the descriptive statistics part, the study shows the mean, standard deviation, minimum and maximum values of the dependent and explanatory variables including the number of observation for each variable during the period under consideration, that is from 2000-2018. However, this section provide test for the classical linear regression model (CLRM) assumptions such as normality, heteroscedasticity, autocorrelation and multicollinearity tests. The linearity of the parameter is assumed since the model applies linear ordinary least square (OLS). The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Thus, in order to maintain the validity and robustness of the regression result of the research in

CLRM, it is better to satisfy basic assumptions of CLRM. As noted by Brooks (2008), when these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there will be data that left out of the model. Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, normality, multicollinearity, autocorrelation and heteroscedasticity tests are made for identifying misspecification of data if any so as to fulfill research quality.

#### **4.3.1 Normality test: Bera-Jarque (BJ) test**

Normality test helps to know whether the residuals are normally distributed or not. (Chris book, 2008) argued on one of the commonly applied test in test of normality is the Jarque-bera test. Jarque-bera uses the property of normally distributed random variable that the entire distribution is defined by the first two moments, the mean and the variations. If the residuals are normally distributed the histogram should be bell-shaped and the bera-jarque statistic would not be significant or should be more than significance level and the null hypothesis should not be rejected and the p-value of the normality test should be more than 0.05 or 5 percent of significance level. If the p-value is less than the significance level the null hypothesis is rejected and the alternative hypothesis is accepted and the residuals are not normally distributed. As stated by Kebete (2014), a normal distribution is not skewed and is defined to have a coefficient of Kurtosis of 3. Skewers measures the extent to which a distribution is not symmetric about its mean value while Kurtosis measures how far the tails of a distribution are (Brooks 2008). The Jarque-Bera probability statistic (p-value) is also expected not to be significant even at 10% (Kebete 2014). The normality test shows that the coefficient of Kurtosis (2) mean less than 3 or, and the JarqueBera statistic is not significant even at 10% level of significance (P-value = 0.09 greater than 0.05), and skewness=0.10. So the conclusion is therefore that the data is normally distributed.

**Figure 4.1 Normality test LIQ**



**Source:** own computation from NBE via Eview.9

### 4.3.2 Heteroscedasticity Test

Under this unit the residual was tested to identify whether it was heteroscedastic or homoscedastic or whether the null hypothesis is accepted or rejected. The null hypothesis was accepted only if the p-value of observed R-squared were more than the significance level of 5 percent or 0.05 unless it was rejected and the alternative hypothesis was accepted. In the classical linear regression model, one of the basic assumptions is Homoscedasticity assumption that states as the probability distribution of the disturbance term remains same for all observations. That is the variance of each  $u_i$  is the same for all values of the explanatory variable. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity (Seid, 2015). Accordingly, in order to detect the heteroscedasticity problems, Breusch-Pagan test was utilized in this study. This test states that if the p-value is significant at 95 confidence interval, the data has heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem. Thus, as shown in table below there is no heteroscedasticity problem for this study hence the p value is 9.59% or (0.0959) showing insignificant value.



**Decision rule**

**HO:** no relation or difference

**HA:** Their difference or similarity.

According to the study the value of significance shows insignificant or p-value is greater than 5% equal 0.095.so the decision is accept HO and reject HA.

Table 4:4 -Heteroscedasticity Test: Breusch-Pagan-Godfrey (Summary)

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	29.81030	21	0.0959

**Source:** own computation from NBE via Eview.9

**4.3.3 Autocorrelation Test**

(Chris books, 2008) argued that the CLRMs di error terms which are zero in cross sectional type errors are uncorrelated with one another. In addition he said that if the errors are not uncorrelated with one another, it would be stated that they are auto correlated or that they are serially correlated. This means they are auto correlated or they are serially correlated. To test this assumption the Durbin–Watson (DW) statistical test was applied. If the p-value of the auto correlation test is greater than the significance level of 5 percent the null hypothesis is accepted and the residual is serially correlated or auto correlated. If the p-value is less than 5 percent the null hypothesis is rejected and the alternative hypothesis is accepted and the residuals are not serially correlated or not auto correlated. . Therefore, the residuals are serially correlated or auto correlated. Furthermore, the researcher tested the autocorrelation assumptions that imply zero covariance of error terms over time. That means errors associated with one observation are uncorrelated with the errors of any other observation. As noted by Gujarati (2004), the best renowned test for detecting serial correlation is Durbin Watson test. Accordingly, if the computed nearest to (2) in application, it is assumed that there is no autocorrelation problem. Thus, as shown in table (5) the computed below in this study was 1.9 which is nearest to 2 implying the absence of autocorrelation problem. Thus, this implies that error terms are not correlated with one another for different observation in this study.

Table 4.5.Autocorrelation Test summary.

R-squared	0.70
Prob(F-statistic)	0.6
Durbin-Watson stat	1.9

**Source:** own computation from NBE via Eview.9

### 4.3.4 Multicollinearity Test

Multicollinearity test was used to know the relationship existed in explanatory variables. If an explanatory variables were an exact linear combination of other explanatory variables then, we can say that the models suffers from perfect collinearity and it cannot be estimated by OLS Chris books,(2008). Multicollinearity condition exists when there is high but not perfect correlation between two or more explanatory variables. According to Churchill and Lacobucci (2005), when there is multicollinearity among the explanatory variables the amount of information about the effect of independent variables on dependent variable decreases. Gujarti, (2004) argues that the standard of statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficient (CC), condition index (CI), and variance inflation factors (VIF). Therefore, in this study correlation matrix for seven independent variables shown in below table had been estimated. The results of the following correlation matrix show that the highest correlation was 0.7 which is between bank size and interest rate spread. Since there is no correlation above 0.7, and 0.75, according to Kennedy (2008), Malhotra, (2007) and Hair etal, (2006) respectively, we can be concluded that there is no the problems of multicollinearity in this study.

**Table 4. 6. The results of Multicollinearity test**

	NPL	USD_BIRR	LG	IRS	INF	GDP	CAR	BS	AQ
NPL	1.000000								
USD_BIRR	-0.398616	1.000000							
LG	-0.280387	-0.060073	1.000000						
IRS	-0.358267	0.588550	-0.233675	1.000000					
INF	0.203710	0.064989	-0.257570	0.205365	1.000000				
GDP	0.068272	0.195634	-0.186879	0.316310	0.305343	1.000000			
CAR	-0.438593	0.283749	0.094745	0.268146	0.028058	-0.057808	1.000000		
BS	-0.159679	0.540583	-0.380578	0.755912	0.348022	0.506736	-0.100967	1.000000	
AQ	-0.171716	0.276460	0.169964	0.293256	0.334615	0.563631	0.292521	0.341951	1.000000

**Source:** own computation from NBE via Eview.

### 4.3.5 Model Selection

#### Random Effect versus Fixed Effect Models

Econometrics model used to examine the impact of exchange rate fluctuation (USD\_BIRR), loan growth (LG) interest rate spread (IRS), inflection (INF) , gross domestic product(GDP),capital adequacy ratio(

CAR), asset quality (AQ), bank size (BS), and nonperforming loans (NPL) on liquidity of commercial banks in Ethiopia was panel data regression model which is either fixed-effects or random-effect model. The appropriate test used to decide whether fixed effect or random effect model is appropriate was Hausman Specification Test. Thus, Hausman Specification Test identifies whether fixed-effects or random-effect model is most appropriate under the null hypothesis that unobservable individual effects ( $u_i$ ) are uncorrelated with one or more of explanatory variables ( $X_i$ ). As noted by Gujarati (2004), fixed effect model is most appropriate when null hypothesis is rejected whereas random effect is appropriate when null hypothesis is not rejected.

For Hausman test, the null and alternative hypotheses are as follows:

$H_0$ :  $u_i$  is not correlated with  $X_i$  (random-effects model appropriate)

$H_1$ :  $u_i$  is correlated with  $X_i$  (fixed-effects model appropriate)

Thus, to test the null hypothesis, it requires comparing the estimates from the random-effects and the fixed-effects estimator. Random-effect estimator is consistent under the null hypothesis, but inconsistent under the alternative hypothesis whereas fixed-effect estimator is consistent under both the null and alternative hypothesis. If the estimates for the random-effects estimators are not significantly different from the estimates for the fixed-effects estimator, then the null hypothesis is accepted and concludes that  $u_i$  is not correlated with  $X_i$ , and therefore the random-effect model is the appropriate model. If the estimates for the random effect estimator are significantly differ from the estimates for the fixed-effect estimator, the null is rejected and conclude that  $u_i$  is correlated with  $X_i$ , and therefore the fixed-effect model is the appropriate model for the study. Besides, if the number of year is exceeds number of cross section, fixed effect model is appropriate which is true for this study.

Accordingly, table below demonstrates the Hausman Specification Test that used to decide the best model for this study. The decision rule, for Hausman Specification test is rejecting the null hypothesis when the p-value is significant. Thus, as shown in table show, the Hausman specification test for this study has a p-value of 0.0005\*\* for the regression models. This indicates that p-value is significant and then the null hypothesis is rejected justifying as fixed effect model is appropriate for the given data set in this study.

Table4.7 Fixed Effect Models

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.837001	(6,117)	0.0016
Cross-section Chi-square	23.890213	6	0.0005

**Source:** own computation from NBE via Eview.9

### 4.3.6 Regression analysis and result discussion

Under this parts of the study Regression analysis for the liquidity of banks measures have been discussed to understand the relationship between banks ability to have covetable asset in short period time measures and independent variables. A regression analyses were done to know the relationship between liquidity measures and those independent variables like, exchange rate fluctuation (USD\_BIRR), loan growth(LG) ,interest rate spread(IRS), inflection (INF) ,gross domestic product(GDP),capital adequacy ratio( CAR) ,asset quality( AQ),bank size(BS),and nonperforming loans(NPL).

#### 4.4.3 The analysis of regression between LIQ and explanatory variables

To analysis the relationship between commercial banks Liquidity measures and others independent variables regression analyses were undertaken. The model of regression was applied as follow:

**Table 4.8** Regression results for determinants of liquidity measured by liquid assets to current liability ratio.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.455742	0.049349	9.235024	0.0000
NPL	-1.968780	0.320312	6.146434	0.0000***
USD_BIRR1	-0.001414	0.001255	-1.126478	0.2623
LG	-0.065367	0.013742	-4.756753	0.0000***
IRS	1.335719	0.360757	3.702548	0.0003***
INF	-0.071549	0.039850	-1.795444	0.0752*
GDP	-0.492401	0.138241	-3.561890	0.0005***
CAR	-0.236269	0.134213	-1.760408	0.0810*
BS	-0.043000	0.007619	-5.643993	0.0000***
AQ	2.785548	0.623887	4.464826	0.0000***
	Effects Specification			

Cross-section fixed (dummy variables)			
<b>R-squared</b>	<b>0.704541</b>		
Adjusted R-squared	0.666662	Mean dependent var	0.210132
S.E. of regression	0.040487	S.D. dependent var	0.070125
Sum squared resid	0.191784	Akaike info criterion	-3.463255
Log likelihood	246.3065	Schwarz criterion	-3.115544
F-statistic	18.59964	Hannan-Quinn criter.	-3.321959
Prob(F-statistic)	<b>0.000000</b>		
		Durbin-Watson stat	1.696623

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

**Source:** Commercial banks reports, NBE, MoFED and own computation via eview9

According to table 4.6 fixed effect regression results, adjusted R2 has the value of 67% which revealed that the explanatory power of the model was good. The value (i.e. 67%) could be interpreted as; the variations of liquidity in Ethiopian commercial banks 67% were explained by, NPL, USD\_BIRR, LG, IRS, INF, GDP, CAR, BS and AQ whereas the rest 33% 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 4.8 indicated that; out of the total nine explanatory variables of the study six of them were statistically significant at 1% level (i.e. NPL, LG, IRS, GDP, BS and AQ) while INF and CAR were significant at 10% level. The rest one variable (exchange USD to birr) had no statistically significant impacts on liquidity of Ethiopian commercial banks for the period between 2000-2018. IRS, GDP and INF was the only macroeconomic variable that significantly affected liquidity, but the rest six 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. The model is well fitted at 5% percent significant level.

$$LIQ=0.455742C-1.968780NPL-0.001414USDtoBIRR-0.065367LG+1.335719IRS-0.071549INF-0.492401GDP-0.236269CAR-0.043000ASZ+2.785548AQ----- (1)$$

### 4.3.7 Result of Regression Analysis

#### I. Bank specific factors

Under this section the researcher has addressed internal (Bank Specific) research objectives those include:

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

Non-performing loan (NPL) is measured by the ratio of provision for non-performing loans to total loans and advances. The regression result found to be negative and statistically significant impact on liquidity. The coefficient value of the variable is -1.96 which indicates a unit increase in NPL results in a 1.96 unit decrease in liquidity of selected Ethiopian commercial banks Significant at 1% p-value. This result is consistent with (Angela Romana,\*, Alina CameliaSargub, 2013), Sargub (2013) which stated that, the banks operating in the Czech Republic registered an increase of their impaired loans ratio during the analyzed period results and decrease in liquidity because the new regulations adopted by the Czech Republic National Bank demanded an decrease of the overall banks liquidity level for the banks that registered a deterioration of their loans portfolio, this also determines the positive and statistically significant link between the liquidity indicator and NPL. Again, In the case of the Lithuanian banks, the increase of the impaired loans ratio had a tremendous impact on their overall liquidity. In order to avoid the collapse of the banking system the Lithuanian National Banks has undertaken a series of reforms, among which an increase of the minimum liquidity level that banks must maintain. So, as banks registered an increase of their impaired loans ratio the Central Bank required an even higher level of liquidity, thus the positive and statistically significant link between the liquidity indicator and the impaired loans ratio is valid. Since, the commercial banks in Ethiopia are highly regulated by the central bank (NBE), they are very strict in NPL management. Therefore, whenever their NPL is higher they have to offset with additional loan and advance and in order to avail new loan they have to increase their liquidity otherwise, increase in amount of nonperforming loans (NPL) leads the banking sector to efficiency problem and the banking system into failure, as per the finding of this study NPL has negative and statistically significant impact on the liquidity position of selected Ethiopian commercial banks. Therefore, the hypotheses stated; there was negative and statistically significant relationship between nonperforming loans (NPL).

### **B. Loan growth and liquidity**

As it is evident in the table, the coefficient of the loan growth was negative and statistically significant even at 1 percent. The result shows that a one unit increase in loan growth, results in a -0.065367unit decrease in banks' liquidity which means that the growth of loan negatively affect the liquidity of the commercial banks in Ethiopia. The negative impact of loan growth on banks liquidity was in line with the hypothesis which is based on the argument of taking loans as illiquid assets of banks. According to this argument when the amount of loans provided by banks increase, the amount of illiquid assets in the total assets portfolio of banks increase and lead to the reduction in the level of liquid assets held by banks. Therefore, this finding reveal that larger amount of loans was provided from periodic deposits with affecting the amount of liquid assets held by the

commercial banks in Ethiopia. Therefore, the hypothesis stating negative and significant relationship between loan growth and banks liquidity should be accepted. (Kashyap, et. al, 2012), stated that as loan growth increase, liquidity asset holdings also decrease.

### **C. Capital adequacy ratio and liquidity**

Capital adequacy which was measured by the ratio of equity and reserve to total asset was statistically significant variable that affected liquidity of Ethiopian commercial banks at 5 percent insignificant level with the p-value of 0.08. And has a negative coefficient value of 0.23 which indicated that holding other variables constant one unit increase in capital adequacy ratio, results in a 0.23 unit decrease in liquidity of Ethiopian commercial banks and in line with the findings of (Vodova, 2012); Subedi and Neupane (2011); and Laurine (2013). The negative and statistically insignificant impact of capital adequacy on liquidity of Ethiopian commercial banks were supported the arguments of the financial fragility-crowding out hypotheses. The first research hypothesis is rejected; there is negative and insignificant relationship between capital adequacy and bank liquidity.

### **D. Size of the bank and liquidity**

In this study natural logarithm of total asset was used as a proxy of bank size, used to know the effect of bank size on liquidity of Ethiopian commercial banks. Bank size found to be a negative and statistically significant at 5 percent level of significance with a p value of 0.0000. The coefficient value of 0.04300 indicated that one unit increases in the total asset results a 0.04300 unit decrease in liquidity of Ethiopian commercial banks, holding other variables constant. This finding was consistent with the findings of (Choon, 2013), (Malik, M.F. & Rafique, A., 2013); Vtyurinen et al. (2012); Chagwiza (2011); Subedi and Neupane (2011). Moreover, the result of this study about Banks liquidity and Bank size are also relevant with the empirical findings of (Vodova, 2011); Hackethal et al., (2010); Rajan and Stein, (2002); (Alger and Alger, 1999) and Vento and Ganga, (2009) in which bank size has found a significant negative relationship with liquidity. Hence on the basis of this hypothesis large banks tend to hold less liquid assets and invest in riskier assets through implicit guarantee. In case of liquidity shortage, large banks access to Lender of the Last Resort (Central Bank) for advances to overcome the liquidity shortage while central bank also provide loan to small banks but on small scale and higher interest rate Therefore, the hypotheses stated; there was positive and statistically significant relationship between bank size and liquidity failed to be accepted.

## **E. Asset quality**

Depending on regression results of above asset quality have positive relationship with liquidity by have a p-value of 0.00. Which is significant because of its p-value is less than its significance level. The result indicates that asset quality has positive relationship with liquidity by significant for the study. Therefore, asset quality can be taken as one of the major factors of affecting banks liquidity in Ethiopia. This means when asset quality increases the liquidity also increase significant factor for the study. Therefore, the result the same with the study of Tobias and Themba 2011 the hypotheses stated; there was negative and statistically significant relationship between asset quality and liquidity failed to reject.

## **II. Macroeconomic specific factors**

Under this section the researcher has addressed macroeconomic factors those include:

### **A. Interest rate spread (IRS) and liquidity**

The results show also the positive impact of the interest rate spread, which is increase in interest rate spread, stimulates the bank to focus more on lending activity and as a result, the share of liquid assets is increasing. The model coefficient obtained of 1.335719 which implies that a 1 unit increase in interest rate spread results in a 1.335719 (P-value, 0.000) unit increase in banks liquidity of commercial banks and statistical significant at 5 percent. Monetary policy interest rate can be considered a measure of a bank's ability to provide loans to customers (Gianni De Nicolò and Marcella Lucchetta, 2010). Therefore, the hypothesis stating interest rate spread has negative and significant impact on liquidity of commercial banks rejected.

### **B. GDP and liquidity**

Business cycles occur in the economy. At times the economy can experience a boom or a recession. These cycles alternate from time to time. Business cycles are measured by the changes in the growth of the gross domestic product of an economy. High GDP levels resemble a boom in the economy and low GDP show that the economy is experiencing difficulties at that time. The coefficient on GDP is negative and significant even at 5 percent significant level, this result is consistent with Valla et al. (2006), Dinger (2009), (Vodova, 2011) and (Aspachs et. al. and Tiesset, 2005), which established negative relationships between the two. According to (Aspachs et. al. and Tiesset, 2005), UK banks seemed to hold smaller amounts of liquidity when GDP increased and vice versa. This implies that in a recession of the economy commercial banks is more liquid than in the boom time. It has also statistically significant impact on liquidity. Hence, the hypothesis stating; real GDP growth rate has positive and significant impact on banks liquidity should be not accepted.



### C. Inflation and liquidity

Inflation refers to changes in the price level in an economy. The general inflation rate proxied by yearly rate of change of the consumer price index has been significant at 1 percent significant level and the coefficient having a negative sign i.e. -0.071549. This shows that the general performance of the price index plays a very crucial role in liquidity. High inflation is expected to result in the normalization of prices in the economy which in turn result in high costs of doing business. This negative relation was based on the theory that during inflationary economy, commercial banks are refraining from long term investment and prefer to hold not risk free liquid asset.

During inflation, it is expected that, banks will make fewer loans and the amount of liquid or short term assets held by economic agents including banks will rise. The negative relation was consistent with the findings of (Vodova, 2011) on Poland commercial banks and (Tseganesh, 2012) on Ethiopian commercial banks. The negative coefficient of -0.071549 indicates that a one unit change on inflation rate of the country, other things being constant, liquidity of Ethiopian commercial banks leads to a -0.071549 unit change in the same direction. Therefore, the hypothesis that Inflation (Consumer Price Index) has negative and insignificant impact on liquidity of commercial banks should be accepted.

**Table 4.9.** Summary of actual and expected signs of explanatory variables on the dependent Variables

Explanatory variables	Expected impact on liquidity	Actual impacts	significance	Insignificance	Decision
NPL	-	-	√		Accept
LG	-	-	√		Accept
IRS	-	+	√		Reject
GDP	+	-	√		Reject
BS	+	-	√		Reject
AQ	-	+	√		Reject
INF	-	-		√	Accept
CAR	+	-		√	Reject
(FERF)(USD-BIRR)	-	-		√	Accept

This chapter discussed the analysis of the results of multiple linear regressions model.

To summarize the above data analysis Ethiopian banks liquidity is highly affected by bank-specific (internal) factors and microeconomic factor. That means except that of all variable because variable (+ve and –ve significant) all variables included in this study are proved as they were the major effect of liquidity of Ethiopian commercial banks.

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATION**

#### **5.1. Introduction**

The study established the factors that determine liquidity in Ethiopia banking sector during the period from 2000-2018 G.C. Findings indicated that bank liquidity are influenced by Size of the Bank (SB), Capital Adequacy (CAR), Non-Performing Loan (NPL), Gross domestic product (GDP), Loan Growth (LG), Asset quality (AQ), Foreign exchange Rate fluctuations (FERF), Interest Rate Spread (IRS), and Inflation (INF). This chapter outlines the summary and conclusions of the study in accordance with the study results. It also gives an insight on the policy recommendations as well as suggestions for future studies.

#### **5.2. Summary of the Study**

The thrust of the study was in identifying the factors affecting liquidity in selected commercial banks operating in Ethiopia. An explanatory research design adopted to explain the casual relationships between the variables. The study employed quantitative methods on secondary data sourced from financial statements of banks, and NBE publications for macro-economic variables. Banks should remain liquid at all times to prevent falling into liquidity crisis, which cause distress among the stakeholders and tremor in the overall economy. Thus, this study attempts to identify the factors affecting liquidity of selected commercial banks in Ethiopia. This research also provides summary of previous studies on similar topics. Nine variables affecting the selected commercial banks liquidity were chosen and analyzed. Panel data was used for the sample of seven commercial banks in Ethiopia from the year 2000 to 2018 G.C and estimate using fixed effect model (FEM). Data was presented by using descriptive statistics. The balanced correlation and regression analysis for liquidity conducted. Before performing OLS regression the models were tested for the classical linear regression model assumptions. Fixed effect model/FEM used based on convenience. Analysis made for nine factors affecting selected commercial banks liquidity. From the list of possible explanatory variables, almost all of them proved to be statistically significant. Based on the results from the regression analysis estimated by fixed effect regression model the following conclusion was made.

### **5.3. Conclusions**

The result of this study confirmed that, all bank specific variables, and all macroeconomic variables except Foreign exchange Rate fluctuations (FERF), had statistically significant impact on the determination of liquidity for selected Ethiopian commercial banks. Interest rate spread (IRS) and asset quality (AQ) the researcher found that are significant and positively related with banks liquidity and it was inconsistent with the hypothesis. Loan Growth (LG), Capital Adequacy (CAR) Non-Performing Loan (NPL) inflation (IFL) and have negative and statistically significant impact on the determination of liquidity of Ethiopian selected commercial banks and it was in line with the hypothesis. Moreover, in the inflationary economy, economic units including banks refraining from long term investments due to the decline in the real value of their investments that aggravate the credit market rationing and prefer to hold risk free liquid assets. Liquidity is negatively influenced also by the interest rate spread. The factors lead to higher lending activity of banks and thus reduce bank liquidity. Size of the Bank (SB) had negative and statistically significant impact on Ethiopian banks liquidity. GDP Growth rate has negative impact on the liquidity of commercial banks but it is statistically insignificant.

### **5.4. Recommendations**

The findings of the study showed that Size of the Bank, Capital Adequacy, Non-Performing Loan, Growth domestic product, Loan Growth , Asset quality, Interest Rate Spread, and Inflation Were the significant drivers of liquidity in Ethiopian commercial banks during 2000 to 2018. Hence, focusing and taking the necessary action on these indicators could reduce the probability of liquidity in Ethiopian commercial banks. Based on the findings of the study the following possible recommendations are forwarded:

- Bank size: Big banks needs to manage their liquidity position and shall give due attention on resource mobilization and liquidity management.
- Loan growth is powerful bank specific driver of liquidity risk of commercial banks in Ethiopia. Therefore commercial banks should revise their credit policy in accordance with the liquidity position of the bank since high loan growth fall liquid asset of banks which results liquidity risk.
- Capital adequacy: While issuing new directives or amending the existing policies, NBE take into account that the increase of capital and statutory reserve requirements policy has stood pressure on the banks liquidity. Since both capital and reserve requirement have negative and insignificant impact on banks liquidity.

- Nonperforming loan was negative relation with liquidity of commercial bank in Ethiopia statically significant. For that matter, Nonperforming loan can be taken as the major factors of banks liquidity in this study for these the finding of the study suggests that the Nonperforming loan can be the factors of liquidity of Ethiopian commercial banks.
- Asset quality was positive relation with liquidity statically significant for that matter, asset quality can be taken as the major factors of banks liquidity in this study finding of the study suggests that the asset quality can be the factors of liquidity of Ethiopian commercial banks.
- From macro-economic variables included in this research commercial banks in Ethiopia is advisable to pay attention for Growth domestic rate, Interest Rate Spread and Inflation since those drivers are significant effect on liquidity. So, commercial banks in Ethiopia should not only be concentrated on firm specific determinants, but also macroeconomic factors must be incorporated in developing strategies to effectively manage liquidity position of private banks.

#### **5.4.3. Improving economic environment**

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

#### **5.5. Suggestions for future studies**

The prime focus of this research was on identifying factors affecting liquidity in the case of selected commercial banks in Ethiopia using selected variables. However, there might be variables that were not included in this study. Thus, future researchers are recommended to undertake similar study by considering additional variables on the same banks which will be useful to validate findings of the current study. Furthermore, it is suggested that researchers consider the newly emerging banks in doing the same research.

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# APPENDIXES

## Appendix 1-Raw Data

BANK	YEAR	LIQ	ASZ	CAR	GDP	INF	IRS	LG	NPL	AQ	USD_BI RR1
CBE	2000	0.32675	6.632	0.12385	0.034	0.054	0.078016	0.18254	0.03132	0.023166	8.14
CBE	2001	0.24807	6.81014	0.11466	0.074	-	0.061658	0.25503	0.03387	0.013205	8.33
CBE	2002	0.28957	7.01392	0.11781	0.016	-	0.064579	0.13547	0.03768	0.011887	8.54
CBE	2003	0.35261	7.24494	0.09779	-0.021	0.109	0.050163	0.25589	0.055	0.011142	8.58
CBE	2004	0.31243	7.47874	0.08757	0.117	0.073	0.051788	0.1825	0.07717	0.016399	8.63
CBE	2005	0.2089	7.70796	0.10243	0.126	0.061	0.055342	0.36364	0.06202	0.019019	8.6518
CBE	2006	0.23426	7.99092	0.10291	0.115	0.106	0.054485	0.45116	0.04915	0.030116	8.681
CBE	2007	0.22508	8.25062	0.11319	0.118	0.158	0.065467	0.34188	0.04339	0.042158	8.7943
CBE	2008	0.19395	8.48058	0.12388	0.112	0.253	0.064283	0.08992	0.04638	0.033016	9.24
CBE	2009	0.22043	8.76757	0.11676	0.1	0.364	0.077698	-0.0091	0.05499	0.025433	10.42
CBE	2010	0.29978	8.98027	0.11836	0.1057	0.028	0.071055	0.15949	0.04715	0.034461	12.89
CBE	2011	0.17564	9.22185	0.12932	0.114	0.181	0.071962	0.26728	0.03635	0.039936	16.1
CBE	2012	0.1695	9.38737	0.13491	0.087	0.341	0.090522	0.38083	0.02705	0.035771	17.3
CBE	2013	0.16615	9.60635	0.13535	0.099	0.135	0.086552	0.40064	0.02305	0.037884	18.3
CBE	2014	0.13147	9.90493	0.12609	0.103	0.081	0.087064	0.19019	0.0227	0.035428	19.1
CBE	2015	0.08897	10.0804	0.12947	0.104	0.077	0.082593	0.36024	0.01739	0.029401	20.1
CBE	2016	0.08673	10.2959	0.12886	0.08	0.097	0.09019	0.23784	0.01526	0.027815	21.1
CBE	2017	0.09072	10.6448	0.11111	0.109	0.072	0.09019	0.46214	0.0146	0.02743	22.4
CBE	2018	0.17564	10.0804	0.13535	0.099	0.028	0.087064	0.40064	0.05499	0.029401	26.2
AIB	2000	0.13649	6.57647	0.17131	0.034	0.054	0.041359	1.03906	0.01533	0.0217	8.14
AIB	2001	0.26578	6.79794	0.16406	0.074	-	0.063329	0.31609	0.0262	0.023544	8.33
AIB	2002	0.31962	7.04054	0.12347	0.016	-	0.059756	-0.0262	0.0568	0.001963	8.54
AIB	2003	0.32558	7.19519	0.11178	-0.021	0.109	0.051545	0.20927	0.07664	0.004848	8.58
AIB	2004	0.3306	7.36834	0.12177	0.117	0.073	0.078087	0.18912	0.07588	0.026045	8.63
AIB	2005	0.24419	7.629	0.12348	0.126	0.061	0.064806	0.28274	0.04943	0.033498	8.6518
AIB	2006	0.10903	7.94944	0.14185	0.115	0.106	0.065222	0.59076	0.03108	0.034758	8.681
AIB	2007	0.17344	8.13035	0.1384	0.118	0.158	0.065585	0.17422	0.04686	0.021509	8.7943
AIB	2008	0.14564	8.35936	0.1017	0.112	0.253	0.062744	0.22219	0.08895	0.003803	9.24
AIB	2009	0.25822	8.60824	0.11315	0.1	0.364	0.076909	-0.0384	0.09827	0.020615	10.42
AIB	2010	0.21594	8.74505	0.11563	0.1057	0.028	0.058276	0.164	0.07407	0.023916	12.89
AIB	2011	0.21617	8.89261	0.11565	0.114	0.181	0.085269	0.05152	0.03332	0.02669	16.1
AIB	2012	0.19868	9.0167	0.13628	0.087	0.341	0.096862	0.17544	0.02568	0.02788	17.3
AIB	2013	0.11912	9.22319	0.1307	0.099	0.135	0.081267	0.20646	0.01989	0.023552	18.3
AIB	2014	0.15386	9.33047	0.17527	0.103	0.081	0.110319	0.07634	0.01794	0.041804	19.1
AIB	2015	0.17513	9.52278	0.15382	0.104	0.077	0.111177	0.16681	0.01507	0.023392	20.1

AIB	2016	0.08859	9.7308	0.14767	0.08	0.097	0.10382	0.3567	0.01373	0.023647	21.1
AIB	2017	0.07965	10.1395	0.15359	0.109	0.072	0.10382	0.76062	0.01262	0.025371	22.4
AIB	2018	0.15386	8.89261	0.1307	0.114	0.181	0.085269	0.20646	0.02568	0.023552	26.2
DB	2000	0.25434	6.76273	0.08902	0.034	0.054	0.056998	0.77076	0.03377	0.014295	8.14
DB	2001	0.24091	7.00307	0.08455	0.074	-	0.063051	0.33959	0.03221	0.021374	8.33
DB	2002	0.27456	7.30384	0.0821	0.016	-	0.058076	0.22129	0.03096	0.018561	8.54
DB	2003	0.25666	7.59639	0.06479	-0.021	0.109	0.046213	0.45298	0.03867	0.015531	8.58
DB	2004	0.24169	7.89245	0.06425	0.117	0.073	0.050406	0.33386	0.03728	0.023993	8.63
DB	2005	0.1845	8.1374	0.07105	0.126	0.061	0.054226	0.32071	0.03226	0.02329	8.6518
DB	2006	0.14672	8.422	0.08491	0.115	0.106	0.058338	0.41756	0.02655	0.033392	8.681
DB	2007	0.13408	8.70633	0.12109	0.118	0.158	0.061109	0.26043	0.02482	0.035326	8.7943
DB	2008	0.14597	8.96554	0.12386	0.112	0.253	0.069505	0.0988	0.02317	0.034472	9.24
DB	2009	0.12958	9.18323	0.11904	0.1	0.364	0.072503	0.01586	0.02297	0.028458	10.42
DB	2010	0.16916	9.42169	0.11717	0.1057	0.028	0.071132	0.13419	0.02181	0.029344	12.89
DB	2011	0.13019	9.59286	0.126	0.114	0.181	0.069623	0.23148	0.01989	0.033366	16.1
DB	2012	0.20137	9.7711	0.14155	0.087	0.341	0.08134	0.3066	0.02147	0.040523	17.3
DB	2013	0.1937	9.89077	0.13432	0.099	0.135	0.084276	0.09091	0.02246	0.032564	18.3
DB	2014	0.1849	9.99708	0.15072	0.103	0.081	0.088567	0.06401	0.01746	0.034164	19.1
DB	2015	0.13334	10.1171	0.14751	0.104	0.077	0.08901	0.22242	0.01571	0.031209	20.1
DB	2016	0.13687	10.2603	0.14295	0.08	0.097	0.087309	0.10134	0.01705	0.027261	21.1
DB	2017	0.10811	10.4523	0.14152	0.109	0.072	0.087309	0.4244	0.0202	0.023927	22.4
DB	2018	0.20137	9.99708	0.13432	0.099	0.135	0.088567	0.22242	0.02246	0.034164	26.2
BO A	2000	0.20361	5.0626	0.25317	0.034	0.054	0.038027	0	0	0.012658	8.14
BO A	2001	0.14276	5.81711	0.18452	0.074	-	0.066438	2.55932	0	0.048583	8.33
BO A	2002	0.30337	6.2804	0.18539	0.016	-	0.060521	0.54286	0.01235	0.029885	8.54
BO A	2003	0.23051	6.78559	0.14124	-0.021	0.109	0.048565	0.69753	0.04	0.018323	8.58
BO A	2004	0.29118	7.1285	0.13873	0.117	0.073	0.053218	0.42909	0.03817	0.032833	8.63
BO A	2005	0.21132	7.45703	0.12933	0.126	0.061	0.053633	0.44148	0.04148	0.030883	8.6518
BO A	2006	0.25122	7.61431	0.1406	0.115	0.106	0.049815	0.30185	0.03864	0.030859	8.681
BO A	2007	0.23056	7.86596	0.17146	0.118	0.158	0.05855	0.23186	0.03412	0.032801	8.7943
BO A	2008	0.16783	8.20251	0.17279	0.112	0.253	0.074156	0.16335	0.03786	0.036132	9.24
BO A	2009	0.29716	8.47773	0.16078	0.1	0.364	0.091429	0.05037	0.04605	0.036341	10.42
BO A	2010	0.24948	8.69459	0.1632	0.1057	0.028	0.082847	0.14676	0.039	0.037281	12.89
BO A	2011	0.27546	8.86947	0.17339	0.114	0.181	0.097162	0.08656	0.04124	0.037675	16.1
BO A	2012	0.25928	9.02108	0.19336	0.087	0.341	0.0909	0.34064	0.02712	0.037204	17.3
BO A	2013	0.19147	9.12091	0.19151	0.099	0.135	0.097792	0.22489	0.02502	0.03437	18.3
BO A	2014	0.18251	9.28241	0.18862	0.103	0.081	0.082158	0.19035	0.02096	0.029899	19.1
BO A	2015	0.156	9.49222	0.17066	0.104	0.077	0.098074	0.27485	0.01502	0.028086	20.1
BO	2016	0.18259	9.66969	0.16686	0.08	0.097	0.120318	0.08963	0.01767	0.026802	21.1

A											
BO											
A	2017	0.15614	9.95322	0.14054	0.109	0.072	0.120318	0.4259	0.01654	0.028029	22.4
BO											
A	2018	0.156	9.49222	0.19151	0.103	0.081	0.097792	0.27485	0.01767	0.029899	26.2
WB	2000	0.28767	4.96285	0.27972	0.034	0.054	0.064593	1.37838	0.01136	0.027397	8.14
WB	2001	0.31613	5.36598	0.29439	0.074	0.003	0.066007	0.52273	0.00746	0.028011	8.33
WB	2002	0.3344	5.74939	0.28026	0.016	0.106	0.072548	0.21642	0.01227	0.015152	8.54
WB	2003	0.2516	6.1506	0.19403	-0.021	0.109	0.044611	0.77914	0.02414	0.012771	8.58
WB	2004	0.36053	6.51323	0.14243	0.117	0.073	0.049636	0.32414	0.03906	0.012248	8.63
WB	2005	0.32526	6.97821	0.1165	0.126	0.061	0.057918	0.54427	0.03879	0.035489	8.6518
WB	2006	0.192	7.37713	0.11945	0.115	0.106	0.046947	0.69309	0.02888	0.032934	8.681
WB	2007	0.2827	7.68823	0.19427	0.118	0.158	0.060568	0.40438	0.03014	0.033849	8.7943
WB	2008	0.2524	8.0864	0.17195	0.112	0.253	0.066309	0.31891	0.02676	0.033516	9.24
WB	2009	0.24816	8.44499	0.1319	0.1	0.364	0.073363	0.15733	0.03088	0.023688	10.42
WB	2010	0.259	8.68207	0.13772	0.1057	0.028	0.073967	0.21437	0.03648	0.033078	12.89
WB	2011	0.19137	8.9523	0.14668	0.114	0.181	0.079534	0.25381	0.0277	0.034038	16.1
WB	2012	0.22905	9.08101	0.15928	0.087	0.341	0.097555	0.2467	0.02331	0.036077	17.3
WB	2013	0.16002	9.20811	0.14181	0.099	0.135	0.097036	0.15308	0.01859	0.022781	18.3
WB	2014	0.13365	9.38231	0.14933	0.103	0.081	0.110023	0.07618	0.01441	0.018145	19.1
WB	2015	0.14704	9.57226	0.13701	0.104	0.077	0.105516	0.35317	0.01223	0.021444	20.1
WB	2016	0.12106	9.75672	0.13964	0.08	0.097	0.103331	0.24406	0.013	0.021436	21.1
WB	2017	0.10396	9.9944	0.13228	0.109	0.072	0.103331	0.4056	0.01246	0.019693	22.4
WB	2018	0.16002	9.38231	0.13701	0.104	0.081	0.097036	0.07618	0.01441	0.036077	26.2
UB	2000	0.34241	6.24222	0.09728	0.034	0.054	0.061703	0.33674	0.02672	0.006818	8.14
UB	2001	0.28645	6.36819	0.09949	0.074	0.003	0.072603	0.31298	0.04361	0.010939	8.33
UB	2002	0.25232	6.4708	0.09907	0.016	0.106	0.064613	0.18023	0.04926	0.009764	8.54
UB	2003	0.29134	6.7901	0.10461	-0.021	0.109	0.049407	0.4064	0.05079	0.014332	8.58
UB	2004	0.27544	7.03878	0.11316	0.117	0.073	0.068883	0.29247	0.05827	0.031543	8.63
UB	2005	0.3453	7.38771	0.11139	0.126	0.061	0.06276	0.35772	0.0509	0.034833	8.6518
UB	2006	0.21514	7.72268	0.11288	0.115	0.106	0.055645	0.58982	0.04834	0.036645	8.681
UB	2007	0.28535	8.15479	0.14799	0.118	0.158	0.065652	0.35279	0.04408	0.039031	8.7943
UB	2008	0.23238	8.32479	0.18044	0.112	0.253	0.071287	0.08899	0.05917	0.036513	9.24
UB	2009	0.19984	8.54058	0.19871	0.1	0.364	0.088175	-0.0999	0.0609	0.039084	10.42
UB	2010	0.26118	8.65555	0.22206	0.1057	0.028	0.080637	0.17113	0.03971	0.04113	12.89
UB	2011	0.27545	8.9948	0.20601	0.114	0.181	0.091377	0.17631	0.04542	0.046842	16.1
UB	2012	0.26506	9.02968	0.23246	0.087	0.341	0.099573	0.2253	0.02432	0.040985	17.3
UB	2013	0.17013	9.24896	0.20914	0.099	0.135	0.101996	0.31536	0.0224	0.036638	18.3
UB	2014	0.12214	9.32746	0.21784	0.103	0.081	0.115851	-0.0183	0.0167	0.028184	19.1
UB	2015	0.07908	9.52598	0.20179	0.104	0.077	0.111086	0.31872	0.01662	0.028248	20.1
UB	2016	0.12281	9.6921	0.19651	0.08	0.097	0.105519	0.23622	0.01653	0.025124	21.1
UB	2017	0.09648	9.9499	0.1744	0.109	0.072	0.105519	0.3635	0.0139	0.02866	22.4
UB	2018	0.12214	9.24896	0.21784	0.104	0.135	0.088175	0.17113	0.04542	0.046842	26.2

NIB	2000	0.10361	5.0626	0.25317	0.034	0.054	0.038027	0	0	0.012658	26.2
NIB	2001	0.14276	5.81711	0.18452	0.074	-	0.066438	2.55932	0	0.048583	26.2
NIB	2002	0.30337	6.2804	0.18539	0.016	-	0.060521	0.54286	0.01235	0.029885	26.2
NIB	2003	0.23051	6.78559	0.14124	-0.021	0.109	0.048565	0.69753	0.04	0.018323	26.2
NIB	2004	0.29118	7.1285	0.13873	0.117	0.073	0.053218	0.42909	0.03817	0.032833	26.2
NIB	2005	0.21132	7.45703	0.12933	0.126	0.061	0.053633	0.44148	0.04148	0.030883	26.2
NIB	2006	0.25122	7.61431	0.1406	0.115	0.106	0.049815	0.30185	0.03864	0.030859	26.2
NIB	2007	0.23056	7.86596	0.17146	0.118	0.158	0.05855	0.23186	0.03412	0.032801	26.2
NIB	2008	0.16783	8.20251	0.17279	0.112	0.253	0.074156	0.16335	0.03786	0.036132	26.2
NIB	2009	0.29716	8.47773	0.16078	0.1	0.364	0.091429	0.05037	0.04605	0.036341	26.2
NIB	2010	0.24948	8.69459	0.1632	0.1057	0.028	0.082847	0.14676	0.039	0.037281	26.2
NIB	2011	0.27546	8.86947	0.17339	0.114	0.181	0.097162	0.08656	0.04124	0.037675	26.2
NIB	2012	0.25928	9.02108	0.19336	0.087	0.341	0.0909	0.34064	0.02712	0.037204	26.2
NIB	2013	0.19147	9.12091	0.19151	0.099	0.135	0.097792	0.22489	0.02502	0.03437	26.2
NIB	2014	0.18251	9.28241	0.18862	0.103	0.081	0.082158	0.19035	0.02096	0.029899	26.2
NIB	2015	0.156	9.49222	0.17066	0.104	0.077	0.098074	0.27485	0.01502	0.028086	26.2
NIB	2016	0.18259	9.66969	0.16686	0.08	0.097	0.120318	0.08963	0.01767	0.026802	26.2
NIB	2017	0.15614	9.95322	0.14054	0.109	0.072	0.120318	0.4259	0.01654	0.028029	26.2
NIB	2018	0.156	9.49222	0.19151	0.103	0.081	0.097792	0.27485	0.01767	0.029899	26.2

## Appendix 2 - Heteroskedasticity Test: Breusch-Pagan- odfrey

Residual Cross-Section Dependence Test

Null hypothesis: No cross-section dependence (correlation) in residuals

Equation: Untitled

Periods included: 19

Cross-sections included: 7

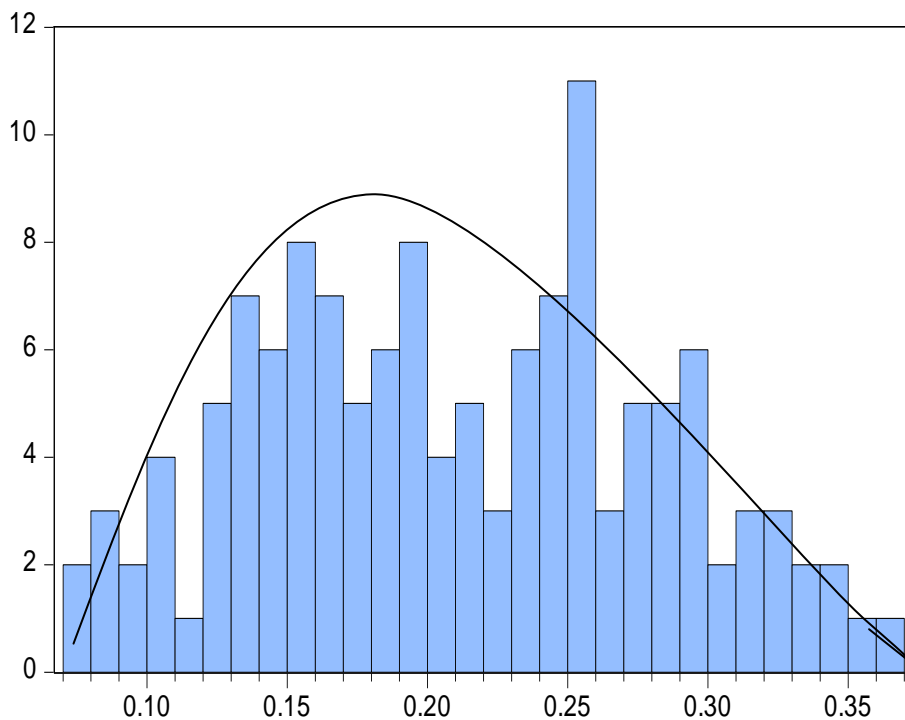
Total panel observations: 133

Note: non-zero cross-section means detected in data

Cross-section means were removed during computation of correlations

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	32.57725	21	0.0511
Pesaran scaled LM	0.706285		0.4800
Pesaran CD	2.274592		0.0229

## Appendix 3- normality test



Series: LIQ	
Sample 2000 2018	
Observations 133	
Mean	0.210132
Median	0.203611
Maximum	0.360534
Minimum	0.079075
Std. Dev.	0.070125
Skewness	0.110372
Kurtosis	2.094797
Jarque-Bera Probability	4.810828
	0.090228

## Appendix 4 –MULTI COLENARITY

	LIQ	NPL	USD_BIR R1	LG	IRS	INF	GDP	CAR	ASZ	AQ
LIQ	1.000000	0.486309	-0.466130	-0.068033	-0.456013	-0.102347	-0.304572	-0.065263	-0.608167	-0.176291
NPL	0.486309	1.000000	-0.398616	-0.280387	-0.358267	0.203710	0.068272	-0.438593	-0.159679	-0.171716
USD_BIR R1	-0.466130	-0.398616	1.000000	-0.060073	0.588550	0.064989	0.195634	0.283749	0.540583	0.276460
LG	-0.068033	-0.280387	-0.060073	1.000000	-0.233675	-0.257570	-0.186879	0.094745	-0.380578	0.169964
IRS	-0.456013	-0.358267	0.588550	-0.233675	1.000000	0.205365	0.316310	0.268146	0.755912	0.293256
INF	-0.102347	0.203710	0.064989	-0.257570	0.205365	1.000000	0.305343	0.028058	0.348022	0.334615
GDP	-0.304572	0.068272	0.195634	-0.186879	0.316310	0.305343	1.000000	-0.057808	0.506736	0.563631
CAR	-0.065263	-0.438593	0.283749	0.094745	0.268146	0.028058	-0.057808	1.000000	-0.100967	0.292521
ASZ	-0.608167	-0.159679	0.540583	-0.380578	0.755912	0.348022	0.506736	-0.100967	1.000000	0.341951
AQ	-0.176291	-0.171716	0.276460	0.169964	0.293256	0.334615	0.563631	0.292521	0.341951	1.000000

## Appendix 5: analysis regression

Dependent Variable: LIQ  
Method: Panel Least Squares  
Date: 03/27/20 Time: 05:48  
Sample: 2000 2018  
Periods included: 19  
Cross-sections included: 7  
Total panel (balanced) observations: 133

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.455742	0.049349	9.235024	0.0000
NPL	-1.968780	0.320312	6.146434	0.0000
USD_BIRR1	-0.001414	0.001255	-1.126478	0.2623
LG	-0.065367	0.013742	-4.756753	0.0000
IRS	1.335719	0.360757	3.702548	0.0003
INF	-0.071549	0.039850	-1.795444	0.0752
GDP	-0.492401	0.138241	-3.561890	0.0005
CAR	-0.236269	0.134213	-1.760408	0.0810
ASZ	-0.043000	0.007619	-5.643993	0.0000
AQ	2.785548	0.623887	4.464826	0.0000

### Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.704541	Mean dependent var	0.210132
Adjusted R-squared	0.666662	S.D. dependent var	0.070125
S.E. of regression	0.040487	Akaike info criterion	-3.463255
Sum squared resid	0.191784	Schwarz criterion	-3.115544
Log likelihood	246.3065	Hannan-Quinn criter.	-3.321959
F-statistic	18.59964	Durbin-Watson stat	1.696623
Prob(F-statistic)	0.000000		

## Appendix 6 - List of Commercial Bank in Ethiopia

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