Determining Factors of Liquidity of Private Commercial Banks in Ethiopia

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

Wolkite University

We Strive for Wisdom!

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June, 2019

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Declaration

I certify that the ideas contained in this study are entirely my own, except where otherwise acknowledged. I also certify that the work is original and has not been submitted for any other award at any university.

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Abstract

This study intended to examine the determinants of Liquidity in Private Commercial Banks in Ethiopia. In view of that, this study determined the bank-specific and macro-economic factors affecting bank liquidity for Six Private commercial banks in Ethiopia, covering the period of 2000-2017 by using balanced fixed effect panel regression. The findings of the study showed that capital adequacy, and inflation had statistically significant and positive relationship with banks' liquidity. Bank size had a negative and statistically significant impact on Private Commercial banks .Loan growth had positive and statistically insignificant impact on Private Commercial banks. GDP growth rate has statistically insignificant and positive influence on the liquidity of private commercial Banks. Inflation had positive and significant impact on banks liquidity. On the other hand, the results of the study profitability were quite surprising. The result is conflicting with researcher's expectations and also a finance theory which emphasizes the negative correlation of liquidity and profitability. Moreover, the coefficient of profitability was not statistically significant, implying that its Influence is insignificant. This positive relation shows that, higher profitability leads to increase banks liquidity. Conclusion about the impact of Ethiopian bank's profitability on liquidity remains ambiguous and additional investigation is required. The researcher recommended that to maintain adequate system for managing liquidity of private commercial banks in Ethiopia.

Key words: determinants of liquidity, Ethiopian Private commercial banks, Panel Regression model.

Acknowledgements

Successful completion of this research work is the result of supports and guidance I received from many people. But foremost, I thank the almighty God for His blessings with health, the energy and the endurance required to undertake this demanding job with determination. His support has been infinite in my entire life success. My profound gratitude and appreciation go to my advisors, Dr. Deresse Mersha and Mr. Idris Ali. For their intellectual stimulation and continuous support rendered to me throughout the entire research process. Their comments at various stages of the research process were instrumental in greatly improving the quality of my work.

I am indebted to my employer organization, the World Vision Ethiopia, for their understanding and flexibility throughout my study period.

Finally, I would like to thank my family particularly, my mother, for her support and all the people who have devoted their precious time and expertise, and lent me their hands at all steps of the preparation of this study and all my best friends who are highly supportive. The cumulative result is supports I received from them have enabled me to bring this research work to final Fruition.

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List of Acronyms

AB: Awash Bank

BCBS: Basel Committee on Banking Supervisions

BIS: Bank for International Settlement

BOA: Bank of Abyssinia

CA: Capital adequacy

CBRC: China Banking Regulatory Commission

CC: Correlation Coefficient

CLRM: Classical Linear Regression Model

DB: Dashen Bank

FEM: Fixed Effect Model

FSA: Financial service authority

GDP: Gross domestic Product

GOV: Government of Ethiopia

GNP: Gross National Product

HQLA: High quality liquid asset

ILG: Individual liquidity guidance

INF: General Inflation Rate

LG: Loan growth

LOLR: Lender of last resort

MoFEC: Ministry of Finance and Economic Cooperative

NBE: National Bank of Ethiopia

NIB: Nib international Bank

REM: Random Effect Model

ROA: Return on Assets

ROE: Return on equity

UB: United Bank

UK: United Kingdom

US: United States

WB: Wogagen Bank

ZB: Zemen Bank

Chapter One-Introduction

1.1 Background of the study

Banks play a central role in all modern financial systems. To perform it effectively, banks must be safe and be perceived as such. The single most important assurance is for the economic value of a bank's assets to be worth significantly more than the liabilities that it owes. The difference represents a cushion of "capital" that is available to cover losses of any kind. However, the recent financial crisis underlined the importance of a second type of buffer, the "liquidity" that banks have to cover unexpected cash outflows. A bank can be solvent, holding assets exceeding its liabilities on an economic and accounting basis, and still die a sudden death if its depositors and other funders lose confidence in the institution.

Liquidity management is a concept that is receiving serious attention all over the world especially with the current financial situations and the state of the world economy. Some of the striking corporate goals include the need to maximize profit, maintain high level of liquidity in order to guarantee safety, attain the highest level of owner's net worth coupled with the attainment of other corporate objectives. (Sunny *Obilor 2013).* The importance of liquidity management as it affects corporate profitability in today's business cannot be over emphasized. The crucial part in managing working capital is required maintenance of its liquidity in day-to-day operation to ensure its smooth running and meets its obligation (Eljelly, 2004).

Liquidity plays a significant role in the successful functioning of a business firm. A firm should ensure that it does not suffer from lack-of or excess liquidity to meet its short-term compulsions. A study of liquidity is of major importance to both the internal and the external analysts because of its close relationship with day-to-day operations of a business (Bhunia, 2012).

The whole banking system is particularly reliant on the satisfactory degree of liquidity because if a single bank registers the liquidity crisis it will affect the whole financial institutions framework through the contagion effect (mainly because of interbank dependencies) and may ultimately raise the level of systemic risk. Different approaches are used to raise the liquidity such as asset management, debt management and commonly the mixture of these two. Hence, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans.

Therefore, banks have to hold optimal level of liquidity that can maximize their profit and enable them to meet their obligation. This chapter consists eight sections that include: back grounds of the study, statement of the problem, the overall purpose of the study, research hypotheses, scope of the research, limitations of the study, significance of the study and organization of the study. Therefore, this paper aimed to identify and analyze those factors affecting private commercial banks liquidity in Ethiopia.

1.2 Statement of the Problem

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

Some banks have strategy to hold excessive liquidity as a signal to the market that they have strong liquidity resilience. Nonetheless, excessive liquidity in a bank infers that the bank might have bad liquidity management and indicates that it does not have optimal asset liability management. In addition, banks hold excessive liquidity as consequences of weak infrastructure in financial market. This among others includes limited instruments, payment system hurdle, and segmentation in interbank market. Di Giorgia (1999) considered that financial system development is reflected in the cost of participation in the financial system. The lower the cost of participation, the more efficient the infrastructure in the financial system is. In industrial and developed countries, the cost of information processing, project evaluation and debtor monitoring are relatively small. This favorable condition contributes to an efficient liquidity management as liquidity reserve could be suppressed to a minimum level. In contrast, countries with unfavorable condition and limited infrastructure in the financial system, inclines to complicate liquidity management of banks. In such a circumstance,

banks have a propensity to hold higher liquidity reserve than required.

Commercial banks may experience excess or shortage of liquidity. Liquidity excess is preferred by all depository institutions, but is it a good position, Lamoo and Casey (2005) argued that excess liquidity can have damaging consequences for financial stability by leading to speculative feedback loops such as momentum trading. Hence because of the liquidity destabilization property, it needs to be constrained or harnessed. Liquidity can be "too much of a good thing". In this case depository institution management may be tempted to put a fair amount of that liquidity to good work by converting liquid assets into riskier, less liquid assets that yield higher returns. Thus assets that are liquid today are not necessarily going to be liquid on the date that the institution management expects them to be liquid. On the other hand, liquid shortage is a threat to institutions. Liquidity shortages lead to liquidity risk and have contagion effect. Liquidity risk arises when an unexpected deposit withdrawal or a loan demand occurs. Banks like any other business, cannot make enough money without taking on risk. Risk-taking, may lead to bank failure, is therefore an essential part of the game Different measures have been developed focusing on the sources of liquidity risk; that is on the liability side, asset side and off-balance sheet operations. Moore (2009) pointed out that one can measure liquidity by stock approach or flow approach. The stock approach focuses on the asset and liability sides of the balance sheet employing ratios to identify liquidity trends. The flow approach focuses on comparing the variability in bank's inflows and outflows to determine the amount of reserves that are needed during a period.

In fact, the banking sector in Ethiopia currently acts as the link that holds the country's economy together. Hence, keeping their optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers. Studies made by Worku (2006) and Semu (2010), indicated the presence of excess liquidity held by commercial banks in Ethiopia. Studies made by Tseganesh (2012) focuses on bank specific and some macroeconomic factors affecting liquidity and concluded that the impact of banks liquidity on financial performance was non-linear (positive and negative). But to the knowledge of the researcher the empirical studies on the area of factors affecting private commercial bank liquidity that incorporate regulatory factors with that of bank specific and macro-economic factors of private commercial banks was not done. Therefore, this study aimed to contribute to the current literature by providing some evidence on the factors that contributes to the liquidity of private commercial banks through analyzing significant factors affecting liquidity.

1.3 Objective of the Study

1.3.1 General Objective

The general purpose of the study was to determine factors of Liquidity on private Commercial banks in Ethiopia.

1.3.2 Specific Objectives

The study attempted to achieve the following specific objectives:

- To Examine the relationship between capital adequacy and bank liquidity
- To investigate the relationship between Bank size and banks liquidity
- To determine the relationship between Loan growth and banks liquidity
- To examine the relationship between GDP growth and banks liquidity
- To Investigate the relationship between Inflation rate and banks liquidity
- To examine the relationship between Profitability and banks liquidity

1.4 Research Hypotheses

The following six research hypotheses were formulated based on the objectives of the study regarding the determining factors of liquidity of private commercial banks in Ethiopia.

H1: Capital adequacy has positive and significant bank liquidity

H2: Bank size has positive and significant impact on banks liquidity

H3: Loan growth has negative and significant impact on banks liquidity

H4: GDP growth rate has Negative and significant impact on banks liquidity

H5: Inflation rate has positive and significant impact on banks liquidity

H6: Profitability has negative and significant impact on banks liquidity

1.5 Significance of the study

This study had ultimate significance to show the degree of the bank-specific, regulatory factor and macroeconomic determinants of liquidity in what extent it affects the Liquidity of the private commercial banks. The study expected to have great contribution to the existing knowledge in the area of factors determining commercial banks liquidity in the context of Ethiopia. This in turn contributes to the well-being of the financial sector of the economy and the society as a whole. Therefore, the major beneficiaries from this study were each private commercial banks regulatory bodies, the academic staff of the country and the society as a whole in the country.

1.6 Scope and limitation of the study

1.6.1 Scope of the Study

There were various types of financial institutions operating under various sector of economy but, this study concentrated on the private commercial banks in Ethiopia excluding public banks and microfinance. Furthermore, this study limited its coverage on determinants of private commercial banks liquidity for the past eighteen years, that is, from 2000 to 2017 for six private commercial banks.

1.6.2 Limitation of the Study

In the study due to time constraint to compile the data, more of financial related variables were considered than that of non-financial measure variables and it may have a little influence and might need further investigation. The study would have the limitation on obtaining the adequate information and available material or information on key off balance sheet determinants that may significantly affect Commercial Bank liquidity like the impact of the latest financial crisis, unemployment rate, Government influence etc.

1.7 Organization of the thesis

This thesis consists of five chapters. Chapter one is the introduction part which contains background to the study, statement of the problem, research objectives, research hypotheses, significance of the study, scope and limitation of the study, and organization of the thesis. In chapter two, a discussion of theoretical review, empirical review and gaps in the literature are included. Chapter three outlined the methodology used to implement the research project. This chapter presents the research strategies followed, justification, and research design, sampling techniques, sample size, data collection method/instruments and methods of data analysis. Chapter four reports the analysis, discussions and presentation part of the research findings. In the final chapter, major findings were outlined; synthesis made and summarized in the form of conclusion, and recommendations forwarded.

Chapter Two –Literature Review

Under this chapter the theoretical and empirical evidences, focusing on liquidity of private commercial banks, are presented. Section 2.1 Overview of Banking Environment in Ethiopia, Section 2.2 discusses about the theoretical aspects of banks liquidity, Section 2.3 bank liquidity and its measuring, Section 2.4 the determinants of liquidity investigated by the study and in section 2.5, extensively explains impact of liquidity regulation. Then, section 2.6 accesses related empirical studies in Ethiopia. Finally, section 2.7 give summaries to the chapter and briefly discusses knowledge gap in the relevant literatures.

2.1 Theoretical Review

2.1.1 Overview of Banking Environment in Ethiopia

Modern banking in Ethiopia started in 1905 with the establishment of Bank of Abyssinia, which was based on a fifty-year franchise given to the British owned National Bank of Egypt. It has landmark significance in introducing financial services, which were previously unknown in the country (Alemayehu, 2006). A significance feature of commercial banking in Ethiopia then was its innovative nature rather than its contribution to growth and its competitive nature. As the society was new for the banking service, banks had faced difficulty in familiarizing the public and they faced considerable cost of installation.

In 1931, Emperor Haile Silassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking services until the Italian invasion of 1936. During the Italian invasion, Bank of Italy was formed a legal tender in Ethiopia. In 1943, after Ethiopia regains its independence from fascist Italy, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed. In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution.

In the pre-1974 era, the banking industry was dominated largely by a single government owned bank, State Bank of Ethiopia. Despite the efforts made to free banking from foreign control and to make the institution responsible to Ethiopia's credit needs, these developments did not bring about meaningful competitive environment, as banking industry was characterized by specialization and low level of

business. The establishment of privately owned Addis Ababa Bank in 1964 and its growing branch network created relatively better banking service among commercial banks, with concentration of their branch offices in big towns and trade routes in the Country. The then monetary and banking system gave at most emphasis to stability and balanced growth of the economy.

During the Derge regime, there was one commercial bank, whose overriding objective was to accelerate development so as to improve the standard of living of the broad masses rather than maximization of profit. The change of government in 1991 and the consequent changes in economic policy witnessed another transformation in the banking industry. Monetary and Banking Proclamation of 1994 established the National Bank of Ethiopia as a judicial entity, separated from the government and outlined its main functions. Monetary and Banking proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 laid down the legal basis for participation of the private sector in banking business, which had been completely prohibited during the Derge regime. Shortly, Monetary and Banking proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 laid down the legal basis for investment in the banking sector. Consequently, shortly after the proclamation the first private bank, Awash International Bank was established in 1994 by 486 shareholders and by 1998 the authorized capital of the Bank reached Birr 50.0 million. Dashen Bank was established on September 20,1995 as a share company with an authorized and subscribed capital of Birr 50.0 million. 131 shareholders with subscribed and authorized capital of 25.0 million and 50 million founded bank of Abyssinia. Wogagen Bank with an authorized capital of Birr 60.0 million started operation in 1997. The fifth private bank, United Bank was established on 10th September 1998 by 335 shareholders and with the authorized capital of the 50.0 Million. Nib International Bank that started operation on May 26, 1999 with an authorized capital of Birr 150.0 million. Cooperative Bank of Oromia was established on October 29, 2004 with an authorized capital of Birr 22.0 million. Lion International Bank with an authorized capital of Birr 108 million started operation in October 02, 2006. Zemen Bank that started operation on June 17, 2008 with an authorized capital of Birr 87 million. Oromia International Bank that started operation on September 18, 2008 with an authorized capital of Birr 91 million between the year 2009 to 2013 six private commercial banks enter in the industry that is in 2009 Buna International bank, by 2010 Abay Bank and Berehan International bank, Addis international bank in 2011 and Debub Global Bank in 2012. The last bank to be established to date was Enat Bank which started operation in year 2013.

Strategy for financial development was characterized by gradualism and maintaining macroeconomic stability (Addison and Alemayehu, 2001). The Ethiopian financial sector consists mainly of banks (1public and 16 private), insurance companies (one public and 13 private) and micro-finance institutions (31). The banking system accounts for about 80% of total assets of the financial sector, following a significant capital injection by private banks mainly Dashen Bank, Bank of Abyssinia, United Bank, Awash International Bank, Nib International Bank, Wogagen Bank and Cooperative Bank of Oromia, the total capital of the banking industry increased by 13.2 percent and reached Birr 26.4 billion by the end of June 2015. As a result, the share of private banks in total capital surged to 55.3 percent from 48.4 percent last year. Currently, private banks account for 45.4% of bank branches (2208), 44.8% of total capital, 68.5% of total deposits and 68.11% of outstanding loans of banks, although the decline in dominance with the after opening up to the private sector of private banks (NBE Annual Report 2016)

2.2 Theories of Bank Liquidity

According to the modern theory of financial intermediation, an important role of banks in the economy is to create liquidity by funding illiquid loans with liquid demand deposits (e.g. Diamond 1984, Rama Krishnan and Thakor 1984). More generally, banks create liquidity on the balance sheet by transforming fewer liquid assets into more liquid liabilities. Kashyap, Rajan, and Stein (2002) suggest that banks may also create significant liquidity off the balance sheet through loan commitments and similar claims to liquid funds.

Formal models of banks as liquidity creators in this sense were developed by Bryant (1980) and Diamond and Dybvig (1983). In those models, depositors can suffer interim liquidity shocks, so being able to hold liquid (demand) deposit claims improves welfare. In Diamond and Dybvig (1983), this liquidity creation exposes banks to withdrawal risk. Fear that other depositors may rush in to withdraw their deposits prematurely even though they may not have liquidity needs can cause all depositors to withdraw, precipitating a bank run as one of two possible equilibrium. It is impossible for the bank to "provision" for such an event, short of practicing 100% reserve banking, i.e., keeping all deposits as cash in vault. But such an institution would be merely a safe-deposit box, rather than a bank that creates liquidity. Diamond and Dybvig (1983) argue that federal deposit insurance can eliminate bank runs, thereby ridding banks of the prospect of the large-scale deposit withdrawals that characterize such runs.

The major objective of a commercial bank is to create liquidity while remaining financially sound. However, there are a number of dimensions in the way banks concretely manage their liquidity risk. In plain words, there are competing liquidity management theories (Alton & Hazen 2001). Liquidity management theories encompass where it is exactly performed in the organization, how liquidity is measured and monitored, and the measures that banks can take to prevent or tackle a liquidity shortage. These competing theories include:

2.2.1 The Need for Liquidity

According to Anyanwu (1993) liquidity simply means the ability to convert an asset to cash with minimum delay and minimum loss/cost. In the portfolio of commercial banks, liquid assets play a very crucial role because banks operate largely with the funds borrowed from depositors in form of demand and time deposits. These liquidity assets are the essential balance sheet items which have the capacity to maintain the confidence of depositors which is the most valuable intangible asset of the commercial banking business (Spindt, 1980).

According to Nwankwo (1991), adequate liquidity enables a bank to meet three risks. First is the funding risk – the ability to replace net outflows either through withdrawals of retail deposits or nonrenewal of wholesale funds. Secondly, adequate liquidity is needed to enable the bank to compensate for the non-receipt of inflow of funds if the borrower or borrowers fail to meet their commitments. The third risk arises from calls to honor maturity obligations or from request for funds from important customers.

Adequate liquidity enables the bank to find new funds to honor the maturity obligations such as a sudden upsurge in borrowing under atomic or agreed lines of credit or to be able to undertake new lending when desirable. For instance, a request from a highly valued customer. Adequate liquidity is also needed to avoid forced sale of asset at unfavorable market conditions and at heavy loss. Adequate liquidity serves as vehicle for profitable operations specially to sustain confidence of depositors in meeting short run obligations. Finally, adequate liquidity guides against involuntary or non-voluntary borrowing from the regulatory authorities where there is a serious liquidity crisis, the bank is placed at the mercy of the Central Bank, and hence the control of its destiny may be handed over. Having adequate or sufficient liquidity to meet all commitments at all times at normal market rates of interest is indispensable for both large and small banks (Nwankwo, 1991). Liquidity is the life blood of a banking setup.

2.2.2 Anticipated Income Theory

This theory holds that a bank's liquidity can be managed through the proper phasing and structuring of the loan commitments made by a bank to the customers. Here the liquidity can be planned if the scheduled loan payments by a customer are based on the future of the borrower. According to Nzotta (1997) the theory emphasizes the earning potential and the credit worthiness of a borrower as the ultimate guarantee for ensuring adequate liquidity. Nwankwo (1991) posits that the theory points to the movement towards self-liquidating commitments by banks. This theory has encouraged many commercial banks to adopt a ladder effects in investment portfolio.

2.2.3 Keynes -Liquidity preference Theory

As cited by Berihun B (2015) the economics and finance literature analyze possible reasons for firms to hold liquid assets. Keynes (1936) identified three motives on why people demand and prefer liquidity. The transaction motive, here firms hold cash in order to satisfy the cash inflow and cash outflow needs that they have. Cash is held to carry out transactions and demand for liquidity is for transactional motive. The demand for cash is affected by the size of the income, time gaps between the receipts of the income, and the spending patterns of the cash available. The precautionary motive of holding cash serves as an emergency fund for a firm. If expected cash inflows are not received as expected cash held on a precautionary basis could be used to satisfy short-term obligations that the cash inflow may have been bench marked for. Speculative reason for holding cash is creating the ability for a firm to take advantage of special opportunities that if acted upon quickly will favor the firm.

2.2.4 Shift-ability Theory

According to Dodds (1982) this theory hypothesize that a bank's liquidity is maintained if it holds assets that could be shifted or sold to other lenders or investors for cash. This point of view contends that a bank's liquidity could be enhanced if it always has assets to sell and provided the Central Bank and the discount Market stands ready to purchase the asset offered for discount. Thus, this theory recognizes and contends that shift-ability, marketability or transferability of a bank's assets is a basis for ensuring liquidity. This theory further contends that highly marketable security held by a bank is an excellent source of liquidity. Dodds (1982) contends that to ensure convertibility without delay and appreciable loss, such assets must meet three requisites. Liability Management Theory, Liquidity management theory according to Dodds (1982) consists of the activities involved in obtaining funds

from depositors and other creditors (from the market especially) and determining the appropriate mix of funds for a particularly bank.

According to Nwankwo (1991) the theory argues that since banks can buy all the funds they need, there is no need to store liquidity on the asset side (liquidity asset) of the balance sheet. Liquidity theory has been subjected to critical review by various authors. The general consensus is that during the period of distress, a bank may find it difficult to obtain the desired liquidity since the confidence of the market may have seriously affected and credit worthiness would invariably be lacking. However, for a healthy bank, the liabilities (deposits, market funds and other creditors) constitute an important source of liquidity.

2.2.5 Financial Intermediation Theory

According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long term, illiquid assets with short term, liquid liabilities (Wang, 2002). Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Krueger (2002) emphasize the "preference for liquidity" under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets. However, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. More generally, the higher is liquidity creation to the external public, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers (Horne and Wachowicz, 2000).

2.2.6 Commercial Loan Theory

This theory has been subjected to various criticisms by Dodds (1982) and Nwankwo (1992). From the various points of view, the major limitation is that the theory is inconsistent with the demands of economic development especially for developing countries since it excludes long term loans which are the engine of growth. The theory also emphasizes the maturity structure of bank assets (loan and investments) and not necessarily the marketability or the shift-ability of the assets. Also, the theory assumes that repayment from the self-liquidating assets of the bank would be sufficient to provide for liquidity. This ignores the fact that seasonal deposit withdrawals and meeting credit request could affect the liquidity position adversely. Moreover, the theory fails to reflect in the normal stability of demand deposits in the liquidity consideration.

This obvious view may eventually impact on the liquidity position of the bank. Also, the theory assumes that repayment from the self-liquidating assets of a bank would be sufficient to provide for liquidity. This ignores the fact that seasonal deposit withdrawals and meeting credit request could affect the liquidity position adversely.

2.3 Bank Liquidity and its Measures

Bank for International Settlements defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans. The term liquidity risk includes two types of risk: funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that a bank cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption.

Liquidity risk can be measured by two main methods: liquidity gap and liquidity ratios. The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit. Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets that can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions.

As cited in (Vodova, P. 2011) Various authors like Moore (2010), Rychtárik (2009), or Praet and Herzberg (2008) provide various 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.

L1 this liquidity ratio L1 should give us information about the general liquidity shock absorption capacity of a bank. As a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock. Nevertheless, high value of this ratio may be also interpreted as

inefficiency, since liquid assets yield lower income liquidity bears high opportunity costs for the bank. Thus, it is necessary to optimize the relation between liquidity and profitability (Vodova, P. 2011).

The liquidity ratio *L2* is more focused on the bank's sensitivity to selected types of funding (we included deposits of households, enterprises and other financial institutions). The ratio *L2* should therefore capture the bank's vulnerability related to these funding sources. The bank is able to meet its obligations in terms of funding (the volume of liquid assets is high enough to cover volatile funding) if the value of this ratio is 100 % or more. Lower value indicates a bank's increased sensitivity related to deposit withdrawals (Vodova, P. 2011).

The ratio *L3* measures the share of loans in total assets. It indicates what percentage of the assets of the bank is tied up in illiquid loans. Therefore, the higher this ratio the less liquid the bank is (Vodova, P. 2011). The last liquidity ratio *L4* relates illiquid assets with liquid liabilities. Its interpretation is the same as in case of ratio *L3*: the higher this ratio the less liquid the bank is (Vodova, P. 2011).

2.4 Determinants of Bank Liquidity

Different literature explains different determinants that can be employed by banks. Liquidity determinants can be divided into three classes which are; micro-economic, macro-economic and financial variables. According to Gunsel (2008), micro-economic approach uses financial ratios that are in the context of CAMELS (C-Capital Adequacy, A-Asset Quality, M-Management Efficiency, E-Earnings, L-Liquidity and S-Asset Size) theory. The micro-economic variables are bank-specific variables which are; capital, assets, deposits, and loans. Micro-level approach focuses on individual institution's balance sheet and those variables are the main causes of bank failure. Moore (2009) investigated liquidity determinants in Latin America and Caribbean countries. The determinants include cash demands and bank rate. Some authors such as, Aspachs *et al* (2005), Bunda and Desquilbert (2008) and Lucchetta (2007) identified the following liquidity determinants; interbank rate, exchange rate, loan growth, bank's total asset size, central bank bailout and business cycle.

The macro-economic variable broadly focuses on the state of the economy. The liquidity position of a bank is very sensitive to macro-economic variable fluctuations. This has been echoed by Eichengreen and Arteta (2000), Hutchison and McDill (1999) and Hardy and Pazarbasioglu (1998). The increasing inflation, decline in asset prices, high interest rates, credit expansion, real gross domestic product growth determine the bank's liquidity position. High inflation rate and sudden changes of inflation

have a negative impact on interest rates and bank's capital. In this respect, the bank's non-performing loans will expand and collateral security values deteriorate. It has been found that inflation rate significantly determines bank liquidity (Heffernan; 2005 and Bessis; 2002). Unanticipated rise in interest rates can lead to liquidity crunch as result of decrease in cash flows. Interest rate would signal an impending liquidity crises and compound credit risk. Yilmaz (2003) and Vodov'a (2011) indicate that interest rate significantly determines liqudity. In addition, the country's real gross domestic product growth rate and unemployment rate influence the financial institution's liquidity levels. We cannot exclusively classify financial variables since some fall in micro-economic and others in macro-economic variables. Therefore, the determinants of banks liquidity can be grouped as micro-economic variables encroach to financial variables such as liquid assets, total assets, capital, return on equity and loans and macro-economic variable

2.4.1 Bank Size and Liquidity

(Vento and Ganga, 2009), Large banks would benefit from the decrease cost of funding and allows them to invest in riskier assets through implicit guarantee, Therefore, “too big to fail” status of large banks could lead to moral hazard behavior and excessive risk exposure. According to the “too big to fail” argument, large banks would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannotta et al. 2007). Therefore, “too big to fail” status of large banks could lead to moral hazard behavior and excessive risk exposure. If big banks are seeing themselves as “too big to fail”, their motivation to hold liquid assets is limited. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort. Thus, large banks are likely to perform higher levels of liquidity creation that exposes them to losses associated with having to sale illiquid assets to satisfy the liquidity demands of customers (Kiyotaki and Moore, 2008). Hence, there can be positive relationship between bank size and illiquidity. However, since small banks are likely to be focused on traditional intermediation activities and transformation activities (Lynch, 2007). They do have small amount of liquidity. Hence, there can be negative relationship between bank size and illiquidity (Sharma & Iselin, 2006).

2.4.2 Capital adequacy and bank liquidity

The theoretical literature produces opposing predictions on the link between capital and liquidity creation. One set of theories – which we refer to collectively as the “financial fragility-crowding out” hypothesis – predicts that higher capital reduces liquidity creation. Diamond and Rajan (2000, 2001)

focus on financial fragility. They model a relationship bank that raises funds from investors to provide financing to an entrepreneur. The entrepreneur may withhold effort, which reduces the amount of bank financing attainable. More importantly, the bank may also withhold effort, which limits the bank's ability to raise financing. A deposit contract mitigates the bank's holdup problem – because depositors can run on the bank if the bank threatens to withhold effort – and therefore maximizes liquidity creation. Providers of capital cannot run on the bank, which limits their willingness to provide funds, and hence reduces liquidity creation. Thus, the higher a bank's capital ratio, the less liquidity it will create. Gorton and Winton (2000) show how a higher capital ratio may reduce liquidity creation through the crowding out of deposits. They argue that deposits are more effective liquidity hedges for investors than investments in equity capital. Thus, higher capital ratios shift investors' funds from relatively liquid deposits to relatively illiquid bank capital, reducing overall liquidity for investors.

Under the alternative "risk absorption" hypothesis, higher capital enhances banks' ability to create liquidity. This insight is based on two strands of the literature. One strand consists of papers (e.g., Diamond and Dybvig 1983, Allen and Santomero 1998, Allen and Gale 2004) By contrast, bank capital is not eligible and with a stochastic value that depends on the state of bank fundamentals and on the liquidity of the stock exchange. Consequently, higher capital ratios shift investors‟ funds from relatively liquid deposits to relatively illiquid bank capital. Thus, the higher is the bank's capital ratio; the lower is its liquidity creation. Under the alternative "risk absorption" hypothesis, which is directly linked to the risk-transformation role of banks, higher capital enhances the ability of banks to create liquidity. Liquidity creation increases the bank's exposure to risk as its losses increase with the level of illiquid assets to satisfy the liquidity demands of customers (Allen and Gale 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet the liquidity demands of customers. Bank capital allows the bank to absorb greater risk (Repullo 2004). Thus, under the second view, the higher is the bank's capital ratio, the higher is its liquidity creation.

2.4.3 Loan growth and bank liquidity

Diamond & Rajan (2002) stated that lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. As such, it is one of the greatest sources of risk to a bank's safety and soundness (Kiyotaki and Moore, 2008). Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the

asset portfolio of a bank. According to Eakins (2008), in practice the amount of liquidity held by banks is heavily influenced by loan demand that is the base for loan growth. If demand for loans is weak, then the bank tends to hold more liquid assets (short term assets), whereas if demand for loans is high, they tend to hold fewer liquid assets since long term loans are generally more profitable. Therefore, a growth in loans and advances has negative impact on banks liquidity (Weisel, Harm, & Brandley, 2003). Loan Growth will be measured by the Current year total loans less previous year total loans over the previous year total loans which can also be measured by the leverage ratio. It can also be said that leverage ratios tend to find the debt a company has on its balance sheet or its financial health. Therefore, a growth in loans and advances has negative impact on banks liquidity.

2.4.4 The rate of inflation and bank liquidity

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

2.4.5 GDP growth and bank liquidity

Macroeconomic context is likely to affect bank activities and investment decisions as the profile of bank liquidity (Pana et al. 2009 and Shen et al. 2010). For example, the demand for differentiated financial products is higher during economic boom and may improve bank ability to expand its loan and securities portfolios at a higher rate. Similarly, economic downturns are exacerbated by the reduction in bank credit supply. Based on these arguments, we can expect banks to increase their

transformation activities and their illiquidity during economic booms. According to the theory of bank liquidity and financial fragility, the relationship between banks‟ liquidity preference and the business cycle is fundamental to explain the inherent instability of the capitalist system as an endogenous market process (Minsky 1982, p. 74). In periods of economic expansion, which are characterized by high degree of confidence of the economic units about their profitability, there is a rise in the level of investment. During this expansion, economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates (Painceira 2010). As in Pilbeam (2005) in line with the above argument the "loan able fund theory of interest" states that the supply for loan (i.e. illiquid assets for banks) increases when the economy is at boom or going out of recession. Aspachs et al. (2005) indicated that banks hoard liquidity during periods of economic downturn, when lending opportunities may not be as good and they run down liquidity buffers during economic expansions when lending opportunities may have picked up. Thus, it can be expected that higher economic growth makes banks run down their liquidity buffer and induce banks to lend more.

2.4.6 Profitability and bank Liquidity

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

It is argued that when banks hold high liquidity, they do so at the opportunity cost of some investment, which could generate high returns (Kamau 2009). The trade-offs that generally exist between return and liquidity risk are demonstrated by observing that a shift from short term securities to long term securities or loans raises a bank's return but also increases its liquidity risks and the inverse is true. Thus, a high liquidity ratio indicates a less risky and less profitable bank (Hempel et al. 1994). Thus, management is faced with the dilemma of liquidity and profitability. Myers and Rajan (1998) emphasized the adverse effect of increased liquidity for financial institutions stating that, "although

more liquid assets increase the ability to raise cash on short-notice, they also reduce management's ability to commit credibly to an investment strategy that protects investors" which, finally, can result in reduction of the "firm's capacity to raise external finance" in some cases. Thus, this indicates the negative relationship between bank profitability and liquidity. Berger (1995) analyses the statistical relationships between bank earnings and capital for U.S. banks over the period of 1983- 1989 and finds that, contrary to what one might expect in situations of perfect capital markets with symmetric information (see Modigliani and Miller 1958, 1963) in which there is no relationship between earning and bank capital), there is a positive relationship between capital and return on equity. This result, according to the author, is consistent with the "expected bankruptcy cost hypothesis." More specifically, Berger's results suggest that banks with higher levels of capital see their funding costs decrease to such an extent that it more than offsets the cost of issuing additional capital. While Berger (1995), applies the concept of the "expected bankruptcy cost hypothesis" in the realm of capital, it is also conceptually applicable to the impact of liquid assets on profitability, whereby banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability.

At the same time, a recent paper by Morris and Shin (2010), develops a model where the total credit risk of a bank is decomposed into "insolvency risk" ("the conditional probability of default due to deterioration of asset quality if there is no run by short- term creditors") and "illiquidity risk" ("the probability of a default due to a run when the institution would otherwise have been solvent"). The model provides a formula for "illiquidity risk" and the authors show that an increase in the liquidity ratio of a bank decreases the probability of an "illiquid" default.

These two concepts can be drawn together in the context of the current paper. If an increase in the relative liquid assets holdings of a bank decreases its probability of default, and if the "expected bankruptcy cost hypothesis" is indeed correct, then holdings of liquid assets should exhibit a positive relationship with bank profits. At the same time, holding liquid assets imposes an opportunity cost on the bank given their low return relative to other assets, thereby having a negative effect on profitability. Thus, overall, liquid assets exhibit a non- linear relationship to bank profitability in which increasing liquid assets would improve a bank's profitability through the "expected bankruptcy cost hypothesis", as long as the marginal benefit of holding additional liquid assets outweighs the opportunity cost of their low relative return.

2.5 Impact of liquidity regulation on banks

During the international financial crisis which started in mid-2007, liquidity in short term money markets dried up and banks suffered severe funding problems, including secured funding for highly-rated assets. By September 2007, Northern Rock experienced the first bank run by retail depositors in the UK since 1878. The significant reduction in market liquidity forced major central banks across the globe to provide huge amounts of liquidity assistance to their banking systems. In 2010 the UK Financial Services Authority (FSA) introduced a new liquidity regulation called the Individual Liquidity Guidance (ILG). Internationally the Basel Committee on Banking Supervision agreed on a Liquidity Coverage Ratio (LCR) in 2013, which is similar in design to the ILG. The ILG aims to make the banking system more resilient to liquidity shocks by requiring banks to hold a minimum quantity of high quality liquid assets (HQLA) consisting of cash, central bank reserves and government bonds to cover net outflows of liabilities .Although more stringent liquidity regulation can reduce the risk of bank runs and freezing of the interbank market, there has been a vigorous debate about the negative impact of liquidity regulation due to its impact on bank lending to the non-financial economy and bank profitability. The ILG is designed to encourage banks to either increase the ratio of HQLA to other assets, decrease the ratio of short-term wholesale funding to more stable deposit and equity funding or a combination of the two in short, there are many possible ways for banks to meet tighter liquidity requirements.

There are few historical episodes to evaluate the response of banks to a tightening of liquidity regulation. This has created a wide range of views about the impact of liquidity Regulation. Financial industry groups have argued that liquidity regulation will substantially increase the cost of bank funding and damage the real economy as banks pass on higher costs and reduce credit supply to the real economy (IIF, 2010).

2.5.1 Monetary Policy Instruments and bank liquidity

The ultimate policy objective of any country in general is to have sustainable economic growth and development. Policy measures are geared at achieving moderate inflation rate, keeping unemployment rate low, balancing foreign trade, stabilizing exchange and interest rates, etc and in general attaining stable and well-functioning macro-economic environment. In this process, monetary policy plays a central role. For instance, during economic recession where output falls with a fall in aggregate demand, monetary policy aims at increasing demand and hence production as well as employment will

follow the same pattern of demand. In contrast, at the time of economic boom where demand exceeds production and treat to create inflation, the monetary policy instruments are utilized that could offset the condition and achieve price stability by counter cyclical action upon money supply (Johnston, and Sundararajan, 1999).However, there is a doubt whether monetary policy can reverse inflationary situation in an economy that is created due to cost-push rather than inflation of demand-pull like the one shown in the preceding paragraph. Since monetary policy is more powerful on inflation driven by money stock rather than cost-push, some economists even suggest direct control instead of conventional monetary policy (Munn, et al, 1991). On the other hand, care should be taken in timing and speed of applying the monetary policy instruments as their effect is felt after certain time lag and untimely and wrong policy measure will be costly as it might even aggravate the situation making corrective measures difficult before any damage happened (Axilrod, et al, 1997).

Monetary policy instruments are broadly classified as Direct, to refer to the authorities' direct controlling mechanism of the monetary variables, and indirect monetary policy instruments, those that are implemented through market-based operation. Direct monetary control is administrative control of growth of money supply in the economy and of the features that characterizes the system, there is aggregate and individual bank credit ceilings, high reserve and liquid asset requirements, direct control of interest rates, selective credit controls and preferential central bank refinance facilities to direct credit to priority sectors are the main ones (Johnston and Sandararajan, 1999). High reserve and liquidity requirement are set to absorb liquidity from the banking sector in order to finance government deficit while direct control of interest rates is aimed for designing preferential rates for certain loan categories (Johnston and Sandararajan, 1999).

Direct monetary control has the following shortcomings (Johnston and Sandararajan, 1999). Direct monetary control and efficient allocation of resources trade-off as competition in the sector is disrupted. Direct control provides room for 'rent seeking' and abuse in allocation of individual bank credit ceiling. Encourages other unregulated and parallel financial sector and instruments that compete with the legal ones weakening the effectiveness and narrowing the coverage of legal instruments in the economy. It is also inconsistent to use direct control in the present world economy of globalization and freedom of capital movement as it deprives the benefit that international financial institution can bring. Despite the above problems associated with direct control, it has advantage of easily achieving targets such as 'maintaining a particular interest rate at a certain level, or keeping banks' overall credit

expansion below a certain ceiling' (Johnston and Sandararajan, 1999: 26). The disadvantage of direct monetary control, as shown above, outweighs its advantage and hence currently many countries shifted to indirect monetary controlling system. The major one of this mechanism is Open market operation (OMO). It is the major policy instrument for promoting non-inflationary economic growth (Oduyemi, 1993). It is a purchase and sale of securities either in primary or secondary market in order to expand or contract excess reserve and hence the credit expansion power of the banking system (Munn, et al, 1991). OMO, besides its direct influence on monetary base, it provides 'orderly market for government securities and exercise effects upon foreign exchange market' (Axilrod, 1997).

2.5.2 Monetary Policy Instruments in Ethiopia

It is self-evident that monetary policy plays an important role in the performance of an economy. However, the effectiveness of the policy in achieving the intended goal largely depends on the institutional factors that constrain or facilitate the implementation process of the policy. In what follows the monetary policy framework of the National Bank of Ethiopia will be described detailing the monetary policy objectives, the targeting framework, the instruments of monetary policy and legal & institutional framework of the monetary policy decision-making structure as well as the exchange rate regime of the country.

During the command economic era, monetary variables were under direct control of the monetary authorities. Interest rate was set at a level to patronize the private sector in general, direct orders were given to banks to lend to prioritized sector and there was a ceiling on credit that banks can advance. Moreover, the banking sector was totally dominated by government banks and private sector was prohibited from entering into the financial sector. As a result, there was only one commercial bank, Commercial Bank of Ethiopia, and one development bank. However, since the start of economic reform, following the change of government, the financial sector has undergone reform and the private sector was allowed to invest in the area. Consequently, private banks and insurances started to flourish soon after the enactment of a Monetary and Banking proclamation of 1994. Following these developments, attention was shifted from direct control of monetary variables towards market-based policy instruments as the government leaves the economy to private sector. Accordingly, indirect or market-based monetary policy instruments are advocated to control or influence the supply of and demand for money.

The principal objective of the monetary policy of the National Bank of Ethiopia is to maintain price & exchange rate stability and support sustainable economic growth of Ethiopia. Price stability is a proxy for macroeconomic stability which is vital in private sector economic decision on investment, consumption, international trade and saving. Finally, macroeconomic stability fosters employment and economic growth. Maintaining exchange rate stability on the other hand is considered as the principal policy objective of NBE so as to be competitive in the international Trade and to use exchange rate intervention as policy tools for monetary policy to affect both foreign reserve position and domestic money supply. More specifically, the objectives of Ethiopia's monetary policy are to:

- ✓ Foster monetary, credit and financial conditions conducive to orderly, balanced and sustained economic growth and development.
- ✓ Preserve the purchasing power of the national currency – ensuring that the level of money supply is generally consistent with developments in the macro- economy and intervening in the foreign exchange rate market for the purpose of stabilizing the rate when conditions necessitate.
- ✓ Encourage the mobilization of domestic and foreign savings and their efficient allocation for productive economic activities through the implementation of a prudent market driven interest rate policy.
- ✓ Facilitate the emergence of financial and capital markets that are capable of responding to the needs of the economy through appropriate policy measures. These measures would ensure the gradual introduction of trading instruments on a short-term basis.

2.6 Empirical Review

2.6.1 Determinants of Banks Liquidity-Empirical studies

The enormousness of the liquidity generated by the banks for the economy and the issues on which the liquidity generation is dependent is a matter of consideration so far. The issues related to bank liquidity creation are given importance and a massive theoretical literature is developed in a few past years on financial institutions liquidity supply. Diamond and Dybvig (1983) are the first who gave the theoretical explanation for the presence of credit holding bodies and they provided the justifications for the importance of bank's role in creating liquidity.

There are considerable researches that are done on banks liquidity one of them are Vodava (2011) who studied the liquidity of Czech's commercial banks and the determinants of it. The results showed that

there is a significant relationship between the liquidity and the resources sufficiency. Shin and Adrian (2007) showed that in a chaotic economic era the liquidity position is that much concerned that any changes in it may change the whole banking network. Their study showed that backing of liquidity is stable and often decreased in tumult phase so it is necessary to consider the liquidity management. Moreover, liquidity is very important for both predictable and unpredictable losses. It deals with cash and cash equivalents, investment in securities and placement with other banks. It can help to reduce losses and enhance the chances of banks profitability that's why liquidity is a very essential measure.

Fielding (2005) had a different view and paid attention on political instability in Egypt. The determinants were; level of economic output, discount rate, reserve requirements, and violent political incidence. The bank competition within East African community was assessed by Sanya and Gaertner (2012), and specifically looked at Tanzania, Kenya, Uganda, Rwanda and Burundi. The Kenyan banking system liquidity was determined by return on assets and return on equity. Tanzanian banks liquidity was determined by return on equity, return on assets and bank's capital.

Standard textbooks on financial intermediation (e.g., Greenbaum and Thakor, 2007; Freixas and Rochet, 2008) explain that banks are institutions that make loans funded by a combination of deposits from the public and equity supplied by the banks' shareholders. More formally, banks engage in "liquidity creation," which is a form of "qualitative asset transformation." To understand liquidity creation, picture a firm in need of long-term financing in a world without banks. In such a world, savers would directly finance the funding needs of the firm, and they would end up with an illiquid claim against the firm. In contrast, in a world with banks, it is the bank that provides the long-term loan to the firm, and the bank is able to offer savers demand deposits. So, it is the bank that holds the illiquid claim against the firm and savers end up with a liquid claim against the bank. Because of this difference in liquidity between what banks do with their money and the way they finance their activities, banks are said to create liquidity

In Diamond and Dybvig (1983), this liquidity creation exposes banks to withdrawal risk. Fear that other depositors may rush in to withdraw their deposits prematurely even though they may not have liquidity needs can cause all depositors to withdraw, precipitating a bank run as one of two possible equilibrium. It is impossible for the bank to "provision" for such an event, short of practicing 100% reserve banking, i.e., keeping all deposits as cash in vault. But such an institution would be merely a safe-deposit box, rather than a bank that creates liquidity. Diamond and Dybvig (1983) argue that

federal deposit insurance can eliminate bank runs, thereby ridding banks of the prospect of the large-scale deposit withdrawals that characterize such runs. Thus, even with deposit insurance, banks need to worry about having enough liquidity on hand to meet the normal liquidity needs of depositors

Valla, Escorbiac, and Tiesset (2006), Vodova (2011) define liquidity as the ability of bank to meet its obligation in cashflow that can be classified as funding liquidity and market liquidity. Edlin and Jaffee (2009) affirmed that excess liquidity exists due to credit crunch and banks are reluctant to allocate credit.

By utilizing GMM (generalized method moment) dan VAR (vector autoregression), Henry, Birchwood, and Primus (2010) estimated precautionary reserve demand and the impact of involuntary reserve. The result designates that banks hold excess liquidity as a precautionary for liquidity gap. The spread between credit interest rate and central bank policy rate has an effect negatively on precautionary reserve. In addition, fiscal operation influences dynamic involuntary reserves. Decelerated credit growth during economic slowdown also augments liquidity holding.

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. The regression model was estimated using ordinary least squares. The result of the study showed that the volatility of cash-to-deposit ratio and money market interest rate have negative and significant effect on liquidity.

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

The healthier the economy is the more liquidity is created. It was also found that banks with a higher ratio of interest to provision income create more liquidity. Other bank-related variables, such as size or performance revealed no statistically significant influence on the creation of liquidity by the banks.

Determinants of liquidity risk of banks from emerging economies for a sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis were analyzed by (Bunda and Desquilbet 2008). The study was aimed to explore how the liquidity of commercial bank assets is affected by the exchange rate regime of the country in which they operate. The liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behavior of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors: total assets as a measure of the size of the bank, the lending interest rate as a measure of lending profitability, and the realization of a financial crisis, which could be caused by poor bank liquidity expected to have negative impact on banks liquidity whereas, the ratio of equity to assets as a measure of capital adequacy, the presence of prudential regulation, which means the obligation for banks to be liquid enough, the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers, and the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes are expected to have positive impact on banks liquidity.

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

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

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

2.6.2 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).

The study conducted by Semu (2010) intended to assess the impact of reducing or restricting loan disbursement on the performance of banks in Ethiopia. It also attempts to examine the possible factors that compel the banks to reduce or restrict lending. Quantitative method particularly survey design approach was adopted for the study. The findings of the study showed that deposit and capital have statistically significant relationship with banks‟ performance measured in terms of return on equity (ROE). New loan and liquidity have relationship with banks‟ performance measured in terms of both return on asset (ROA) and ROE. However, the relationship was found to be statistically insignificant. Deposit and capital have no statistically significant relationship with banks‟ performance in terms of

ROA. The study suggested that when banks face lending constraints, they have to use their funds like by purchasing treasury bills and bonds. Moreover, banks must develop non-interest generating services. Excess cash maintained by banks should be used by diversifying credit options and to avoid inefficiencies.

The study conducted by Tseganesh (2012) accesses the determinants of Ethiopian commercial banks liquidity and their impact on financial performance by using the panel data of the sample of eight commercial banks in Ethiopia from 2000 to 2011. Data was presented by using descriptive statistics. The balanced correlation and regression analysis for two liquidity ratios and financial performance was conducted.

The result of the study shows that, Bank liquidity increases with higher bank size and higher interest rates margin. NPL and inflation had positive and significant impact on banks liquidity. The coefficient sign for capital adequacy revealed positive and significant impact on liquidity as Short-term interest rate on banks liquidity was statistically significant and had positive impact on liquidity

According to Tseganesh (2012), the positive relationship between interest rate margin and banks liquidity in both liquidity measures may indicate the presence of credit rationing and credit crunch in the economy or it could be due to credit cap during the past two years (2008/09 and 2009/10) and 27% investment on millennium dam bond from the total loan disbursement by commercial banks in the year 2011. Loan growth and GDP growth rate had insignificant impact on banks liquidity in Ethiopia. Four of the statistically significant variables affecting banks liquidity affect banks performance. These are capital adequacy, bank size, the share of non-performing loans on the total bank loan and short-term interest rate. Capital adequacy and bank size had positive and significant impact on financial performance just like on liquidity of banks. Whereas, non-performing loan and short-term interest rate had negative and significant impact on financial performance of banks

The study conducted by Habtamu (2012*) on* determinants of bank profitability in the context of Private Commercial banks in Ethiopia used fixed effect regression model to investigate the impact of capital adequacy, asset quality, managerial efficiency, liquidly, bank size, and real GDP growth rate on major bank profitability measures i.e. ROA, ROE, and NIM separately. Beside this the study used primary data analysis to solicit mangers perception towards the determinants of private commercial banks profitability. The empirical results show that bank specific factors; capital adequacy, managerial

efficiency, bank size and macro-economic factors; level of GDP, and regulation have a strong influence on the profitability of private commercial banks in Ethiopia. Fixed effect regression model was applied to investigate the impact of capital adequacy, asset quality, managerial efficiency, liquidly, bank size, and real GDP growth rate on major bank profitability measures i.e., ROA, ROE, and NIM separately.

The study conducted by Berihun B (2015) on Determinants of Banks Liquidity and their Impact on Profitability of Ethiopian commercial banks also used panel data regression analysis. The results of regression analysis showed that Bank size and Loan growth had negative and statistically significant impact on banks liquidity measured by Liquid asset to total Asset. Real growth rate of gross domestic product on the basis price level, Interest rate on lending, Non-performing loans in the total volume of loans, Bank size, Actual reserve ration and short-term interest rate had positive and statistically. Among the statistically significant factors affecting banks liquidity bank size had positive and statistically significant impact on Profitability whereas, growth rate of gross domestic product on the basis price level, Actual reserve rate and Non-performing loans in the total volume of loans had negative impact on profitability.

2.7 Summary and Knowledge gap

Theory on bank liquidity is well documented unlike empirical studies. 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.

To the knowledge of the researcher there is no empirical studies done regarding to determinants of private commercial banks liquidity in Ethiopia. Therefore, the objective of this study is to assess the factors that affect Private commercial bank liquidity in Ethiopia and fill the knowledge gap by adopting secondary data (survey of document).

Chapter Three-Research Methodology

3.1 Research Paradigm

This research paper employed quantitative research design. The functional or positivist paradigm that guides the quantitative mode of inquiry is based on the assumption that social reality has an objective onto logical structure and that individuals are responding agents to this objective environment (Morgan & Smircich, 1980). Quantitative research involves counting and measuring of events and performing the statistical analysis of a body of numerical data. The assumption behind the positivist paradigm is that there is an objective truth existing in the world that can be measured and explained scientifically. The main concerns of the quantitative paradigm are that measurement is reliable, valid, and generalizable in its clear prediction of cause and effect (Cassell & Symon, 1994). Being deductive and particularistic, quantitative researcher is based up on formulating the research hypothesis and verifying them empirically on a specific set of data. Scientific hypothesis is value free; biases, and subjectivity preferences have no places in the quantitative approach.

3.2 Research Approach Adopted

As noted in Creswell (2009) in terms of investigative study there are three familiar types of research approaches to business and social research namely, quantitative, qualitative and mixed methods approach. Therefore, the following discussion briefly presents the basic nature of quantitative approaches that this study is mainly focused on. Quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell 2009, p.4). In quantitative research approach there are two strategies of inquiries namely, survey design and experimental design. The chief advantage of this approach is that numbers are easy to work with, data are readily collected, coded, summarized and analyzed (Dunn 1999, p. 37). Further quantitative research approach has the advantage of being able to make generalizations, for a broader population, based on findings from the sample.

Structured document survey used to collect the necessary data from audited financial statements of each commercial bank in the sample for bank specific factors and annual reports of National Bank of Ethiopia/NBE and Ministry of Finance and Economic Cooperative/MoFEC for macroeconomic, bank specific and regulatory factors and the data will be analyzed by using EViews 8 software package.

In order to identify determinants of liquidity of Ethiopian Private commercial banks, the panel data regression analysis was used. The data collected through surveys administered to a sample or subset of

the entire population, allows the researcher to generalize or make inferences. Results were interpreted to determine the probability that the conclusions found among the sample can be replicated within the larger population. Conclusions were derived from data collection and measures of statistical analysis. The selection of variables was based on previous relevant studies. The researcher considered whether the use of the particular variable makes economic sense in Ethiopia conditions.

3.3 Variable Description and Research Hypotheses

As presented in the first chapter the general objectives of this research were to identify determinants of liquidity of private commercial banks in Ethiopia through analyzing statistically significant factors affecting banks liquidity. In order to achieve these broad objectives, six research hypotheses were developed.

This research work attempted to identify the firm specific factors, macroeconomic factors and regulatory factors affecting liquidity in the case of private commercial banks in Ethiopia.

3.3.1 Dependent variables

3.3.1.1 Liquidity of Banks:

Liquidity is a financial term that means the amount of capital that is available for investment. Today, most of this capital is credit, not cash. Bank Liquidity simply means the ability of the bank to maintain sufficient funds to pay for its maturing obligations. It is the bank's ability to immediately meet cash, cheques, other withdrawals obligations and legitimate new loan demand while abiding by existing reserve requirements. Nwaezeaku (2008) defined liquidity as the degree of convertibility to cash or the ease with which any asset can be converted to cash (sold at a fair market price). In the portfolio of commercial banks, liquidity assets play a very crucial role because banks operate largely with the funds borrowed from depositors in form of demand and time deposits. These liquidity assets are the essential balance sheet items which have the capacity to maintain the confidence of depositors which is the most valuable intangible asset of the commercial banking business (Spindt, 1980). For the purpose of this research the researcher uses the following two measures of liquidity.

The first method is the ratio of cash and cash equivalents to total assets (L1) which tells about the general liquidity shock absorption by a bank. The higher the L1 indicates the more liquidity. According to the NBE establishment proclamation (No. 591, pp. 416) liquid assets of banks include cash on hand, deposit in other banks, and short-term government securities that are acceptable by the

NBE as collateral (for instance, Treasury bills). As a universal canon, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity

$$\mathbf{L1} = \frac{\textbf{Liquidity Assets}}{\textbf{Total Assets}}$$

The second method is Loan to deposit and short-term financing ratio (L2). It indicates what percentage of the volatile funding of the bank is tied up in illiquid loans. The volatile funding includes deposits, interbank borrowing, certificate of deposit and short term borrowing from the central bank. Therefore, the higher this ratio the less liquid the bank is.

$$\mathbf{L2} = \frac{\textbf{Loan}}{\textbf{Deposit}}$$

3.3.2. Independent variables: Banks Specific Variables

3.3.2.1 Profitability of Banks:

Commercial banks are profit seeking organization. Bank has to earn profit because if they don't, all shareholders would selloff the shares if proper dividends are not earned. Hence, they have to earn profit for their shareholders and at the same time maintain liquidity to satisfy the withdrawal need of its customers. Bank liquidity management involves a trade of between the cost of attaining higher liquidity and the cost of inefficient allocation of such liquidity. Bourke (1989) finds same evidence of positive relationship between liquid asset and bank profitability. On the other hand, other researcher like Molyneuv and Thornton (1992) and Goddard,et al(2004) argues that holding liquid asset imposes an operating cost on bank given their low return relative to other asset thereby having a negative effect on profitability. Therefore, the study expects a negative effect of Profitability on liquidity. Profitability of private commercial banks in this study measured by ROE

$$\textbf{Return on equity} = \frac{\textbf{Net income after tax}}{\textbf{Total equity capital account}}$$

3.3.2.2. Capital Adequacy of Banks (CA)

Capital adequacy is the sufficient funds to absorb losses to protect depositors, creditors, and official institutions in the interest of maintaining banking system stability. The proxy for capital adequacy used in this study was the ratio of equity to total assets.

3.3.2.3Bank Size (Bsize)

Bank size is defined broadly as the banks net total asset. It measures its general capacity to undertake its intermediary function. This study expected positive impact of bank size on liquidity as per the traditional transformation view argument. The proxy for bank size was the natural logarithm of total assets.

3.3.2.4Loan Growth of Banks (LG)

The loan portfolio is typically the largest asset and the predominate source of revenue. The Study expected negative relationship between banks loan growth and liquidity. The proxy for loan growth was annual growth rate of gross loans and advances to customers.

3.3.3. Independent variables: Macro Economic Variables:

3.3.3.1Gross Domestic Products (GDP)

GDP is a macroeconomic factor that affects bank liquidity. The study expected negative relationship between banks liquidity and economic cycle.

3.3.3.2 Inflation Rate (INFL)

Inflation reflects a situation where the demand for goods and services exceeds their supply in the economy. Inflation causes many distortions in the economy. To proxy inflation the annual gross inflation rate was used.

Table 3.1 Summary of explanatory variables and their expected effect on the dependent variables

Independent variables	**Proxies and Definition**	**Expected effect**
Capital adequacy	**CA-** the share of own capital on the total asset of the bank	Positive
Bank size	**BSIZE**-Natural logarithm of total asset	Positive

Loan growth	**LG**-annual loan growth rate	Negative
Gross domestic product	**GDP**-real rate of gross domestic product	Negative
Inflation	**INF**-annual inflation rate	Positive
Profitability	**ROE**: Return on Equity	Negative

3.4 Population and Sampling Procedure

3.4.1 Population of the study

The study population/participants were all private commercial banks in Ethiopia that exist in the fiscal year 2016/17. According to NBE (2016/17), there are seventeen commercial banks in the year 2016/17 such as Commercial Bank of Ethiopia (CBE) , Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Abay Bank s.c ,Debub Global Bank, Addis International Bank, and Enat Bank. The Commercial Bank of Ethiopia is publicly owned and the remaining sixteen are privately owned commercial banks.

3.4.2 Sampling frame:

The frame for drawing sample included those private commercial banks having at least Eighteen years working experience in Ethiopia (i.e. from 2000 to 2017. In Ethiopia there are six private commercial banks having at least Eighteen years' experience which include: Dashen Bank S.C (DB), Awash Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB) and Bank of Abyssinia S.C (BOA). Therefore, the matrix for the frame is 18*6 that includes 108 observations.

3.4.3 Sample size

It is the portion of the study population and when addressing the total population in the study is not possible. But in this case, since the number of banks in the country is small, the study assumed the data of Six Commercial Banks. Therefore, the sampling frame and the sample was the same. According to Brooks (2008, p 105), while there is no definitive answer for an appropriate sample size

for model specification, it should be noted that most testing procedures in econometrics rely on asymptotic theory. This theory says that as the sample size approaches to the population, the results from the sample estimates are more appropriate for generalizing to the general population. Thus, in this case the sample size was almost equal to the population which enabled to make appropriate generalization.

3.5 Types of Data and Data Collection Instruments

Only secondary data were used for the study. Accordingly, structured document review was used for this research to collect required information, which was relevant for addressing the objectives of the study. Data were collected from audited financial statements (balance sheet and income statement) of each private commercial bank included in the sample and various journals and publications of NBE and MOFEC for the macroeconomic data from 2000 to 2017. All data were collected on annual base and the figures for the variables were on June 30 of each year under study.

3.5.1 Methods of Data Analysis

To test the proposed hypotheses, statistical analyses carried out using the following methods: First, descriptive statistics of the variables (both dependent and independent) were calculated over the sample period. This is in line with Malhotra (2007), which states using descriptive statistics methods helps the researcher in picturing the existing situation and allows relevant information. Then, correlation analyses between dependent and independent variables were made. Finally, ordinary least square/OLS regression approach including all of its assumptions was employed. The assumptions were tested to see the applicability of the regression models developed first to test the relationship between banks liquidity and independent variables explaining liquidity of commercial banks in Ethiopia. Data collection from different sources analyzed by using EViews 8 software package

3.5.2 Regression Model Specification

The nature of data used in this study enabled to use panel/longitudinal data model which is deemed to have advantages over cross sectional and time series data methodology. Panel data involves the pooling of observations on the cross-sectional over several time periods. As Brook (2008) stated the advantages of using panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross-sectional data alone. Second, it is often of interest to examine how variables, or the relationships between them, change dynamically (over time). To do this using pure time-series data

would often require a long run of data simply to get a sufficient number of observations to be able to conduct any meaningful hypothesis tests. But by combining cross-sectional and time series data, one can increase the number of degrees of freedom, and thus the power of the test, by employing information on the dynamic behavior of a large number of entities at the same time. The additional variation introduced by combining the data in this way can also help to mitigate problems of multicollinearity that may arise if time series are modeled individually. Third, by structuring the model in an appropriate way, we can remove the impact of certain forms of omitted variables bias in regression results.

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

Thus, the general panel/longitudinal regression model was as follows:

$$y_{it} = \alpha + \beta x_{i\,t} + u_{i\,t}$$

With subscript **i** denote the cross-section and **t** representing the time-series dimension. The left-hand variable **yit** is the dependent variable, **α** is the intercept term, **β** is a **k×1** vector of parameters to be estimated on the explanatory variables, and **xi** t is a **1 × k** vector of observations on the explanatory variables**, t = 1, . . . , T** ; **i = 1, . . . , N**.

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

$$LIQ_{i,t} = \alpha + \beta 1\ CA_{i,t} + \beta 2\ BSIZE_{i,t} + \beta 3\ LG_{i,t} + \beta 4\ GDP_{,t} + \beta 5\ INF_t + \beta 6 ROE_{,} + u_{i,t}$$

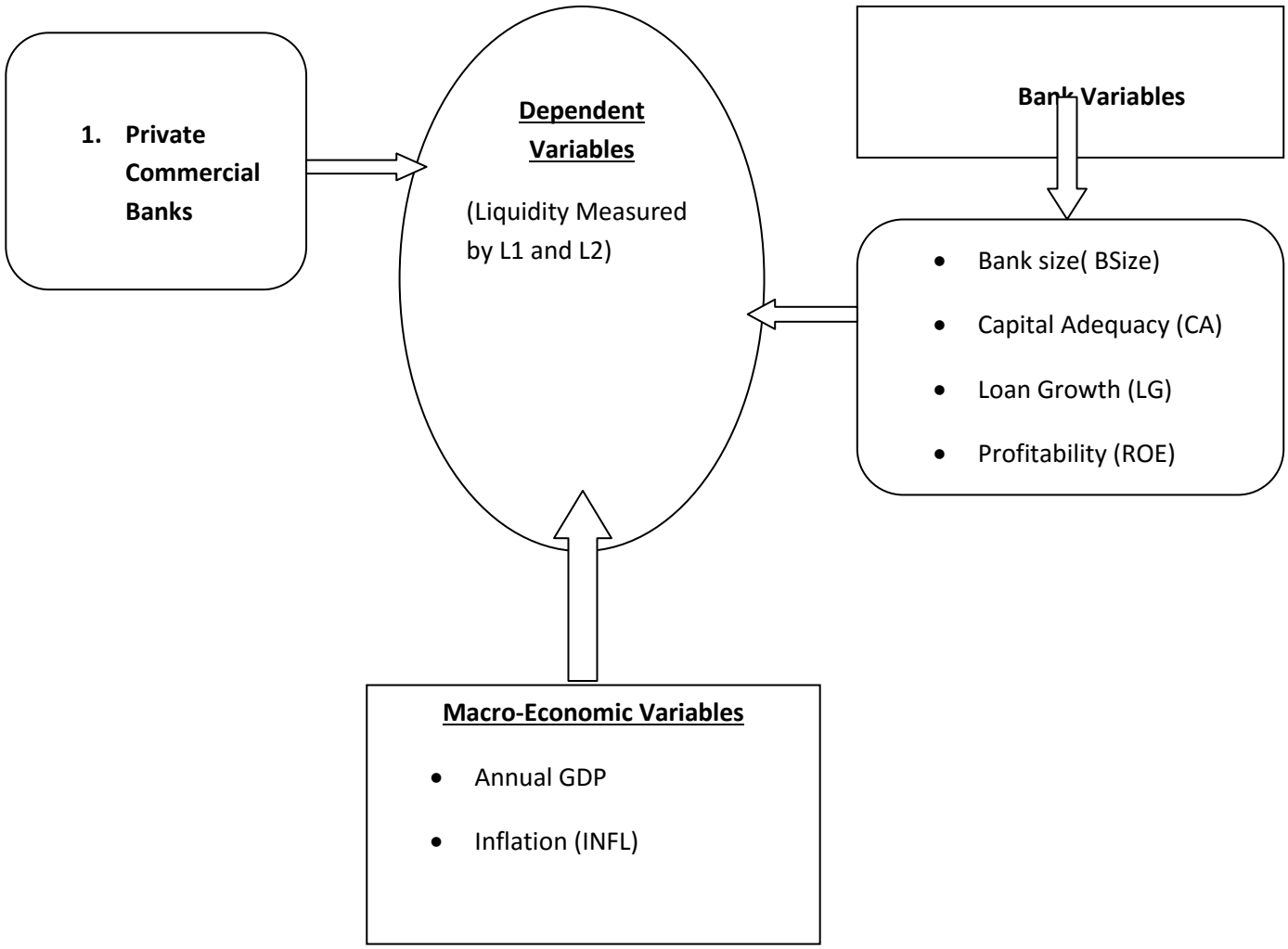
Where: -

- **LIQ it:** is liquidity ratio of ith bank on year t
- **CA i,t:** is capital adequacy of ith bank on the year t.
- **BSIZEi,t:** is the size of it bank on the year t.
- **LGi,t:** is the loan growth of ith bank on the year t.
- **GDPt:** is the real domestic product/GDP growth of Ethiopia on the year t.
- **INFt: is the overall inflation rate in Ethiopia on the year t.**

- **ROEit:** is return on total capital of bank i on year t.
- **Ui t:** is a random error term

3.6. Conceptual Framework

On the basis of the hypotheses that developed from the literature, the following conceptual frame work was developed.



$$LIQ\ i,t = \alpha + \beta 1\ CAi,t + \beta 2\ BSIZEi,t + \beta 3\ LGi,t + \beta 4\ GDP,t + \beta 5\ INFt + \beta 6 ROE,+ ui,t$$

L1= $\alpha + \beta 1\ CAi,t + \beta 2\ BSIZEi,t + \beta 3\ LGi,t + \beta 4\ GDP,t + \beta 5\ INFt + \beta 6 ROE,+ ui,t$....(Equation #1)

L2= $\alpha + \beta 1\ CAi,t + \beta 2\ BSIZEi,t + \beta 3\ LGi,t + \beta 4\ GDP,t + \beta 5\ INFt + \beta 6 ROE,+ ui,t$...(Equation #2)

Figure 3.1 Conceptual Frame Work.

Chapter Four-Results and Discussions

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. Then data was analyzed in terms fixed effect model of via eview8 version. In this chapter the results of study which include descriptive statistics of variables, correlation results for dependent and explanatory variables, Secondary data analysis was done by using E-views 8 software. The first section of this chapter was mainly start with discussion for the result of descriptive statistics. Furthermore, the second and third section presents the correlation matrix and the basic tests for the assumptions of classical liner regression model. Next to this, model selection and regression result were presented. Lastly, the result of the regression analysis was discussed in detail.

4.1. Descriptive Statistics

This section reports mean, maximum, minimum, standard deviation and number of observation for each variables used in this study. The banks that are included in this study were all private commercial banks those operate before 2000. The data for this study was drawn from six commercial banks for 1999/00 to 2016/17 periods. To this end, 108 observations were analyzed to examine the determinants of liquidity of private Commercial banks in Ethiopia. The descriptive statistics for the dependent and independent variables are presented below. The dependent variables are liquidity measured by liquid assets to total assets ratio **L1** and loans to deposits ratio **L2**. The independent variables are: Bank size, capital adequacy, loan growth, real GDP growth, ROE, and inflation rate.

Table 4.1 Descriptive statistics of the dependent and independent variables.

	L1	L2	BSIZE	CAP	GDP	INFL	LG	ROE
Mean	0.349	0.714	27.943	0.237	0.234	0.119	0.319	0.317
Median	0.345	0.686	28.115	0.209	0.206	0.086	0.256	0.225
Maximum	1.115	1.158	31.309	0.6239	0.532	0.552	2.559	10.640
Minimum	0.136	0.489	23.661	-0.034	-0.026	-0.108	-0.099	-0.018
Std. Dev.	0.133	0.146	1.736	0.152	0.147	0.145	0.313	1.006
Observations	108	108	108	108	108	108	108	108

Source: Financial statement of sampled commercial banks and own computation through E-views 8

Liquidity position is basically checked and measured by the liquidity ratio. The liquidity measure provides suggestions about the level of liquidity on which the commercial banks are operating and also gives the idea about the growth of capital markets that either it's still at early stage or not that in

return assure the bank management, policy development and stakeholders to compete the arising challenges to commercial banks. In this study the liquidity is measured by two methods. The first method is the ratio of cash and cash equivalents to total assets (L1) which tells about the general liquidity shock absorption by a bank. The higher the L1 indicates the more liquidity.

The mean value of L1 was 34.9% which was above the legal obligation of the NBE directive No.SBB/57/2014- Minimum Regulatory Liquidity Requirement of 15%. The standard deviations of 13.31% show little dispersion of liquid assets to total assets ratio from its mean for private commercial banks in Ethiopia. The maximum and minimum values of L1 were 111.5% and 13.58% respectively.

The mean value of L2 was 71.43% that is slightly lower than the international standard for loans to deposit ratio (i.e. 75% (CBRC 2012)). This indicates on average for the private commercial banks in Ethiopia higher amount of volatile liabilities/deposits were tied up with illiquid loans. Even though it shows little dispersion from the international standard there was high dispersion of L2 towards its mean value among banks that is shown by the standard deviation of 14.59%. The maximum value of L2 was 115.7% which is far above the standard whereas the minimum value was 48.85% which is far below the standard. This indicates that there were some private commercial banks in Ethiopia having extra liquidity (banks around 49% L2) and others were going to face liquidity shortages/risk (banks around 100% L2). Therefore, it can be concluded that loans to deposit ratio was exceedingly dispersed among private commercial banks in Ethiopia.

The bank size plays an important role to maintain the position of a bank in the market. The size of Ethiopian private commercial banks under this study has mean value of 27.94, and the maximum and minimum value of 31.31 and 23.66 respectively. The standard deviation value is 1.74 which shows little dispersion from the mean value. These results show that the size of private commercial banks in Ethiopia does not show as such dispersal between the sampled banks.

The mean value of capital adequacy ratio is 23.72% with at 15.15 percent standard deviation. The maximum and the minimum of the CA is 62.34% and -3.39% respectively. The results exhibit in table 4.1 shows that the banks hold average capital ratio of 23.72% which is relatively higher than the 8% that set by the Basel Committee. The minimum value of CA of Ethiopian Private commercial banks is far from than the 8% of national bank regulatory requirement and Basel committee. From this result

we conclude that there is significant variation in capital adequacy ratio of private commercial banks in Ethiopia.

The mean value of the variable loan growth was 31.94% with maximum and minimum values of 255.93% and -9.99% respectively. In terms of loan growth commercial banks in Ethiopia were highly different with the standard deviation of 31.27%.

The ROE indicates that the Ethiopian private commercial banks attained, on average, a positive after tax profit over the last Eighteen years. For the total sample, the mean of ROE was 31.71% with a minimum of -1.81% and a maximum of 1064%. That means, the most profitable bank among the sampled banks earned 1064% return from the total equity invested in the firm. On the other hand, the least profitable bank of the sampled banks earned -1.81% returns from total equity invested in the firm. The standard deviation statistics for ROE is 100.62% which indicates that the profitability variation between the selected banks is very high or highly dispersed. The result implies that these banks need to optimize the use of their equity to increase the return on their equity.

The remaining independent variables were the macroeconomic indicators that can affect banks liquidity position over time. The mean value of real GDP growth rate was 23.38% indicating the average real growth rate of the country's economy over the past 18 years. The maximum growth of the economy was recorded in the year 2011/12 (i.e. 45.10%) and the minimum was in the year 2001/02 (i.e. -2.16%). Since the year 2003 the country has been recording double digit growth rate with little dispersion towards the average over the period under study with the standard deviation of 14.74%. The other Macro Economic factor affecting liquidity of Ethiopian Commercial banks was the general inflation rate, had standard deviation of the country on average over the past Eighteen years was more than the average GDP (i.e. 14.47%).This implies that Inflation rate in Ethiopia remains fairly unsteady. The maximum inflation was recorded in the year 2007/08 (i.e. 55.24%) and the minimum was in the year 2000/01 (i.e. -10.77%).

The rate of inflation was highly dispersed over the periods under study towards its mean with standard deviation of 14.47%.

4.2. Correlation Analysis

The purpose of correlation matrix in this particular study was to show the linear association between the dependent and independent variables. As noted in Brooks (2008), correlation between two

variables measures the degree of linear association between them. Values of the correlation coefficient are always range between positive one and negative one (2008), correlation between two variables measures the degree of linear association between them. Values of the correlation coefficient are always range between positive one and negative one.

A correlation coefficient of positive one indicates that a perfect positive association between the two variables; while a correlation coefficient of negative one indicates that a perfect negative association between the two variables. A correlation coefficient of zero, on the other hand, indicates that there is no linear relationship between the two variables.

Table 4.2 Correlation matrix of the dependent and independent variables.

	L1	L2	BSIZE	CAP	GDP	INFL	LG	ROE
L1	1.000							
L2		1.000						
BSIZE	-0.370	-0.681	1.000					
CAP	0.271	-0.263	0.337	1.000				
GDP	0.130	-0.331	0.420	0.563	1.000			
INFL	0.118	-0.184	0.273	0.601	0.524	1.000		
LG	-0.039	0.570	-0.458	-0.271	-0.330	-0.217	1.000	
ROE	0.564	0.013	-0.176	0.125	-0.059	-0.044	0.206	1.000

Source: Financial statement of sampled commercial banks and own computation through E-views 8

Table 4.2 presents the correlation coefficients, a liquid asset to total Asset ratio/L1 was positively correlated with ROE with a correlation of 0.564. L2 results have to be interpreted in reverse: positive sign of the coefficient means negative linear relationship with liquidity and conversely. With regard to L2, banks liquidity and profitability also had positive relationship with a correlation of 0.013. Which indicates that firm with higher ROE have higher capacity to absorb Liquidity shock. On the other hand, CAP had positive relationship with L1 and negative relationship with L2. Bank size had both negative relationship with banks liquidity measured by L1 and L2 with a correlation of -0.370 and -0.681 respectively. Loan growth had negative relationship with banks liquidity measured by L1 and had Positive relationship measured by L2 with a correlation of -0.039 and 0.570, respectively; which indicates that firm with higher loan growth have less bank liquidity. Among the macroeconomic factors affecting liquidity, real GDP growth rate and general inflation rate had positive correlation with liquidity of commercial banks in Ethiopia in case of Liquidity measured by L1 and negative correlation with Liquidity measured by L2.

4.3 Tests of the Classical Linear Regression Model (CLRM) Assumption.

Diagnostic test was made to make sure that the classical linear regression model assumption is violated or not. In this study an attempt was made to test Heteroscedasticity, Autocorrelation, normality and Mutlicolinearity the result of which are presented and discussed as follows.

4.3.1 Heteroscedasticity Test

It is a test made to check whether error terms variance is constant (homoscedasticity) or not (Heteroscedasticity). To test for the presence of Heteroscedasticity, the popular white test was employed (Brooks 2008). One of the important assumptions of the multiple regressions reveals that the variance of the disturbance term is constant. This is called the assumption of homoscedasticity. If disturbance terms (errors) do not have constant variance, they are said to be Heteroscedasticity (Gujarati, 2004).

In this study as shown in table 4.3, both the F-statistic and Chi-Square versions of the test statistic gave the same conclusion that there is no evidence for the presence of Heteroscedasticity, since the p-values were in excess of 0.05 to both L1 and L2 models.

Table 4.3 Heteroscedasticity Test: White

Model 1(L1)

Heteroscedasticity Test: White

F-statistic	0.907163	Prob. F(27,80)	0.6000
Obs*R-squared	25.31536	Prob. Chi-Square(27)	0.5568
Scaled explained SS	37.62660	Prob. Chi-Square(27)	0.0840

Model 2 (L2)

Heteroscedasticity Test: White

F-statistic	1.175311	Prob. F(27,80)	0.259
Obs*R-squared	32.46486	Prob. Chi-Square(27)	0.463
Scaled explained SS	25.75085	Prob. Chi-Square(27)	0.0635

Source: Financial statement of sampled commercial banks and own computation through E-views 8

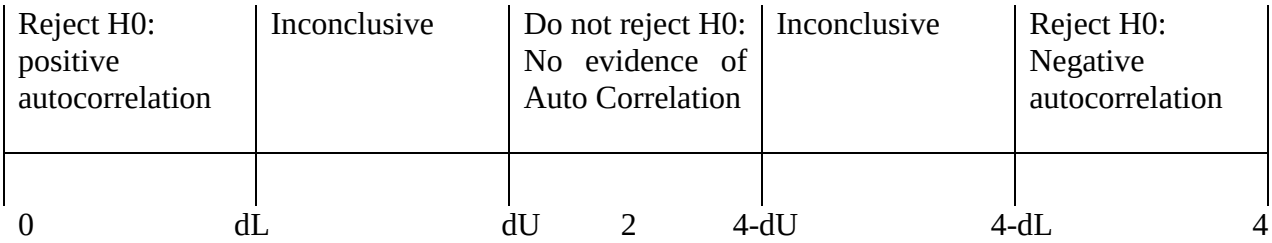
4.3.2 Autocorrelation Test

The other Assumption of classical linear regression model is Autocorrelation. The diagnostic test for CLRM assumption of no autocorrelation was tested by this study. According to Gujarati, (2004) the assumption of no autocorrelation between the disturbances assumes that given any two X values, Xi and Xj ($i \neq j$), the correlation between any two ui and uj($i \neq j$), is zero. According to Chris Brooks (2008) it is assumed that the errors are uncorrelated with one another. 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 assumption was tested by Durbin Watson (DW) test of autocorrelation. Durbin--Watson (DW) is a test for first order Autocorrelation -- i.e. it tests for a relationship between an error and its immediate previous value.

DW has 2 critical values: an upper critical value (dU) and a lower critical value (dL), and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected! The rejection, non-rejection, and inconclusive regions are shown on the number line in table 4.4

Figure 4.4 Rejection, non-rejection, and inconclusive regions for DW test



According to Brooks (2008) the following is the decision rule to reject and not to reject the null hypothesis null hypothesis is rejected and the existence of positive autocorrelation presumed if DW is less than the lower critical value dL;

The null hypothesis is also rejected and the existence of negative autocorrelation presumed if DW is greater than 4 minus the lower critical value dL;

The null hypothesis is not rejected and no significant residual autocorrelation is presumed if DW is between the upper critical value dU. and 4 minus the upper critical value dU.

The null hypothesis is neither rejected or fails to be rejected if DW is between lower critical value dL and the upper critical value dU. or if DW is in between4 minus the upper critical value dUand4 minus the lower critical value DL.

The DW test table Value of dL, dU, 4-dU and 4dL at N=108 and K=6 for this study is presented graphically below

Figure 4.5 DW test Result

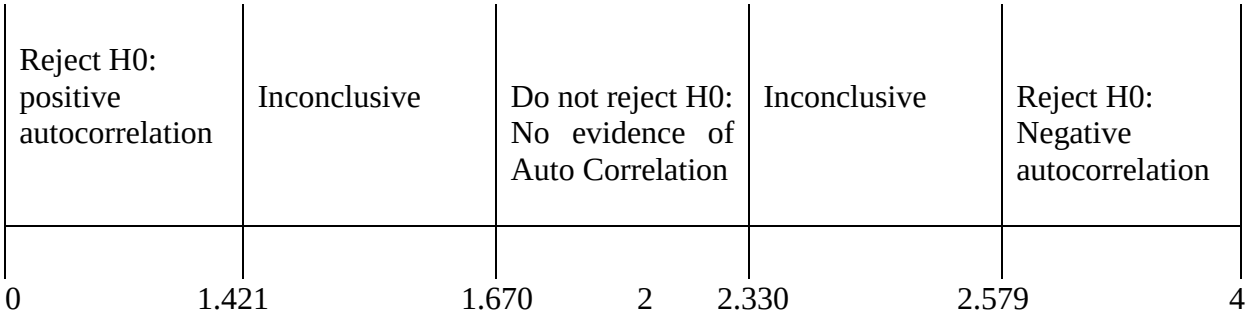


Table 4.6 DW Test result –Test of autocorrelation

Variables	Durbin-Watson test Statistics	
Bank Specific and Macro Economic Factors	**L1 Model**	**L2 Model**
	1.593	1.774

Source: computation through E-views 8

As indicated in the table 4.5, the Durbin-Watson test statistic value was 1.593 and 1.774 for model L1 and L2, respectively. As mentioned in the previous chapters, to analyze factors affecting Commercial banks liquidity in Ethiopia 108 (6*18) observations were used in the models.

Therefore, the relevant critical values for the test are dL= 1.421, dU= 1.670,

i.e., for 108 Observations (N) and 6 regressors (K) and 4-dU = 4-1.670=2.330; 4-dL=

4-1.421=2.579.

The DW value (1.593) of L1 and (1.774) of L2 lies in the inconclusive region and where the null hypothesis of no autocorrelation can neither be rejected nor not rejected respectively .Generally, there is no first order autocorrelation problem in the regression model of all of dependant variable.

4.3.3 Normality Test

The other classical linear regression model assumption is normally distribution of the residual. The classical normal linear regression model assumes that each ui is distributed normally with mean and standard deviation values are near to 0 and 1 respectively Gujarati (2004). To test the normality assumption in this study the researcher applied the Jarque-Bera (JB) test. As noted by Brooks (2008)

JB uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments -- the mean and the variance.

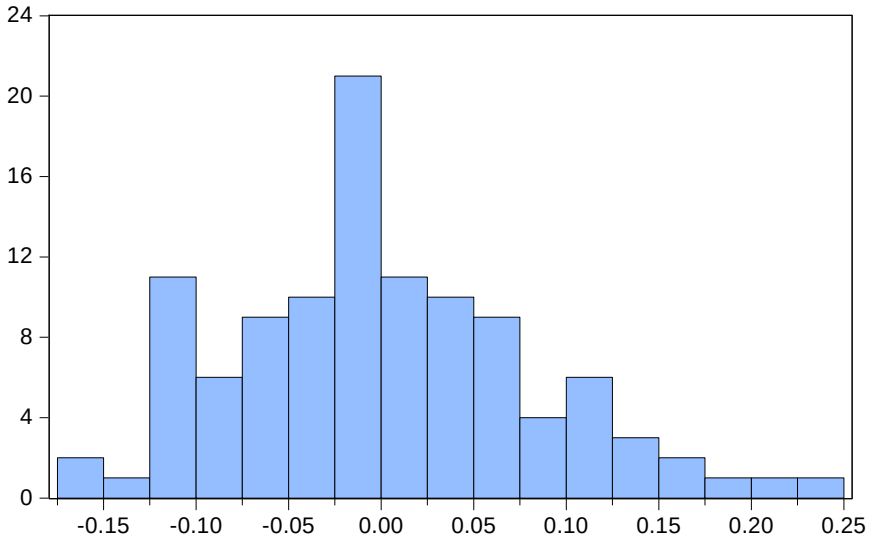
The standardized third and fourth moments of a distribution are known as its skewness and kurtosis. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distributed. If the residuals are normally distributed, the histogram should be bell shaped and the Jarque-Bera statistic would not be significant. This means that the p-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% significant level.

In this study normality of the regression models' residuals is tested with the Jarque- Bera measure. If the Jarque-Bera value is smaller than 0.05, the hypothesis of the normality must be rejected (Brooks, 2008). However, if the sample is big enough, the non-normality of residuals do not cause trouble. The histograms of model residuals values are presented in the following table where the Jarque-Bera value is greater than 0.05

As clearly plotted in figure 4.3 and 4.4 the normality test for this study shows a p-value of Jarque-Bera (i.e. 0.11 and 0.79 for L1 and L2 respectively) which is greater than 0.05 and the histogram is also bell-shaped implying that the residuals of this study is normally distributed.

Thus, since the sample size for this study is large enough, it is approximately considered as normally distributed. This implies that residuals area asymptotically normal in this study. As shown in the histogram in the appendix (2) kurtosis approaches to 3 (i.e. 3.12 for Liq1, 3.10 for Liq2. Hence, the null hypothesis that is the error term is normally distributed should not be rejected and it seems that the error term in all of the cases follows the normal distribution.

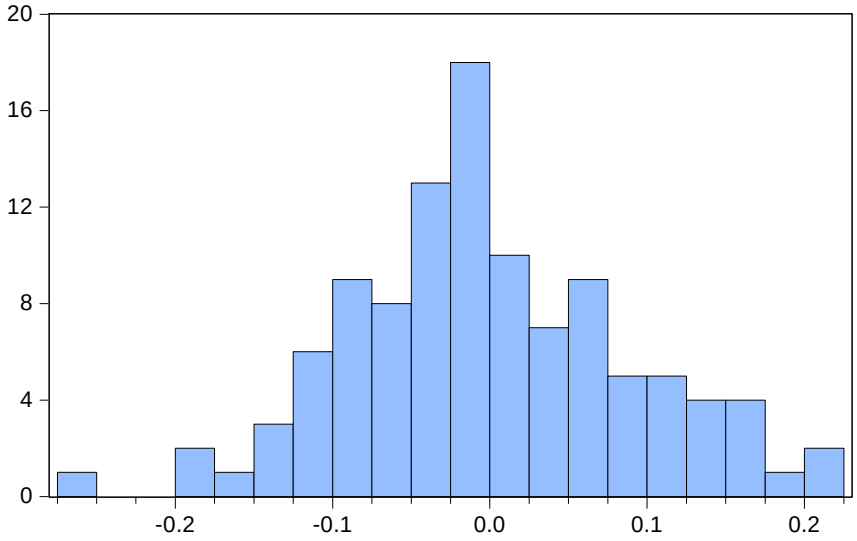
Figure 4.3 Normality Test: for L1



Series: Standardized Residuals	
Sample 2000 2017	
Observations 108	
Mean	-1.28e-18
Median	-0.008519
Maximum	0.243402
Minimum	-0.161858
Std. Dev.	0.080924
Skewness	0.482393
Kurtosis	3.120265
Jarque-Bera	4.253741
Probability	0.119210

Source: computation through E-views 8

Figure 4.4 Normality Test: for L2



Series: Standardized Residuals	
Sample 2000 2017	
Observations 108	
Mean	-5.14e-19
Median	-0.008554
Maximum	0.223876
Minimum	-0.262955
Std. Dev.	0.089225
Skewness	0.151163
Kurtosis	3.104320
Jarque-Bera	0.460275
Probability	0.794424

Source: computation through E-views 8

4.3.4 Mutlicolinearity Test

The other very important assumption of the classical linear regression model is multicollinearity. According to Guajarati (2004) one of the assumptions of the classical linear regression model is that

there is no multicollinearity among the explanatory variables, the Xs. Broadly interpreted, multicollinearity refers to the situation where there is either an exact or approximately exact linear relationship among the explanatory variable. To test the multicollinearity problem the current study used correlation matrix between the explanatory variables.

According to Kennedy (2008) multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.70 Table 4.5 below shows the correlation coefficient among explanatory variables in this study. Therefore, there is no evidence for presence of multicollinearity problem in this study model

Table 4.5 Correlation Matrix for Independent Variables.

	BSIZE	CAP	GDP	INFL	LG	ROE
BSIZE	1					
CAP	0.337	1				
GDP	0.421	0.563	1			
INFL	0.274	0.602	0.525	1		
LG	-0.459	-0.271	-0.331	-0.218	1	
ROE	-0.176	0.126	-0.059	-0.044	0.206	1

Source: computation through E-views 8

4.4 Choosing Random Effect (RE) versus Fixed Effect (FE) Model

In order, achieve the objective of the study the researcher-employed panel Data model. As far as the Data is concerned, comprising both time series and cross sectional elements, panel model is appropriate. In order, achieve the objective of the study the researcher-employed panel Data model. As far as the Data, comprising both time series and cross-sectional elements panel model is appropriate. The choice of this methods are comparing time series and cross-sectional units and by using Hausman specification test.

As noted by Gujarati (2004) if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model and random effect model.

Hence, the choice here is based on computational convenience. On this score, random effect model may be preferable.

The best alternative to make a choice between fixed effects and random effects model is conducting Hausman specification test. In this study the Hausman Specification tests is utilized to decide which model is appropriate to fit the sample data. Hausman specification test is the classical test of whether

the fixed or random effects model should have used. Running a Hausman specification test at five percent level enables the researcher to choose between fixed effects and random effects models (Hausman, 1978). The hypothesis for Hausman specification test is:

Null hypothesis: - Random effect model is more appropriate

Alternative hypothesis: - Fixed effect model is more appropriate

Decision rule: if the P-value from the Hausman test is statistically significant (less than five percent) the fixed-effect model is preferred in favor of random effect, otherwise the random effect model is selected. The result from Hausman test in table allow as to not reject the null hypothesis that random model is better in this regression analysis. This implies that fixed effect model is more appropriate than Random effect model to undertake the panel regression estimation for this study.

Table 4.6 Correlated Random Effects -Hausman test for L1

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	16.765119	4	0.0021

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
BSIZE	-0.017607	-0.024471	0.000026	0.1818
CAP	1.269883	1.115480	0.010580	0.1333
LG	-0.029391	-0.051275	0.000042	0.0008
ROE	0.044834	0.047088	0.000005	0.3012

Period random effects test equation:
Dependent Variable: L1
Method: Panel Least Squares
Date: 06/01/19 Time: 20:55
Sample: 2000 2017
Periods included: 18
Cross-sections included: 6
Total panel (balanced) observations: 108
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.534558	0.240627	2.221527	0.0289
BSIZE	-0.017607	0.008451	-2.083498	0.0402
CAP	1.269883	0.268833	4.723686	0.0000
GDP	NA	NA	NA	NA

INFL	NA	NA	NA	NA
LG	-0.029391	0.025009	-1.175241	0.2431
ROE	0.044834	0.008716	5.143731	0.0000

Effects Specification

Period fixed (dummy variables)

R-squared	0.844092	Mean dependent var	0.348628
Adjusted R-squared	0.806021	S.D. dependent var	0.133099
S.E. of regression	0.058621	Akaike info criterion	-2.655825
Sum squared resid	0.295532	Schwarz criterion	-2.109465
Log likelihood	165.4146	Hannan-Quinn criter.	-2.434296
F-statistic	22.17171	Durbin-Watson stat	1.558996
Prob(F-statistic)	0.000000		

Source: computation through E-views 8

Table 4.7 Correlated Random Effects - Hausman Test for L2

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	13.493689	4	0.0091

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
BSIZE	-0.026015	-0.038886	0.000057	0.0873
CAP	-0.031400	0.366435	0.025076	0.0120
LG	0.119500	0.130626	0.000107	0.2828
ROE	-0.020898	-0.030614	0.000011	0.0036

Period random effects test equation:
Dependent Variable: L2
Method: Panel Least Squares
Date: 06/01/19 Time: 21:04
Sample: 2000 2017
Periods included: 18
Cross-sections included: 6
Total panel (balanced) observations: 108
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.417139	0.305215	4.643078	0.0000
BSIZE	-0.026015	0.010719	-2.426960	0.0173
CAP	-0.031400	0.340993	-0.092083	0.9268
GDP	NA	NA	NA	NA
INFL	NA	NA	NA	NA
LG	0.119500	0.031722	3.767149	0.0003
ROE	-0.020898	0.011056	-1.890273	0.0621

Effects Specification			
Period fixed (dummy variables)			
R-squared	0.791396	Mean dependent var	0.714299
Adjusted R-squared	0.740458	S.D. dependent var	0.145953
S.E. of regression	0.074356	Akaike info criterion	-2.180281
Sum squared resid	0.475478	Schwarz criterion	-1.633921
Log likelihood	139.7352	Hannan-Quinn criter.	-1.958752
F-statistic	15.53640	Durbin-Watson stat	1.415272
Prob(F-statistic)	0.000000		

Source: computation through E-views 8

4.5 Results of the Regression Analysis (Fixed Effect)

This section presents a fixed effect model regression result to examine the impact of explanatory variables (BSIZE, CAP, GDP, INFL, LG, and ROE) on the Liquidity of Private Commercial banks in Ethiopia. Table 4.8 and 4.9 displays fixed effect model regression estimation result.

Table 4.8 Fixed Effect Regression Result for L1

Dependent Variable: L1
Method: Panel Least Squares
Date: 06/01/19 Time: 21:01
Sample: 2000 2017
Periods included: 18
Cross-sections included: 6
Total panel (balanced) observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.377531	0.166772	8.259968	0.0000
BSIZE	-0.037575	0.006000	-6.262471	0.0000*
CAP	0.647337	0.285222	2.269589	0.0255**
GDP	-0.443208	0.305125	-1.452546	0.1496
INFL	0.026948	0.082986	0.324731	0.7461
LG	-0.150243	0.031247	-4.808315	0.0000*
ROE	0.050301	0.011487	4.378957	0.0000*

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.630337	Mean dependent var	0.348628
Adjusted R-squared	0.587979	S.D. dependent var	0.133099
S.E. of regression	0.085435	Akaike info criterion	-1.977687
Sum squared resid	0.700715	Schwarz criterion	-1.679672
Log likelihood	118.7951	Hannan-Quinn criter.	-1.856853
F-statistic	14.88144	Durbin-Watson stat	1.593443
Prob(F-statistic)	0.000000		

Source: computation through E-views 8

Note: * significant at 1%, ** Significant at 5%, and *** insignificant
The estimated model is the following:

Liq1= 1.377 - 0.037BSIZE +0.647CAP -0.443GDP +0.026INFL -0.150LG +0.050ROE
(0.1667) (0.0060) (0.2852) (0.3051) (0.0829) (0.0312) (0.0114)

R2 = 0.630 Adjusted R2 = 0.587 Prob. (F-statistic) = 0.000000 DW = 1.593

Note: values in parentheses are standard errors

The estimation result of the panel regression model used in this study is reported in table 4.8 displays the results of the regression analysis regarding the determinant of explanatory variables on the liquidity of Private commercial banks in Ethiopia (L1).Accordingly, the R-squared statistics and the Adjusted-R squared statistics of the model are 0.630 and 0.587 respectively. These indicate that explanatory variables included in this model could explain variation in the dependent variable by about 63% and 58.7% respectively. The explanatory power of models is substantially higher. The remaining 41.3% can be taken as the role of explanatory variables that are not included in this model, but that have impact on Liquidity. The Value of F-Statistics is 14.88144 with P-Value of 0.000000 which is used to measure the overall significance of the Model.

Under the following regression outputs the beta coefficient was negative and positive; beta indicates that each variable's level of influence on the dependent variable. P-value indicates at what percentage level of each variable is significant. R2 values indicate the explanatory power of the model and in this study adjusted R2 value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models and F-probability of 0.000 indicates that the model fit the sample data well and the explanatory variables are jointly significant. All the independent variables jointly have statistically significant impact on Liquidity of Private Commercial banks of Ethiopia. The above table presents results of liquid assets to total assets ratio (L1) as dependent variable and bank specific and macroeconomic explanatory variables for the sample of six private commercial banks in Ethiopia. As it is shown in the above table, bank size (BSIZE), Loan Growth (LG) and Return on equity (ROE) had statistically significant influence on Ethiopian private commercial bank's liquidity (L1) at 1% significant level. The other statistically significant variable, Capital Adequacy (CAP) had statistically significant impact on liquidity (L1) at 5% significant level. The other variables such as capital Inflation (INFL) and gross domestic product (GDP) were statistically insignificant impact on liquidity (L1). On the other hand the coefficient sign of bank size (BSIZE) and return on equity (ROE) were contrary to our expectations whereas the

coefficient sign of capital adequacy (CAP), loan growth (LG) gross domestic product (GDP) and inflation (INFL) were aligned with our expectations.

Table 4.9 Fixed Effect Regression Result for L2

Dependent Variable: L2
Method: Panel Least Squares
Date: 06/01/19 Time: 21:05
Sample: 2000 2017
Periods included: 18
Cross-sections included: 6
Total panel (balanced) observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.875150	0.183879	10.19771	0.0000
BSIZE	-0.042524	0.006616	-6.427850	0.0000*
CAP	0.811734	0.314480	2.581192	0.0114**
GDP	-0.882056	0.336425	-2.621850	0.0102**
INFL	0.063859	0.091499	0.697924	0.4869
LG	0.152568	0.034452	4.428437	0.0000*
ROE	-0.047942	0.012665	-3.785280	0.0003*

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.626274	Mean dependent var	0.714299
Adjusted R-squared	0.583451	S.D. dependent var	0.145953
S.E. of regression	0.094199	Akaike info criterion	-1.782381
Sum squared resid	0.851846	Schwarz criterion	-1.484366
Log likelihood	108.2486	Hannan-Quinn criter.	-1.661547
F-statistic	14.62478	Durbin-Watson stat	1. 77430
Prob(F-statistic)	0.000000		

Source: computation through E-views 8

Note: * significant at 1%, **Significant at 5%, and *** insignificant
The estimated model is the following:

Liq2= 1.875 - 0.042BSIZE +0.811CAP -0.882GDP +0.063INFL+0.152LG -0.047ROE
(0.1838) (0.0066) (0.3144) (0.3364) (0.0914) (0.0344) (0.01266)

R2 = 0.626 Adjusted R2 = 0.583 Prob. (F-statistic) = 0.000000 DW = 1.774

Note: values in parentheses are standard errors

The estimation result of the panel regression model used in this study is reported in table 4.9 display accordingly, the R-squared statistics and the Adjusted-R squared statistics of the model are 0.626 and 0.583 respectively. These indicate that explanatory variables included in this model could explain variation in the dependent variable by about 58.3%. The explanatory power of models is substantially higher. The remaining 41.7% can be taken as the role of explanatory variables that are not included in this model, but that have impact on Liquidity. Determinants of Private commercial banks liquidity

measured by L2 are presented in the above table. This ratio measures the amount of volatile liabilities (i.e. deposits) tied up with illiquid assets (i.e. loans). As high value of this ratio means low liquidity, these results have to be interpreted in reverse: positive sign of the coefficient means negative impact on liquidity and conversely.

The result of the analysis show that six factors influence the amount of liquid liabilities/deposits and tied up to illiquid assets/loans and advances to customers. Bank size, GDP and ROE against L2 were negatively related with Liquidity, and the coefficient of those variables are -0.0425,-0.8820 and -0.0479 respectively, and Loan Growth, Capital Adequacy, and Inflation had a positively related with Liquidity which was measured by L2 and the coefficients for those variables are 0.1525, 0.8117, and 0.0638 respectively. This indicates that there was an inverse relationship between the aforementioned six independent variables and L2.Thus, the increase of those variables will lead to decrease in L2.

On the other hand, the coefficient signs of Bank Size and Loan Growth were opposite to our expectations, where as the coefficient sign of Capital adequacy, GDP, Inflation and Return on equity were aligned with our expectations. Thus the overall result shows that, bank liquidity (L2) decreases with higher Bank Size and GDP while increases with higher capital adequacy and Inflation. In this regard, Capital adequacy, Return on Equity, GDP and Inflation had coefficient sign which is in-line with our expectations while the coefficient sign of the other statistically significant variables are contrary to our expectations. The regression result shows that, statistically significant influence of bank size and Loan Growth on liquidity which is measured by L2 was consistent with the result found on the study made by Tseganesh (2012)

4.6 Discussion of the regression results

4.6.1 Determinants of Banks Liquidity (Discussion)

This section discussed the bank specific and macroeconomic factors of determinants of banks liquidity. Two model are tested; model 1 represents that the liquidity is measured by L1 (cash and cash equivalents to total assets) whereas model 2 represents that the liquidity is measured by L2 (loans and advance to total deposit) in this study the researcher depends on both measurements L1 and L2 because there is no autocorrelation.

4.6.1.1Capital Adequacy and Liquidity:

Although, the study expected positive and statistically significant impact of capital adequacy on liquidity that matches with findings of Czech commercial banks analysis (Vodova 2011) and with that the argument of risk absorption, That is, the higher capital to total assets ratio of banks the higher the capacity of the bank to absorb risks and create higher level of liquidity to the external public through deposits and loans. In other words, higher capital ratio of banks create positive signal to the external public and attract more deposits. Though, the regression result of the study shows similar result with that of our hypothesis .the regression result of L1 liquidity measured by liquid asset to total asset shows positive relationship between capital adequacy and liquidity, and statistically significant impact on liquidity.

Though, capital adequacy had positive relationship and statistically significant impact on banks liquidity measured by L2. The coefficient sign of capital adequacy in this equation was parallel to hypothesis and in line with hypothesis .So that, as per the findings we fail to reject the hypothesis saying Capital adequacy has positive and significant impact on banks liquidity.

4.6.1.2 Bank size and liquidity

The positive and statistically significant impact of bank size on liquidity as per L1 and L2 was inconsistent with hypothesis (2) .The result in this study found that Bank Size (Bsize) had a negative and statistically significant impact on liquidity of Private commercial banks which was measured by L1 and L2.This negative sign of the coefficient indicates the inverse relationship between bank size and Liquidity. This is to mean that small banks has little cash and cash equivalent reserves in other banks (central bank and other commercial banks) since they have little dealing with other types of investment instruments than loans. The value of the coefficient in the case of L2 (i.e. -0.0425) indicating higher impact of size on the liquidity position of Private commercial banks in Ethiopia. In other words, being other variables constant, 1 birr rise/decline in total assets result in -0.0425 birr rise/decline in liquid assets. The value of the coefficient in the case of L2 was higher than in the case of L1 (i.e. -0.0375). Generally, the results in both L1 and L2 cases exposed that bank liquidity decreases with the size of banks in which medium and smaller sized may hold a shock absorber of Liquid Asset. Consequently, the hypothesis: bank size has positive and significant impact on banks should be rejected.

4.6.1.3 Loan Growth and Liquidity

The loan portfolio is typically the largest asset and the predominate source of revenue. Lending is the principal business activity for most commercial banks, and loan is one of the greatest sources of risk to a banks safety and soundness. Since, loans are illiquid assets; increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. In the model, loan growth has statistically significant and negative influence on the liquidity of Private commercial Banks. Liquidity is decreasing with increasing the rate of loan growth. Thus, regression result of fixed effect model was consistent with the hypothesis developed in this study. The study hypothesized that, Loan growth has negative and significant impact on banks liquidity. This negative sign indicates an inverse relationship between loan growth and liquidity position measured by liquid asset to total asset (L1). Thus, the coefficient sign of -0.1502 reveals that there is a negative relationship between Liquidity of Private commercial banks measured by L1 and Loan Growth of banks. This implies that for one percent change in the loan growth rate, keeping other thing constant had resulted -0.1502 unit adjustments on the levels of liquid asset to total asset (L1), in the portfolio in opposite direction 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.

Conversely, Loan growth had positive relation and statistically significant impact on liquidity of Ethiopian Private commercial banks which was measured by L2. This result was opposite to our hypothesis and the coefficient sign was also in the opposite direction of our expectation.

Thus, the first hypothesis, Loan Growth negative and significant impact on banks liquidity was rejected as per the findings.

4.6.1.4 GDP Growth Rate and Liquidity:

Although most studies assumed the negative link between business cycle and bank liquidity, the results show that the approach of Moore (2010) is true for Ethiopia banking sector. The positive sign of the coefficient signals that cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity. Moreover, this finding is fully consistent with philosophy that during expansionary phases, companies (which have higher profits) and households (which have higher income) might prefer to rely more on internal sources of finance and reduce the relative proportion of external financing and might reduce their debt levels. In recessions, households and corporations may increase their demand for bank credit in order to smooth out the impact of lower income and profits (Calza et al., 2001) which reduced the liquidity position of banks. Most borrowers want to take a loan during expansion when they have valuable investments projects. Banks which would like to satisfy the growing demand for loans would face lower liquidity. The regression also shows that Real GDP growth rate is not statistically significant variable even at 10% significance level with p-value of 0.1496. This implies that GDP growth rate of Ethiopia do not have a relationship with Ethiopian Private commercial banks liquidity. As the result in both regression model shows GDP growth rate has statistically insignificant and positive influence on the liquidity of private commercial

Banks. Liquidity is increasing with increasing the rate of real GDP growth. Thus, regression result of fixed effect model is inconsistent with the hypothesis developed in this study. Therefore, the hypothesis stating negative and significant relationship between real GDP growth rate and banks liquidity should be rejected. The result was similar with findings of Tseganesh (2012) and Vodova (2011) and it is inconsistent with the finding of Vodova (2013).

4.6.1.5 Inflation and liquidity

Inflation had positive impact on banks liquidity measured by L1 and L2. The positive and statistically insignificant impact of inflation on liquidity of private commercial in the case of L1 was opposite to researcher hypothesis which was based on the argument that is based on the theory of information asymmetry, stating in the inflationary economy, economic units including commercial banks are refraining from long term investments due to the decline in the real value of their investments that make worse the credit market rationing and prefer to hold risk free/liquid assets. The value of the coefficient (i.e. 0.0269 and 0.06385 for L1 and L2 respectively) indicates for a percentage rise/decline in the general inflation rate of the country, commercial banks holding of liquid assets rise/decline by 2.69% and 6.39% respectively changes in the same direction.

The result as per L2 also opposite to our hypothesis that is inflation rate of the country had Positive and statistically insignificant effect on liquidity. Hence, the result in both measures of liquidity shows insignificant result, we reject the hypothesis stating Inflation has positive and significant impact on banks liquidity. Therefore, the study fail to reject the hypothesis stating inflation has positive and significant impact on banks liquidity. The result of this study is opposite to the findings of Vodova (2011, 2013) and it is consistent with the findings of Tseganesh (2012).

4.6.1.6 Profitability and Liquidity

The results of fixed effect model in table 4.9 indicated that positive link between profitability. Profitability in this study is measured by return on equity (ROE), and liquidity measured by the ratio of L1 which can be quite surprising. The result is conflicting with researcher's expectations and also a finance theory which emphasizes the negative correlation of liquidity and profitability. Moreover, the coefficient of profitability was statistically significant at 1% significance level. This positive relation shows that, higher profitability leads to increase banks liquidity. However, as the major profitability of banks comes from loans and advances and in return the increase on loans leads to decrease in liquid asset, the result should have been in the opposite direction. Thus, the hypothesis that states there is a significant relationship between profitability and liquidity may be rejected or data did not support the

hypothesis. Referring to previous studies, the results concerning profitability are mixed. The result of this study is similar to the findings of Aspachs et al, (2005), and it was opposite to Vodova (2011) and Vodova (2013). Therefore, conclusion about the impact of Ethiopian bank's profitability on liquidity remains vague and additional investigation is required.

Chapter Five- Conclusion and Recommendation

In this last chapter, the major findings of the study were summarized; conclusions were drawn Based on the findings and recommendations were forwarded accordingly.

5.1 Conclusion

Banks perform an activity of financial intermediation that involves risk. One of the main risks that banks need to manage is the liquidity risk. The bank's intermediation activity is characterized by the acceptance of short-term deposits (demand and term deposits) and the granting of medium and long term loans. They must be prepared to meet their withdrawals of deposits at any moment of time.

The panel data was used for the sample of six private commercial banks in Ethiopia from 2000 to 2017. Data was presented by using descriptive statistics. The balanced correlation and regression analysis for two liquidity ratios was conducted. Before performing PLS regression the models were tested for the classical linear regression model assumptions. There was no problem of first order positive serial autocorrelation in all of dependent variables and the models fulfill other assumptions of the CLRM. Fixed effect model/FEM was used based on Hausman Test. Six factors affecting banks liquidity were chosen and analyzed. From the list of possible explanatory variables, most of them proved to be statistically significant. The results of models enable us to make following conclusions.

The regression model of L1 shows capital adequacy has positive and significant impact on liquidity. The result of L2 also shows Parallel result with the proposed hypothesis that is positive and significant effect. The effect of bank size on liquidity of private commercial banks in Ethiopia was negative and significant as per both L1 and L2 measures. Loan growth has negative and significant effect on liquidity on measure by L1 and positive and significant impact on liquidity measured by L2. Profitability has Positive and significant effect on liquidity on measure by L1 and negative and significant impact on liquidity measured by L2. It is also found that inflation rate and real GDP growth rate had no statistically significant effect on the liquidity of Ethiopians private commercial banks both in the case of L1 and L2.

The study found that capital adequacy can affect liquidity of private commercials banks in Ethiopia negatively this was in line with the financial fragility structure and the crowding-out of deposits hypothesis. Financial fragility (weakness) structure, characterized by lower capital, tends to favor liquidity creation (Diamond and Rajan, 2000, 2001), while higher capital ratios may crowd out deposits and thereby reduce liquidity creation (Gorton and Winton 2000). Consequently, higher capital

ratios shift investors' funds from relatively liquid deposits to relatively illiquid bank capital. Thus the higher is the bank's capital ratio; the lower is its liquidity creation.

The regression result of L1 shows bank size has negative and statistically significant effect on liquidity of private commercial banks in Ethiopia. Liquidity is decreasing with the size of the bank. It seems that big banks insure against liquidity crises mainly by passive strategies: they rely on the interbank market or on a liquidity assistance of the Lender of Last Resort. This finding fully corresponds to the well known "too big to fail" hypothesis. If big banks are seeing themselves as "too big to fail", their motivation to hold liquid assets is limited. Bank sizes have positive and statistically significant effect. As per L2, Bank liquidity increases with higher bank size.

Annual growth rate of loan in private banks can affect liquidity negatively; negative sign indicates an inverse relationship between loan growth and liquidity position measured by liquid asset to total asset (L1). Conversely, Loan growth had positive relation and statistically significant impact on liquidity of Ethiopian Private commercial banks which was measured by L2.

The regression result of the model shows that inflation rate and real GDP growth rate had no statistically significant effect on the liquidity of Ethiopia's commercial banks both in the case of L1 and L2.

The ultimate policy objective of any country in general is to have sustainable economic growth and development. Policy measures are geared at achieving moderate inflation rate, keeping unemployment rate low, balancing foreign trade, stabilizing exchange and interest rates, etc aim general attaining stable and well functioning macro-economic environment. In this process, monetary policy plays a central role. As indicated in chapter two Different Monterey policy instrument has been implemented by national banks of Ethiopia.

5.2 Recommendation

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

- The share of capital on the total asset of each Private commercial bank in Ethiopia has positive and significant effect on liquidity. This result suggested that small banks have good capability to create liquidity than big banks interims of asset that is according to "to big to fail assumption" to much capital hinders liquidity creation therefore, it is recommended for all commercial banks to be active in liquidity creation in addition to their capital.

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- It is clearly known that annual loan growth rate have Positive effect on liquidity. higher loan growth signals increase in illiquid assets .the result of the regression of the study also in line with this fact therefore it is recommended for all commercial banks to exercise greater care during granting credit periodic follow-up on the loan is crucial.

- Overall these empirical results provide evidence that, the liquidly of private Ethiopian commercial banks are shaped by bank-specific factors, and macroeconomic that are not the direct result of a bank's managerial decisions. So, the banks' managers and policy makers should give high concern and set direction to manage properly bank-specific determinants
- Private Commercial banks in Ethiopia should identify their optimal level of liquid asset holdings by weighting the marginal costs and marginal benefits of holding them. The benefits related to cash holdings are: reducing the likelihood of financial distress, allows the pursuance of investment policy when financial constraints are met, and minimizes the costs of raising external funds or liquidating existing assets. The main cost of holding cash is the opportunity cost of the capital invested in liquid assets. Banks will therefore trade-off holding cash and investing it depending on its investment needs.

- In this researching area, the future researcher shall be conduct research on the issue like current government policy on bond purchasing principle imposed on the banks by the government to observe their effect on the liquidity and profitability of private commercial banks. Because the variables included in this study were not exhaustive. Future researchers could include other bank specific and macroeconomic variables(such as interest rate on interbank transaction) ,and

more detail study should be recommended to be carried out on each monetary policy instrument to determine significant determinants of regulatory factor on liquidity position of commercial banks of Ethiopia. It could be also useful if future researcher divides banks into groups according to their size and to estimate determinants of liquidity separately for small, medium-sized and large banks.

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APPENDICES:

Appendix 1. Heteroscedasticity Test

Heteroscedasticity Test for Model 1(L1)

Heteroscedasticity Test: White

F-statistic	0.907163	Prob. F(27,80)	0.6000
Obs*R-squared	25.31536	Prob. Chi-Square(27)	0.5568
Scaled explained SS	37.62660	Prob. Chi-Square(27)	0.0840

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/01/19 Time: 21:08
Sample: 1 108
Included observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.629982	0.576758	-1.092281	0.2780
BSIZE^2	-0.000805	0.000718	-1.121751	0.2653
BSIZE*CAP	0.030914	0.051872	0.595977	0.5529
BSIZE*GDP	-0.037943	0.059440	-0.638348	0.5251
BSIZE*INFL	0.039189	0.023191	1.689836	0.0950
BSIZE*LG	-0.000986	0.007667	-0.128559	0.8980
BSIZE*ROE	-0.006970	0.018480	-0.377184	0.7070
BSIZE	0.044953	0.040537	1.108942	0.2708
CAP^2	-0.121465	1.036972	-0.117135	0.9070
CAP*GDP	0.090453	2.292147	0.039462	0.9686
CAP*INFL	0.184795	0.713810	0.258885	0.7964
CAP*LG	0.303509	0.351230	0.864130	0.3901
CAP*ROE	0.750743	0.832804	0.901464	0.3700
CAP	-1.100703	1.455870	-0.756045	0.4518
GDP^2	0.359085	1.501394	0.239167	0.8116
GDP*INFL	-0.804271	0.958824	-0.838809	0.4041
GDP*LG	-0.045558	0.358419	-0.127107	0.8992
GDP*ROE	-1.059481	0.875140	-1.210642	0.2296
GDP	1.180157	1.626994	0.725361	0.4703
INFL^2	0.174880	0.242215	0.722004	0.4724
INFL*LG	-0.133111	0.157683	-0.844166	0.4011
INFL*ROE	0.065319	0.227106	0.287613	0.7744
INFL	-0.934347	0.621066	-1.504425	0.1364
LG^2	0.015600	0.018853	0.827460	0.4104
LG*ROE	-0.302817	0.145824	-2.076594	0.0410
LG	0.032571	0.212721	0.153116	0.8787
ROE^2	-0.006603	0.023671	-0.278955	0.7810

ROE	0.353488	0.520011	0.679771	0.4986

R-squared	0.234401	Mean dependent var	0.007516
Adjusted R-squared	-0.023988	S.D. dependent var	0.013921
S.E. of regression	0.014087	Akaike info criterion	-5.468769
Sum squared resid	0.015875	Schwarz criterion	-4.773402
Log likelihood	323.3136	Hannan-Quinn criter.	-5.186823
F-statistic	0.907163	Durbin-Watson stat	1.560900
Prob(F-statistic)	0.599967		

Heteroscedasticity Test -for Model 2(L2)

Heteroskedasticity Test: White

F-statistic	1.175311	Prob. F(27,80)	0.259
Obs*R-squared	32.46486	Prob. Chi-Square(27)	0.463
Scaled explained SS	25.75085	Prob. Chi-Square(27)	0.0635

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/01/19 Time: 21:09
Sample: 1 108
Included observations: 108

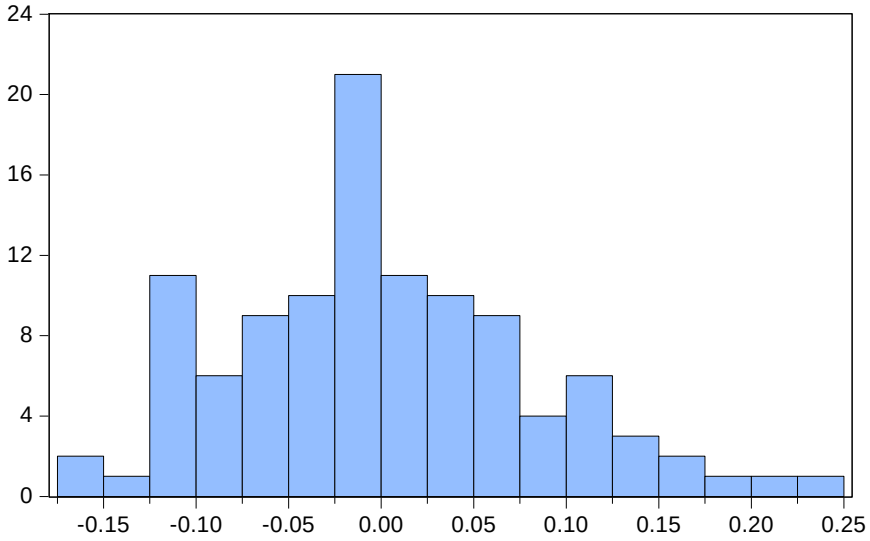
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.091107	0.483080	0.188596	0.8509
BSIZE^2	-0.000215	0.000601	-0.358064	0.7212
BSIZE*CAP	0.004892	0.043447	0.112589	0.9106
BSIZE*GDP	-0.009903	0.049786	-0.198904	0.8428
BSIZE*INFL	0.006500	0.019424	0.334626	0.7388
BSIZE*LG	0.007499	0.006422	1.167661	0.2464
BSIZE*ROE	0.025322	0.015478	1.635954	0.1058
BSIZE	0.002399	0.033953	0.070644	0.9439
CAP^2	0.713630	0.868545	0.821639	0.4137
CAP*GDP	-0.920752	1.919853	-0.479595	0.6328
CAP*INFL	-0.555594	0.597872	-0.929286	0.3555
CAP*LG	-0.163117	0.294183	-0.554474	0.5808
CAP*ROE	-0.904352	0.697539	-1.296490	0.1985
CAP	0.109576	1.219406	0.089860	0.9286
GDP^2	-0.067770	1.257535	-0.053891	0.9572
GDP*INFL	0.920262	0.803091	1.145900	0.2553
GDP*LG	0.041175	0.300204	0.137156	0.8913
GDP*ROE	0.552519	0.732998	0.753779	0.4532
GDP	0.247813	1.362735	0.181850	0.8562
INFL^2	-0.201472	0.202874	-0.993087	0.3237
INFL*LG	-0.000243	0.132072	-0.001842	0.9985
INFL*ROE	0.262993	0.190219	1.382583	0.1706
INFL	-0.275346	0.520191	-0.529316	0.5981
LG^2	0.011496	0.015791	0.728023	0.4687
LG*ROE	0.076692	0.122139	0.627908	0.5319
LG	-0.206839	0.178171	-1.160905	0.2491
ROE^2	0.026366	0.019826	1.329821	0.1874
ROE	-0.698139	0.435550	-1.602891	0.1129

R-squared	0.374675	Mean dependent var	0.008462
Adjusted R-squared	0.163627	S.D. dependent var	0.012901
S.E. of regression	0.011799	Akaike info criterion	-5.823250

Sum squared resid	0.011137	Schwarz criterion	-5.127883
Log likelihood	342.4555	Hannan-Quinn criter.	-5.541304
F-statistic	1.775311	Durbin-Watson stat	1.379792
Prob(F-statistic)	0.025892		

Appendix-2: Normality test

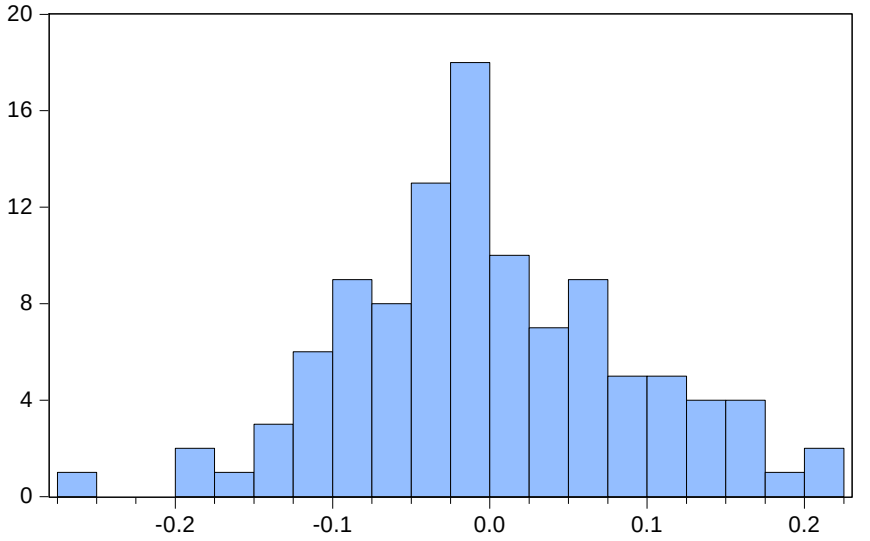
Normality test for Model 1 (L1)



Series: Standardized Residuals
Sample 2000 2017
Observations 108

Mean	-1.28e-18
Median	-0.008519
Maximum	0.243402
Minimum	-0.161858
Std. Dev.	0.080924
Skewness	0.482393
Kurtosis	3.120265
Jarque-Bera	4.253741
Probability	0.119210

Normality test for Model 2 (L2)



Series: Standardized Residuals
Sample 2000 2017
Observations 108

Mean	-5.14e-19
Median	-0.008554
Maximum	0.223876
Minimum	-0.262955
Std. Dev.	0.089225
Skewness	0.151163
Kurtosis	3.104320
Jarque-Bera	0.460275
Probability	0.794424

Appendix-3: Regression result (Fixed effect)

Dependent Variable: L1
Method: Panel Least Squares
Date: 06/01/19 Time: 21:01
Sample: 2000 2017
Periods included: 18
Cross-sections included: 6
Total panel (balanced) observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.377531	0.166772	8.259968	0.0000
BSIZE	-0.037575	0.006000	-6.262471	0.0000
CAP	0.647337	0.285222	2.269589	0.0255
GDP	-0.443208	0.305125	-1.452546	0.1496
INFL	0.026948	0.082986	0.324731	0.7461
LG	-0.150243	0.031247	-4.808315	0.0000
ROE	0.050301	0.011487	4.378957	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.630337	Mean dependent var	0.348628
Adjusted R-squared	0.587979	S.D. dependent var	0.133099
S.E. of regression	0.085435	Akaike info criterion	-1.977687
Sum squared resid	0.700715	Schwarz criterion	-1.679672
Log likelihood	118.7951	Hannan-Quinn criter.	-1.856853
F-statistic	14.88144	Durbin-Watson stat	1.593443
Prob(F-statistic)	0.000000		

Dependent Variable: L2
Method: Panel Least Squares
Date: 06/01/19 Time: 21:05
Sample: 2000 2017
Periods included: 18
Cross-sections included: 6
Total panel (balanced) observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.875150	0.183879	10.19771	0.0000
BSIZE	-0.042524	0.006616	-6.427850	0.0000
CAP	0.811734	0.314480	2.581192	0.0114
GDP	-0.882056	0.336425	-2.621850	0.0102
INFL	0.063859	0.091499	0.697924	0.4869
LG	0.152568	0.034452	4.428437	0.0000
ROE	-0.047942	0.012665	-3.785280	0.0003

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.626274	Mean dependent var	0.714299
Adjusted R-squared	0.583451	S.D. dependent var	0.145953

S.E. of regression	0.094199	Akaike info criterion	-1.782381
Sum squared resid	0.851846	Schwarz criterion	-1.484366
Log likelihood	108.2486	Hannan-Quinn criter.	-1.661547
F-statistic	14.62478	Durbin-Watson stat	1. 77430
Prob(F-statistic)	0.000000		

Appendix-3: DURBIN-WATSON SIGNIFICANCE TABLES

Durbin-Watson Statistic: 1 Per Cent Significance Points of dL and dU

*k‟ is the number of regressors excluding the intercept

Durbin-Watson Statistic: 1 Per Cent Significance Points of dL and dU

	k'=1		k'=2		k'=3		k'=4		k'=5		k=6		k'=7		k'=8		k'=9		k'=10	
N	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
6	0.390	1.142	----	--	-----	----	-----	-----	-----	-----	----	-	-----	-----	-----	-----	-----	-----	-----	----	---	--	--------	-------	-------	----	---
7	0.435	1.036	0.294	1.676	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	----------	-	----			
8	0.497	1.003	0.345	1.489	0.229	2.102	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	--------	--	----			
9	0.554	0.998	0.408	1.389	0.279	1.875	0.183	2.433	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	---------	----	-----			
10	0.604	1.001	0.466	1.333	0.340	1.733	0.230	2.193	0.150	2.690	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	---------	-----				
11	0.653	1.010	0.519	1.297	0.396	1.640	0.286	2.030	0.193	2.453	0.124	2.892	-----	-----	-----	-----	-----	-----	-----	-----	------	---------	-----				
12	0.697	1.023	0.569	1.274	0.449	1.575	0.339	1.913	0.244	2.280	0.164	2.665	0.105	3.053	-----	-----	-----	-----	-----	-----	------	---	-----				
13	0.738	1.038	0.616	1.261	0.499	1.526	0.391	1.826	0.294	2.150	0.211	2.490	0.140	2.838	0.090	3.182	-----	-----	-----	-----	-----						
14	0.776	1.054	0.660	1.254	0.547	1.490	0.441	1.757	0.343	2.049	0.257	2.354	0.183	2.667	0.122	2.981	0.078	3.287	-----	--	-----						
15	0.811	1.070	0.700	1.252	0.591	1.465	0.487	1.705	0.390	1.967	0.303	2.244	0.226	2.530	0.161	2.817	0.107	3.101	0.068	3.374
16	0.844	1.086	0.738	1.253	0.633	1.447	0.532	1.664	0.437	1.901	0.349	2.153	0.269	2.416	0.200	2.681	0.142	2.944	0.094	3.201
17	0.873	1.102	0.773	1.255	0.672	1.432	0.574	1.631	0.481	1.847	0.393	2.078	0.313	2.319	0.241	2.566	0.179	2.811	0.127	3.053
18	0.902	1.118	0.805	1.259	0.708	1.422	0.614	1.604	0.522	1.803	0.435	2.015	0.355	2.238	0.282	2.467	0.216	2.697	0.160	2.925
19	0.928	1.133	0.835	1.264	0.742	1.416	0.650	1.583	0.561	1.767	0.476	1.963	0.396	2.169	0.322	2.381	0.255	2.597	0.196	2.813
20	0.952	1.147	0.862	1.270	0.774	1.410	0.684	1.567	0.598	1.736	0.515	1.918	0.436	2.110	0.362	2.308	0.294	2.510	0.232	2.174
21	0.975	1.161	0.889	1.276	0.803	1.408	0.718	1.554	0.634	1.712	0.552	1.881	0.474	2.059	0.400	2.244	0.331	2.434	0.268	2.625
22	0.997	1.174	0.915	1.284	0.832	1.407	0.748	1.543	0.666	1.691	0.587	1.849	0.510	2.015	0.437	2.188	0.368	2.367	0.304	2.548
23	1.017	1.186	0.938	1.290	0.858	1.407	0.777	1.535	0.699	1.674	0.620	1.821	0.545	1.977	0.473	2.140	0.404	2.308	0.340	2.479
24	1.037	1.199	0.959	1.298	0.881	1.407	0.805	1.527	0.728	1.659	0.652	1.797	0.578	1.944	0.507	2.097	0.439	2.255	0.375	2.417
25	1.055	1.210	0.981	1.305	0.906	1.408	0.832	1.521	0.756	1.645	0.682	1.776	0.610	1.915	0.540	2.059	0.473	2.209	0.409	2.362
26	1.072	1.222	1.000	1.311	0.928	1.410	0.855	1.517	0.782	1.635	0.711	1.759	0.640	1.889	0.572	2.026	0.505	2.168	0.441	2.313
27	1.088	1.232	1.019	1.318	0.948	1.413	0.878	1.514	0.808	1.625	0.738	1.743	0.669	1.867	0.602	1.997	0.536	2.131	0.473	2.269
28	1.104	1.244	1.036	1.325	0.969	1.414	0.901	1.512	0.832	1.618	0.764	1.729	0.696	1.847	0.630	1.970	0.566	2.098	0.504	2.229
29	1.119	1.254	1.053	1.332	0.988	1.418	0.921	1.511	0.855	1.611	0.788	1.718	0.723	1.830	0.658	1.947	0.595	2.068	0.533	2.193
30	1.134	1.264	1.070	1.339	1.006	1.421	0.941	1.510	0.877	1.606	0.812	1.707	0.748	1.814	0.684	1.925	0.622	2.041	0.562	2.160
31	1.147	1.274	1.085	1.345	1.022	1.425	0.960	1.509	0.897	1.601	0.834	1.698	0.772	1.800	0.710	1.906	0.649	2.017	0.589	2.131
32	1.160	1.283	1.100	1.351	1.039	1.428	0.978	1.509	0.917	1.597	0.856	1.690	0.794	1.788	0.734	1.889	0.674	1.995	0.615	2.104
33	1.171	1.291	1.114	1.358	1.055	1.432	0.995	1.510	0.935	1.594	0.876	1.683	0.816	1.776	0.757	1.874	0.698	1.975	0.641	2.080
34	1.184	1.298	1.128	1.364	1.070	1.436	1.012	1.511	0.954	1.591	0.896	1.677	0.837	1.766	0.779	1.860	0.722	1.957	0.665	2.057
35	1.195	1.307	1.141	1.370	1.085	1.439	1.028	1.512	0.971	1.589	0.914	1.671	0.857	1.757	0.800	1.847	0.744	1.940	0.689	2.037
36	1.205	1.315	1.153	1.376	1.098	1.442	1.043	1.513	0.987	1.587	0.932	1.666	0.877	1.749	0.821	1.836	0.766	1.925	0.711	2.018
37	1.217	1.322	1.164	1.383	1.112	1.446	1.058	1.514	1.004	1.585	0.950	1.662	0.895	1.742	0.841	1.825	0.787	1.911	0.733	2.001
38	1.227	1.330	1.176	1.388	1.124	1.449	1.072	1.515	1.019	1.584	0.966	1.658	0.913	1.735	0.860	1.816	0.807	1.899	0.754	1.985
39	1.237	1.337	1.187	1.392	1.137	1.452	1.085	1.517	1.033	1.583	0.982	1.655	0.930	1.729	0.878	1.807	0.826	1.887	0.774	1.970
40	1.246	1.344	1.197	1.398	1.149	1.456	1.098	1.518	1.047	1.583	0.997	1.652	0.946	1.724	0.895	1.799	0.844	1.876	0.749	1.956
45	1.288	1.376	1.245	1.424	1.201	1.474	1.156	1.528	1.111	1.583	1.065	1.643	1.019	1.704	0.974	1.768	0.927	1.834	0.881	1.902
50	1.324	1.403	1.285	1.445	1.245	1.491	1.206	1.537	1.164	1.587	1.123	1.639	1.081	1.692	1.039	1.748	0.997	1.805	0.955	1.864
55	1.356	1.428	1.320	1.466	1.284	1.505	1.246	1.548	1.209	1.592	1.172	1.638	1.134	1.685	1.095	1.734	1.057	1.785	1.018	1.837
60	1.382	1.449	1.351	1.484	1.317	1.520	1.283	1.559	1.248	1.598	1.214	1.639	1.179	1.682	1.144	1.726	1.108	1.771	1.072	1.817
65	1.407	1.467	1.377	1.500	1.346	1.534	1.314	1.568	1.283	1.604	1.251	1.642	1.218	1.680	1.186	1.720	1.153	1.761	1.120	1.802
70	1.429	1.485	1.400	1.514	1.372	1.546	1.343	1.577	1.313	1.611	1.283	1.645	1.253	1.680	1.223	1.716	1.192	1.754	1.162	1.792
75	1.448	1.501	1.422	1.529	1.395	1.557	1.368	1.586	1.340	1.617	1.313	1.649	1.284	1.682	1.256	1.714	1.227	1.748	1.199	1.783
80	1.465	1.514	1.440	1.541	1.416	1.568	1.390	1.595	1.364	1.624	1.338	1.653	1.312	1.683	1.285	1.714	1.259	1.745	1.232	1.777
85	1.481	1.529	1.458	1.553	1.434	1.577	1.411	1.603	1.386	1.630	1.362	1.657	1.337	1.685	1.312	1.714	1.287	1.743	1.262	1.773
90	1.496	1.541	1.474	1.563	1.452	1.587	1.429	1.611	1.406	1.636	1.383	1.661	1.360	1.687	1.336	1.714	1.312	1.741	1.288	1.769
95	1.510	1.552	1.489	1.573	1.468	1.596	1.446	1.618	1.425	1.641	1.403	1.666	1.381	1.690	1.358	1.715	1.336	1.741	1.313	1.767
100	1.522	1.562	1.502	1.582	1.482	1.604	1.461	1.625	1.441	1.647	1.421	1.670	1.400	1.693	1.378	1.717	1.357	1.741	1.335	1.765
150	1.611	1.637	1.598	1.651	1.584	1.665	1.571	1.679	1.557	1.693	1.543	1.708	1.530	1.722	1.515	1.737	1.501	1.752	1.486	1.767
200	1.664	1.684	1.653	1.693	1.643	1.704	1.633	1.715	1.623	1.725	1.613	1.735	1.603	1.746	1.592	1.757	1.582	1.768	1.571	1.779