Determinants of Banks Liquidity and their Impact on Profitability: Evidenced from eight commercial banks in Ethiopia

by

Berhanu BerihunEngida

A Thesis Submitted to
The Department of Accounting and Finance
College of Business and Economics

Presented in Partial Fulfillment of the Requirements for the Degree of Master of Science in Accounting and Finance

Addis Ababa University
Addis Ababa, Ethiopia
June 2015

Addis Ababa University
The Department of Accounting and Finance
College of Business and Economics

DECLARATION

This is to certify that the thesis prepared by Berhanu BerihunEngida, entitled: Determinants of Banks Liquidity and their Impact on profitability: evidenced from eight Commercial banks in Ethiopia and submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Student: Berhanu BerihunEngida

ID.No.GSE/1443/05

Signature----------

Approved by:

Internal examiner: …… Signature _____Date _____

External examiner……Signature _____Date _____

Advisor ……Signature _____Date _____

_____ _____ _____

Chair of Department or Graduate Program Coordinator

Abstract:

Liquidity is increasingly important in the face of high funding costs. The main objective of this paper was to study and identify the main determinates of Ethiopian commercial banks liquidity and its impact on profitability. In order to achieve the objective a secondary sources of data were collected from eight commercial banks in the sample covering the period from 2002/03 to 2013/14 and analyzed themwith 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 Liquide 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. Therefore, the impact of bank liquidity on commercial bank profitability was non-linear. Bank size, and Adjusting the liquidity position with better strategy for managing credit risk (NPL) has positive impact on profitability. Also, the study suggest that commercial banks in Ethiopia should encouraged to conduct research on liquidity issues faced by banks, identify their optimal level of liquid asset holdings by weighting the marginal costs and marginal benefits of holding. Since, commercial banks do not respond to the dynamics of economic growth which can be taken as an indication of ineffective competition and efficiency in the Banking sector, NBE should come out with strict rules and regulations for control mechanism of firm specific and macroeconomic factors.

Keywords: ***bank's liquidity, commercial banks, profitability, fixed effect multiple linear regressions,***

Acknowledgements

My sincere and deepest gratitude goes to my advisor and instructor Dr. VenkatiPonnala for his unreserved assistance in giving me relevant comments and guidance throughout the study. My grateful thanks also go to National Bank of Ethiopia, MOFED employees for their positive cooperation in giving the relevant financial and Macro Economic data for the study.

My acknowledgements also go to my family and my wife Hiwot D. for their moral and spiritual supports throughout my carrier.

Berhanu Berihun

Table of Contents

Contents **Page**

List of figures

List of tables

List of acronyms& Abbreviations

AB: Abay Bank

AADR: Average annual deposit rate

AALR: Average annual lending rate

AIB: Awash International Bank

ATMs: Automated Teller Machine

BCBS: Basel Committee on Banking Supervisions

BIS: Bank for International Settlement

BIB: Birihan International Bank

BLUE: Best Linear Unbiased Estimator

BUIB: Buna International Bank

BOA: Bank of Abyssinia

CAP: Capital adequacy

CBB: Construction and Business Bank

CBE: Commercial Bank of Ethiopia

CBO: Cooperative Bank of Oromiya

CBRC: China Banking Regulatory Commission

CC: Corrélation Coefficient

CLRM: Classical Linear Regression Model

DB: Dashen Bank

DGB: Debub Global bank

DW: Durbin-Watson

EB: Enate Bank

FEM: Fixed Effect Model

GDP: Gross domestic Product

GOV: Government of Ethiopia

GNP: Gross National Product

INF: General Inflation Rate

IRM: Interest rate margin

IRS: Interest rate Spread

IRL: Interest rate on Lending

JB: Jarque-Bera

LG: Loan growth

LIB: Lion International Bank

LOLR: Lender of last resort

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NIB: Nib international Bank

NPL: Non-performing loans

NPV: Net present value

OIB: Oromiya International Bank

OLS: Ordinary Least Square

REM: Random Effect Model

ROA: Return on Assets

RR: Reserve Ration

STIR: Short term interest rate

UB: United Bank

UK: United Kingdom

US: United States

VIF: Variance inflation factor

WB: Wogagen Bank

ZB: Zemen Bank

Chapter One

1. Introduction:

Bank's liquidity indicates the ability to finance its transactions efficiently. If the bank is unable to do this it is known as the liquidity risk. As this risk increases the bank is considered unable to meet its obligations (such as deposits withdrawal, debt maturity and funds for loan portfolio and investment). Bank for International Settlements (BIS, 2008) explains liquidity as bank's ability to finance increases in assets and meets its obligations without losses. A bank should acquire proper liquidities when needed immediately at a sensible cost.

Since, Commercial banks are profit seeking organizations, the way the commercial banks handle their portfolio is how the profits are reflected in their books. Portfolio management is basically how the commercial banks handle their assets and liabilities. According to Aspachs (2005), Portfolio management refers to the management of assets and liabilities in such a way that the profits are maximized. Though banks want to make profits but at the same time they are concerned about liquidity and safety. In fact these three namely liquidity, profitability and safety are the main objectives of a monetary policy.

Banks have to earn profits because if they don't, they would not work as all the shareholders would sell off the shares if proper dividends are not earned. Hence they have to earn profits for their shareholders and at the same time satisfy the withdrawal needs of its customers.

The main issue here comes is sticking the balance between liquidity and profitability as both contradict each other. This is the trade-off between liquidity and profitabilitySufian (2011). Maximum safety or in simple language we can say that liquidity can be attained only if the banks keep high amount of cash or liquid asset against the deposits they have held. But if they do this, this will not bring any profits for the banks. Thus, if the bank goes for maximum safety then they will have to sacrifice the profitability

objective that is the dividends would be as per the requirements of the shareholders. Similarly if they go other way round that is they only keep on investing and trying to increase the profitability factor than they will have the problem if customer demands for cash. Hence it is very tough but indispensable for the banks to reconcile the twin objective of bringing the profitability factor and liquidity factor go hand in handsufian (2011).

A bank has to try to reconcile the twin conflicting objectives by actually working on a good portfolio (Liquidity) management. This can be also done by analyzing the situation, studying the objectives and therefore choosing the diversified and balanced asset portfolio. But the problem with the banks these days are that they are not taking these issues that seriously as seriously it should have been taken into consideration. It is not a lay man job to analyze these situations and work on the same.

Achieving the optimum level of liquidity is extremely dependent on various properties such as: size, characteristics, nature and level of complexity of activities of a bank. Greuning and Bratonovic, (2004) explains the management of liquidity as the bank has to follow a decisional structure for managing liquidity risk; an appropriate strategy of funding, the exposure limits and a set of rules for arranging liquidities in case of need. Every bank must have a well-defined liquidity management policy that is communicated in the whole organization. Banks need high level managers who actually hold a trained knowledge and proficiency in such a field and have a good experience of the same. Such managers can actually understand these situations and react on it. And if these all things are possible then the large investors can actually earn a good trust on these banks.

Banks are not only facing problems with the investors but also with the shareholder and why not? If the banks don't have a good liquidity and cannot fulfill the demand of the depositors then definitely slowly people will stop keeping deposits with these banks and seeing this shareholders will sell of the shares which will in fact reduce the share price of the bank and once

the share prices are reduced then banks will earn less. So overall everything will be facing the problems Wang Y.J. (2002).

For this reason the accurate functionality of financial institutions is needed to evade disorder of any financial service. Optimum level of liquidity is greatly linked with the efficient banking operations. If the liquidity not adequately managed it may lead to insolvency (in case of low liquidity) or low profitability (in case of high liquidity) and ultimately destroy the wealth of shareholder and breakdown of entire financial institutional framework due to strong integration, dependencies and contagion effect.

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 Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking services until the Italian invasion of 1936. 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, the first privately owned commercial bank, Awash International Bank, was established in 1994. Afterwards, additional sixteenprivately owned banks have been established. The government's strategy for financial development was characterized by gradualism and maintaining macroeconomic stability (Addison and Alemayehu, 2001).The Ethiopian financial sector consists mainly of banks (3 public 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, and is dominated by state-owned banks, mainly the Commercial Bank of Ethiopia

(CBE). Currently, public 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(2014)).

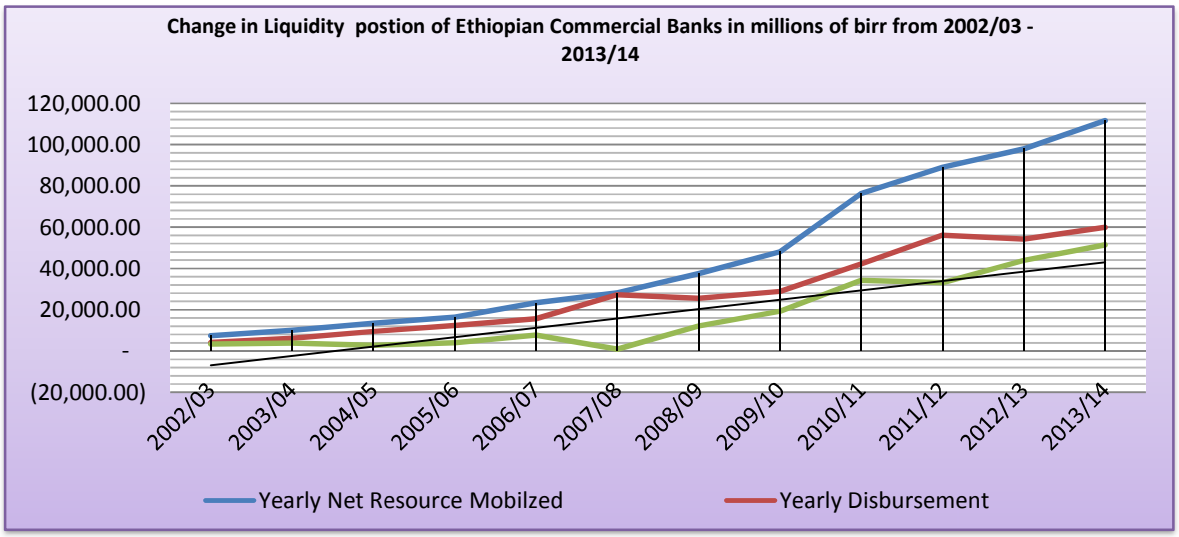
The Central Bank regularly monitors banks' adherence to Basel I capital adequacy requirements, and virtually all commercial banks have risk adjusted capital adequacy ratios well above the minimum requirements of 8%. Basle II capital adequacy rules are enforced and supervision includes both on-site and off-site. 31 day on-site inspection process for both banking and insurance supervision and 5 day off-site analysis for banking and 15 day off-sit analysis for insurance is established and practiced (AfDB-Ethiopia Risk Assessment Report 2014).

The Government amended banking laws aimed to improve corporate governance of banks and to consolidate the stability and safety of the banking sector. These laws are being enforced. The NBE controls the bank minimum deposit rate, which now stands at 5%, while loan interest rates are allowed to float. The Government of Ethiopia (GOE) offers a limited number of 28-day, 3-month, and 6-month Treasury bills, but prohibits the interest rate from exceeding the bank deposit rate. The National Bank of Ethiopia (NBE) began to offer a one year Treasury bill in November 2011. The yields on these T-bills are below 2%. There is a need to deepen the financial services and instruments and to further liberalize the financial sector in Ethiopia. As the sector becomes more dynamic and diversified, the regulatory capacity of NBE will also demand further strengthening. Lack of access to finance is a hindrance for local businesses. Banking coverage stands at about 39,402 people per commercial bank branch for the year end 2013/14, concentrated mainly in urban areas, making Ethiopia one of the most under-banked countries in sub-Saharan Africa.

Liquidity in the Ethiopian banking industry (NBE-Annual report-2014), is basically explained by netchange in liquidity positions between commercial banks (Total Net resources mobilized by the banking system in the form of

deposit, loan collection and borrowing and Disbursement).Fundamentally speaking, many of the activities of commercial banks in Ethiopia depend on their ability to provide liquid funds to their clients. As it is shown in figure 1, over the past twelve years, the change in liquid (excess of resource mobilization to Disbursement in Ethiopia increased from 3,340.9 Million (in 2002/03) to 51,459.9 million (in 2013/14), respectively.

Figure1.1.LiquidityindicatorsofbankingsectorofEthiopia



Source: Own computation from National Bank of Ethiopia 2002/03-2013/14 Annual Report

Keeping optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers. Liquidity risk might arise from the fundamental role of banks in the maturity transformation of short-term deposits into long term loans.

1.2. Statement of the Problem:

Bank for International Settlements (2008), defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans.

Current studies indicate that liquidity risk arises from the inability of a bank to accommodate decreases in liabilities or to fund increases in assets. An illiquidity bank means that it cannot obtain sufficient funds, either by increasing liabilities or by converting assets promptly, at a reasonable cost. In periods the banks don't enjoy enough liquidity, they cannot satisfy the required resources from debt without conversion the asset into liquidity by reasonable cost. Under critical conditions, lack of enough liquidity even results in bank's bankruptcy. A reduction in funding liquidity then caused significant distress. Liquidity and liquidity risk is very conversant and substantial topic.

The reforms in the banking environment in Ethiopia have brought about many structural changes in the banking sector of the country and have also encouraged private banks to enter and expand their operations in the industry (Lelissa, 2007). Despite these changes, currently, the banking industry in Ethiopia is characterized by operational inefficiency, little and insufficient competition and perhaps can be distinguished by its market concentration towards the big government owned commercial bank and having undiversified ownership structure. The existence of less efficiency and little & insufficient competition in the country's banking industry is a clear indicator of relatively poor performance of the sector compared to the developed world financial institutions (Abera, 2012).

Banks in Ethiopia has been holding an increasing share of their balance sheet in liquid assets, such as cash and government securities, prior to the onset of the recent Commercial Bank of Ethiopian deposit mobilization plan Tseganesh (2012). Indeed, in reaction to the funding and liquidity pressures

experienced during the past three years, banks, in aggregate, began to hold considerably more liquid assets. While there was an opportunity cost of holding liquid assets given their relatively low return, banks and supervisors recognized the operational benefits of additional liquidity, along with the benefits in terms of market perception. A relatively strong liquid asset pool could represent a more robust bank to investors and funding markets.

In fact, it was during the past three years that authorities in National Bank of Ethiopia saw the need for a consistent standard to monitor and improve bank liquidity to meet international Banking supervisor requirements. For example, as such, the G20 recommended that the Basel Committee on Banking Supervision (BCBS) establish "a global framework for promoting stronger liquidity buffers at financial institutions" (Working Group 1 of the G20, 2009). This framework, published in December 2010 and subject to an observation period over coming years, would include, among other things, a requirement that internationally-active banks hold enough liquid assets to cover their net cash outflows over a 30-day stress scenario (BCBS 2010).

In broad terms, this regulatory standard is meant to ensure banks are self-insured to withstand a specified distinctive and market-wide liquidity shock. Not surprisingly, however, the calibration of such a standard is a key to its impact on banks and the financial system as a whole.

For reasons such as this, it is crucial to understand the impact that a change in bank's liquid asset holdings has on its stability and profitability. The liquidity position of banks can be affected by bank specific factors, macroeconomic factors and government/central bank regulations. Firm specific factors include profitability, loan growth, bank size, capital adequacy, the percentage of non-performing loan on the total volume of loans which measures loan quality and others. Macroeconomic factors include gross domestic products/GDP, the saving investment trade off, the rate of inflation, different types of interest rates and other macroeconomic factors.

According to National Bank of Ethiopia Annual report (2013/14), Banks in Ethiopia foster the growth of the economy breathing as a source of liquidity. Opportunities in Ethiopian's financial services lie in commercial banking. As reported, over the years, the financial sector resource mobilization (Deposit, Borrowing and Loan collection) had contributed to Ethiopian's GDP with increasing trend from 1.2% in 2002/03 to 7.6% in 2013/14. Apart from that, the total deposit in Ethiopia has been reported to rise over the years (2003/04: ETB 32,677.9 million to 2013/14: ETB 237,146.6 million; grew 626%),with this rapid growth, banks are essentially required to maintain timely cash flows in order to up keep with unusual large withdrawals. Regulators have also implemented heavy regulations, setting out a Liquidity Framework. This has forced banks to monitor their funding structure and its ability to handle short term liquidity problems and provide banks with a better means of assessing the present and future liquidity risk associated with its future liquidity position.

Besides, Studies made by Semu (2010) and Tseganesh (2012), indicated the presence of excess liquidity held by commercial banks in Ethiopia. But to the knowledge of the researcher the empirical studies on the current liquidity position of commercial banks in Ethiopia that the banks able to meet efficiently both expected and unexpected current and future cash flow and also the area of factors affecting bank liquidity was limited.

Optimum level of liquidity is greatly linked with the efficient banking operations. If the liquidity not adequately managed it may lead to insolvency (in case of low liquidity) or low profitability (in case of high liquidity) and ultimately destroy the wealth of shareholder and breakdown of entire financial institutional framework due to strong integration, dependencies and contagion effect. Therefore, empirical studies are important to assess and identify the determinants of banks liquidity and their impact on bank's profitability in the context of Ethiopia. Thus, this study aimed to contribute to the current literature by providing some evidence on the current liquidity position of banks, its determinant factors of the liquidity and the impact of

liquidity on Banks profitability through significant factors affecting liquidity in Ethiopia.

1.3. Objective of the study

1.3.1. General Objective of the Study:

The general purpose of the study is to identify the internal and external factors that affect Commercial banks Liquidity and to assess their impact on Profitability.

1.3.2.Specific Objective of the Study:

The specific objective of this study mainly had three purposes: Those are:

1). toidentify firm/bank specific determinants of commercial banks liquidity in Ethiopia,

2). toidentify Macroeconomic determinants of commercial banks liquidity in Ethiopia,

3). to see the impact of banks liquidity up on Banks profitability.

1.4. Research questions and hypotheses

1.4.1.Research questions:-

RQ1: What are the Banks specific determinatevariables that affect Ethiopia commercial Banks Liquidity?

RQ2: What are the macroeconomic variables that determine Ethiopia commercial Banks liquidity?

RQ3: What is the impact of commercial Banks liquidity determinate factors on its profitability?

Research hypotheses:

The following hypotheses are developed to break down to answer the above mentioned research questions. Therefore, this research work attempted to test the following hypotheses in the case of commercial banks in Ethiopia.

H1: Percentage of non-performing loan in the total volume of loan has no significant impact on banks liquidity.

H2: Capital adequacy has no significant impact on banks liquidity.

H3: Bank size has no significant impact on banks liquidity.

H4: Loan growth has no significant impact on banks liquidity.

H5: Actual Reserve Ratio has no significant impact on banks liquidity.

H6: GDP growth rate has no significant impact on banks liquidity

H7: Inflation rate has no significant impact on banks liquidity.

H8: Interest rate on Bank Lending has no significant impact on banks liquidity

H9: Interest rate margin has no significant impact on banks liquidity

H10: Monetary policy rate (Short term interest rate) has no significant impact on banks liquidity

H11: Bank liquidity has no significant impact on Profitability.

1.5. Scope of the study

The scope of the study is limited to see the impact of capital adequacy, bank size, loan growth, the share of non-performing loans from the total volume of loans and advances, actual Reserve rate,Real GDP growth rate, inflation rate, interest rate margin and short term interest rate on banks liquidity and to see the impact of banks liquidity on profitability through the significant

factors affecting liquidity from 2002/03 to 2013/14 for eight commercial banks in the sample.

1.6. Significance of the study:

The study has great contribution to the existing knowledge in the area of factors determining commercial banks liquidity and their impact on profitability in the context of Ethiopia. In this study, researchers examine a series of variables by introducing Bank/industry specific and macroeconomic factors that may significantly affect the commercial banks' liquidity and its impact on profitability. Researchers' study can be used as a reference for commercial banks, regulatory bodies and the academic staff of the country to focus and control over the variables that bring negative effects on liquidity and its impact on profitability. This in turn contributes to the wellbeing of the financial sector of the economy and the society as a whole.

1.7. Limitations of the Study:

The study would have the limitation on obtaining the adequate information and available material or information for the study on key off balance sheet determinant variable that may significantly affect Commercial Bank liquidity like the impact of the latest financial crisis, unemployment rate, Government influence, current Ethiopian Government giant investment on power generation, sugar factory construction & installation and fertilizer industry development.

1.8. Organization of the study:

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

Chapter Two

2.0. Theoretical Framework:

2.1. Bank Liquidity:

Bank liquidity is ability to meet customers demand and provide advances in the forms of loans and overdrafts. Liquidity is also banks' cash and cash equivalent such as commercial paper, treasury bills, etc. Anyanwu (1993) sees liquidity as assets readily convertible to cash without loss and ability to pay depositors on demand. Shim and Siegel (2007) define liquidity as a company's ability to meet its maturing short-term obligations and if liquidity is insufficient serious financial difficulty may occur. Poor liquidity is comparable to a person having a fever; it is a symptom of a fundamental problem.

Golin (2001) in Yuqi (2008) states that liquidity is a risk not having sufficient current assets (cash and quickly saleable securities) to satisfy current obligations of depositors especially during the time of economic stress. Therefore, without required liquidity and funding to meet obligations, a bank may fail.

Pandey (2010) posits that liquidity is current assets which should be managed efficiently to safeguard the firm against the risk of illiquid. Lack of liquidity in extreme situations can lead to the firm's insolvency. He further state that conflict exists between liquidity and profitability. If the firm does not invest sufficient fund in current assets, it may become illiquid which is risky. It may lose profitability if some idle current assets do not earn anything. Hence, insufficient liquidity is one of the major reasons of bank failure. Liquidity is necessary to enable banks providing funds on demand and credits needed by customers which are associated with the default risk.

2.2. Theories of Bank Liquidity:

In selecting a theoretical framework, many contending theories were considered as possible explanatory frameworks within which to fit the determinants of Bank liquidity and its impact on Profitability.

In the banking theory and practice, there are no generally accepted indicators measuring the liquidity of banks. In spite of the fact that there are not enough acceptable indicators for measuring the liquidity, different authors (Sinkey, 2000; Koch et.al. 2000) offered their own approaches for measuring and expressing the liquidity of individual banks and the banking system, as a whole. However, for the purposes of this study it can be recommended to utilize more liquidity indicators, which were aggregated from the data from individual financial reports filed by commercial banks.

- **Balance sheet liquidity**, which refers broadly to the cash-like assets on the balance sheet of a firm (or household). For non-financial firms, balance sheet liquidity is often measured by the short-term liquid assets on their balance sheet. For banks, which must manage their liquidity very closely, balance sheet liquidity is reflected in a detailed breakdown, by maturity, of their assets and liabilities – especially those coming due in the short term. In the event of a run on banks or faced with asset liability mismatch, balance sheet liquidity provides an assurance of easy conversion of banking assets into cash to help maintain depositors' confidence.

- **Funding liquidity** may be defined as the ability of banks to settle obligations with immediacy (Drehmann and Nikolaou, 2009). The Basel Committee on Banking Supervision defines funding liquidity as the ability of banks to meet their liabilities, unwind or settle their positions as they come due.

The common element in these various concepts of liquidity is that liquidity is the ability to obtain cash – either by turning assets into cash at short notice or by having access to credit, including from central banks.

2.2.1. Inventory Management Model

Baumol's (1952) inventory management model and Miller and Orr's (1966) model which recognized the dynamics of cash flows are some of the earlier research efforts attempted to develop models for optimal liquidity and cash balances, given the organization's cash flows the focus was on using quantitative models that weighed the benefits and costs of holding cash (liquidity). These earlier models help financial managers understand the problem of cash management, but they rest on assumptions that do not hold in practice. The model postulates that firms identify their optimal level of cash holdings by weighting the marginal costs and marginal benefits of holding cash. The benefits related to cash holdings are: reducing the likelihood of financial distress, allows the pursuance of investment policy when financial constraints are met, and minimizes the costs of raising external funds or liquidating existing assets. The main cost of holding cash is the opportunity cost of the capital invested in liquid assets. Firms will therefore trade-off holding cash and investing it depending on its investment needs.

2.2.2. Demand for Money Model:

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

deterioration. Thus, cash flow uncertainty should be positively related with cash holdings.

Barclay and Smith (1995), however provide evidence that firms with the highest and lowest credit risk issue more short-term debt while intermediate credit risk firms issue long-term debt. If we consider that firms with the highest credit rating have better access to borrowing, it is expected that these firms will hold less cash for precautionary reasons, which would cause debt maturity to be positively related to cash holdings.

2.2.3. Keynes -Liquidity preference Theory

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

2.2.4. Theory of Corporate Liquidity:

Almeida et al. (2002) proposed a theory of corporate liquidity demand that is based on the assumption that choices regarding liquidity will depend on firms' access to capital markets and the importance of future investments to the firms. The model predicts that financially constrained firms will save a positive fraction of incremental cash flows, while unconstrained firms will not.

Empirical evidence confirms that firms classified as financially constrained save a positive fraction of their cash flows, while firms classified as unconstrained do not. The cost incurred in a cash shortage is higher for firms with a larger investment opportunity set due to the expected losses that result from giving up valuable investment opportunities. Therefore, it is expected a positive relation between investment opportunity and cash holdings.

The theory further predicts that firms with better investment opportunities have greater financial distress costs because the positive Net Present Value (NPV) of these investments disappears (almost entirely) in case of bankruptcy. In this case, firms with better investment opportunities will keep higher levels of cash to avoid financial distress. To the extent that liquid assets other than cash can be liquidated in the event of a cash shortage, they can be seen as substitutes for cash holdings. Consequently, firms with more liquid asset substitutes are expected to hold less cash.

2.2.5. Theory of Bank Liquidity Requirements:

Charles C. Florian H. and Marie H(2012) theory of Bank Liquidity Requirements states that, not only does cash mitigate the liquidity risks attendant to exogenous shocks, it also mitigates endogenous (banker-chosen) default risk. In the model, costly state verification makes debt the optimal form of outside finance (Calomiris 1991). There is a conflict of interest between the banker/owner and the depositors with respect to risk management; the banker suffers a private cost from managing risk, and does not always gain enough as the owner to offset that cost (Tirole 2010). Greater cash holdings increase the marginal gain to the banker from managing risk, and thereby encourage greater risk management.

Diamond and Dybvig (1983), physical costs of liquidation make liquidity risk (the possible need to finance early consumption) costly, which could motivate the holding of inventories of liquid assets. In Calomiris and Kahn (1991), depositors receive noisy and independent signals about the risky portfolio outcome of the bank. By holding reserves, banks insulate

themselves against the liquidity risk of a small number of misinformed early withdrawals in states of the world where the outcome is actually good. Without those reserves, banks offering demandable debt contracts (which are optimal in the Calomiris-Kahn model) would unnecessarily subject themselves to physical liquidation costs when they fail to meet depositor's requests for early withdrawal

2.2.6. 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).

A usual justification for the existence of deposit-taking institutions, thereby giving also an explanation for the economically important role of banks in providing liquidity, was initially modeled by (Bryant 1980 and Diamond and Dybvig 1983). They showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against peculiar consumption shocks (Weisel, Harm, and Brandley, 2003).

2.2.7. Liquidity measurement theory:

Banks generally face liquidity risk which increases in times of crisis and then endanger the functioning of financial markets. Vento and Ganga (2009), defined three methods to measure liquidity risk: the stock approach, the cash-flows based approach and the hybrid approach. The first approach looks at liquidity as a stock. This approach aims to determine the bank's ability to reimburse its short-terms debts obligations as a measurement of the liquid assets' amount that can be promptly liquidated by the bank or used to obtain secured loans. The idea behind this model is that each financial institution is exposed to unexpected cash outflows that may occur in the future due to unusual variations in the timing or extent therefore needs a quantity much higher than the cash amount required for banking projects. The second approach aims to safeguard the bank's ability to meet its payment obligations and calculating and limiting the liquidity maturity transformation risk, based on the measurement of liquidity-at-risk figures. The last approach combines elements of the stock approaches and of the cash flows based approaches.

2.3. Determinants of Bank Liquidity:

In most of the literatures, there are two way and sometimes three ways of classifying the determinants of bank Liquidity. Al-Tamimi, 2010; Aburime, 2005, for instance classified the determinant factors in to two: bank specific (internal) and macroeconomic variables. The internal factors are individual bank characteristics which affect the bank's performance. These factors are basically influenced by the internal decisions of management and board. The external factors are sector wide or country wide factors which are beyond the control of the company and affect the liquidity of banks.

Other studies, Ongore, 2011, attempted to integrate sector specific factors like bank ownership, bank size and concentration as a specific determinant of bank Liquidity. This approach seems to segregate the external factor determinants in to sector specific and macroeconomic variable. However, some authors, (Chantapong, 2005; Olweny and Shipho, 2011) focused on

sector specific variables with total neglecting of the macroeconomic variables like GDP and inflation. In general the two approaches seem similar in context and wide variation is not observed in classifying the determinants of bank liquidity and most of the researchers used both internal and external variables in their studies.

2.3.1. Non-performing Loans:

Non-performing loans are loans that are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract (Afza and Nazir, 2009). It follows that any loan facility that is not up to date in terms of payment of both principal and interest contrary to the terms of the loan agreement, is non-performing. Therefore, the amount of non-performing loan measures the quality of bank assets (Chakraborty, 2008). Bank nonperforming loans to total gross loans are the value of nonperforming loans divided by the total value of the loan portfolio (including nonperforming loans before the deduction of specific loan-loss provisions). The loan amount recorded as nonperforming should be the gross value of the loan as recorded on the balance sheet, not just the amount that is overdue. Non-performing Loans is measured by ratio of non-performing loans over the Total Loan (Bloem&Gorter, 2001).

2.3.2. Capital adequacy:

Su (2002) has defined banks' capital as common stock plus surplus plus undivided profits plus reserves for contingencies and other capital reserves. In addition since a bank's loan-loss reserves also serves as a buffer for absorbing losses, a broader definition of bank capital include this account. Opposing to the standard view of liquidity creation in which banks create liquidity by transforming liquid liabilities into illiquid assets, the recent theories indicate the creation of liquidity by changing asset mixes.

Raghavan (2003) showed that banks can create more or less liquidity by simply changing their funding mix on the liability side. (Maness and Zietlow, 2004), shows that capital may also affect banks asset portfolio composition, thereby affecting liquidity creation through a change in the asset mix.

Capital adequacy ratios (CAPs) are a measure of the amount of a bank's core capital expressed as a percentage of its total asset.

2.3.3. Bank Size:

(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. 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). Bank Size in this study was measured by natural logarism of the total value of the assets.

2.3.4. Loan Growth:

The loan portfolio is typically the largest asset and the predominate source of revenue. Diamond &Rajan (2002) stated that lending is the principal business activity for most commercial banks. As such, loan is one of the greatest sources of risk to a banks 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 less 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.

2.3.5. Gross Domestic Product (GDP):

The economy health of a nation is measured by its growth rate in national income. The economic growth is measured as percentage change in Gross Domestic Product (GDP) or Gross National Product (GNP). The GNP is broader than GDP, although both proxies are used to measure economic growth.

GDP is a macroeconomic factor that affects bank liquidity. For which, a major recession or crises in business operations reduces borrowers' capability to service obligations which increases banks' NPLs and eventually banks insolvency (Gavin &Hausmann, 1998). In reference to Painceira (2010), research on liquidity preference during different business cycle states that banks liquidity fondness is low in the course of economic boom. Where, banks confidently expect to profit by expanding loanable funds to sustain economic boom, while restrict loanable funds during economic downturn to prioritize liquidity. To sum up, banks prefer high liquidity due to lower confidence in reaping profits during economic downturn. Aspachs, Nier andTiesset (2005) has also inferred that banks prioritize liquidity when the economy plummets, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favorable. Thus, to best knowledge, banks forgo liquidity inducing lending during economic growth. Even Valla, Saes-Escorbiac and Tiesset (2006) reported a negative relationship between liquidity and GDP real growth.

2.3.6. Liquidity and Inflation in Commercial Banks:

Inflation reflects a situation where the demand for goods and services exceeds their supply in the economy (Karl et al, 2002). Inflation causes many distortions in the economy. It hurts people who are retired and living on a fixed income. When overall prices rise these consumers cannot buy as

much as they could previously. It also affects the repayment of loans and discourages savings due to the fact that the money is worth more presently than in the future and inflation therefore affects the liquidity of the of the Commercial Banks.

In any economy inflation is undesirable. This is because of the specific economic costs associated with inflation. First, when inflation is high, currency and non-interest-bearing checking accounts are undesirable because they are constantly declining in purchasing power. Secondly, there are tax distortions, for example, when inflation rages, the actual value of these deductions are much less than it should actually be (Ludi and Ground, 2006). The liquidity position of a bank is very sensitive to macro-economic variable fluctuations (Eichengreen and Arteta (2000), Hutchison and McDill (1999). The increasing inflation, high interest rates and real gross domestic product growth determine the bank's liquidity position. High inflation rate and sudden changes of inflation have a negative impact on Real interest rates and bank's capital. In this respect, the bank's non-performing loans will expand, collateral security values deteriorate and value of loan repayments on banks loans declines. This way, It has been found that inflation rate significantly determines bank liquidity (Heffernan; 2005).

The traditional role of a bank is lending and loans make up the bulk of their assets. In unstable economic environments interest rates charged by banks are fast overtaken by inflation and borrowers find it difficult to repay loans as real incomes fall, insider loans increase and over concentration in certain portfolios increases giving a rise to credit risk. High inflation and high interest rates may cause economic activity to collapse, and resultantly the burden of serving debts denominated in domestic and foreign currency increases and banks' capitalization ratios fall (Gil-Diaz, 1994).

2.3.7 Bank Lending Rate:

Keynesian liquidity preference theory states that when liquidity preference rises interest rates will also rise as people hold onto liquid assets.Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. The interest rate charged depends on the availability of money in the market, on prevailing rates and on the specific terms of the contract, such as term length. Bank lending rate is measured by average interest rate on lending.

2.3.8. Interest rate margin (Spread)/Liquidity premium paid by Borrower:

Interest rate margin is among the most important factors that gauge the efficiency of financial institutions, and wide interest margins are seen to have negative implications for financial intermediation and financial development. There are concerns mainly in the developing economies about the structure and the level and of interest rates (which remain high) and their implications for the efficiency of the banking sector, where high intermediation margins may imply inefficiency of the financial sector and could act as a disincentive to investment and may also slow the economic growth.

Thus, interest margins are an important policy factor as it shows how efficiently banks perform their intermediary roles of collecting savings and allocating loans. A bank with higher liquidity faces lower liquidity risk hence is likely to be associated with lower spreads due to a lower liquidity premium charged on loans. Banks with high risk tend to borrow emergency funds at high costs and thus charge liquidity premium leading to higher spreads (Ahokposis, 2013).

2.3.9. Monetary policy rate (Discount rate):

Short-term interest rates are the rates at which short-term borrowings areeffected between financial institutions or the rate at which short-term

government paper is issued or traded in the market. Short-term interest rates are generally averages of daily rates, measured as a percentage. Short-term interest rates are based on three-month money market rates where available. Typical standardized names are "money market rate" and "treasury bill rate". Treasury bills are known as a zero coupon, or discount security, since it pays the interest and principal at maturity. The rates listed on Treasury bills are known as discount rates.

when monetary policy is loose in the sense that the federal funds rate is lower than the rate implied by the Taylor rule, (In economics, a Taylor rule is a monetary-policy rule that stipulates how much the central bank should change the nominal interest rate in response to changes in inflation, output, or other economic conditions. In particular, the rule stipulates that for each one-percent increase in inflation, the central bank should raise the nominal interest rate by more than one percentage point. This aspect of the rule is often called the Taylor principle), there is rapid growth in repos and financial market liquidity is high. Conversely, when monetary policy is tight in the sense that the fed funds rate is higher than the rate implied by the Taylor rule, repo growth is much lower, even negative at times, and financial market liquidity is low.

2.3.10. Bank Liquidity and Profitability:

Recent crisis has highlighted the vitality of sound liquidity management of a bank. In response, regulators are developing new liquidity frameworks to make stable and resilient financial system. However, there is often that, these two variables pose a conflicting relationship (dilemma of maintaining liquidity or profitability exist). Liquidity needs constrain a bank from investing all its cash though profitability comes from either investing it or bank lending activities. Since banks need to be both profitable (shareholders demands) and liquid (legal regulations), there is inherently conflicts between the two and the need to balance both. In this regard, the liquidity (legal regulations) is different for non-bank businesses. Therefore, banks should

always strike a balance between liquidity and profitability to satisfy shareholders' wealth aspirations as well as regulatory requirements.

As all this fact is agreed by Owolabi, Obiakor and Okwu (2011) whose research result provide evidence that, there is a trade-off between profitability and liquidity in that increase in either one would decrease the other, which mean more liquidity implies less profitability. Subsequently, Bordeleau and Graham (2010), their research analyses the consequences of holding liquid assets on bank profitability for a sample of large Canadian and U.S. banks and results suggest thatProfitability will be improved for banks that hold some liquid assets, however, there is a limit to it where holding further liquid assets reduce a banks' profitability, holding all else constant. Moreover, empirical studies reveal that this relationship varies depending on the condition of the economy and bank's business model. According to the author, banks must also consider the tradeoff between liquidity shocks to resilience and the cost of holding lower return liquidassets as the latter may affect a banks' ability to generate income, increase capital and extend credit.

2.4. Measurement of Banks Profitability:

The profitability of banks is important to the creditors, owners, employees and management. Some of the variables commonly used to measure banks profitability are Return on Asset, Return on Equity and Net Interest Margin. Return on Asset (ROA) is calculated by net income or profit after tax over total assets. It is also measured by net income over average total assets.

Ramlall (2009), Flamini, Donald and Schumacher (2009), Gul, Irshad and Zaman (2011), Khrawish, Siam and Khrawish (2011), Aminu (2013) and Soyemi, Akinpelu and Ogunleye (2013) used net income over total assets to measure ROA. While, Srairi (2009), Sufian (2011) and Antonina (2011) are used net income over average total assets to measure ROA.

Return on Equity (ROE) is measured by net income or profit after tax over total common stock equity. It is also measured by net income over average total common stock equity. Ali, Akhtar and Ahmed (2011) and Aminu (2013)

used net income over total common stock equity to measure ROE. While, Sufian (2011) used net income over average total common stock equity to measure ROE.

In addition, Net Interest Margin (NIM) is computed by net interest income over total assets. It is also measured by net interest income over average total interest earned assets. Gul et al. (2011) and Soyemi at al. (2013) used net interest income over total assets to measure NIM.

2.5. Review of related empirical studies:

2.5.1 Empirical study in case of Developed Country:

The study conducted byRauch et al. 2009attempted to measure the liquidity creation of all 457 state owned savings banks in Germany over the period 1997 to 2006 and it analyzed the influence of monetary policy on bank liquidity creation usingbank balance sheet data and general macroeconomic data. To measure the monetary policy influence, the study developed a dynamic panel regression model with the expected factors of 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. 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.

The study made by Bordeleau and Graham (2010), presented empirical evidence regarding the relationship between liquid asset holdings and profitability for a panel of Canadian and U.S. banks over the period of 1997

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

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

profitability and bank size had statistically insignificant impact on liquidity. Using a measure of support expectations based on the Fitch support rating, the researchers also found strong evidence of the existence of such an effect, which may point to a rationale for regulatory liquidity requirements as a quid pro quo for LOLR support.

Lucchetta (2007) made empirical analysis of the hypothesis that interest rates affect banks‟ risk taking and the decision to hold liquidity across European countries. The liquidity measured by different liquidity ratios should be influenced by: behavior of the bank on the interbank market – the more liquid the bank is the more it lends in the interbank market, interbank rate as a measure of incentives of banks to hold liquidity, monetary policy interest rate as a measure of banks' ability to provide loans to customers, share of loans on total assets and share of loan loss provisions on net interest revenues, both as a measure of risk-taking behavior of the bank, where liquid banks should reduce the risk-taking behavior, and bank size measured by logarithm of total bank assets. The results of the study revealed that the risk-free interest rate negatively affects the liquidity retained by banks and the decision of a bank to be a lender in the inter-bank market. Conversely, the inter-bank interest rate has a positive effect on such decisions. Typically, it is the smaller, risk-averse banks that lend in the inter-bank markets. Meanwhile, the risk-free interest rate is positively correlated with loans investment and bank risk-taking behavior.

2.5.2 Empirical study in case of Developing Country:

In his Work P.Vodova (2011), try to identify determinants of liquidity of commercial banks in the Czech Republic using the panel data regression analysis for four liquidity ratios. The study considered four firm specific and eight macroeconomic independent variables which affect banks liquidity. The expected impact of the independent variables on bank liquidity were: capital adequacy, inflation rate and interest rate on interbank transaction/money market interest rate were positive and for the share of non-performing loans on total volume of loans, bank profitability, GDP growth, interest rate on loans, interest rate margin, monetary policy interest rate/repo rate, unemployment rate and dummy variable of financial crisis for the year 2009 were negative whereas, the expected sign for bank size was ambiguous (+/-). The results of models showed that, Bank liquidity increased with higher capital adequacy, higher interest rates on loans, higher share of non-performing loans and higher interest rate on interbank transaction. In contrast, financial crisis, higher inflation rate and growth rate of gross domestic product have been negative impacted on bank liquidity. The relation between the size of the bank and its liquidity was ambiguous. It could be useful to divide banks into groups according to their size and to estimate determinants of liquidity separately for small, medium-sized and large banks. The study also found that unemployment, interest margin, bank profitability and monetary policy interest rate had no statistically significant effect on the liquidity of Czech commercial banks.

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

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

Naser, Mohammed and Ma'Someh(2013) aimed to examine the effect of liquidity risk on the profitability of commercial banks using of panel data related to commercial banks of Iran during the years 2003 to 2010. In the estimated research model, two groups of bank-specific variables and macroeconomic variables are used. The results of research show that the variables of bank's size, bank's asset, gross domestic product and inflation will cause to improve the profitability of banks while credit risk and liquidity risk will cause to weaken the performance of bank.

Munther, Lina,Rania(2013) study was conducted, for the period from 2005 to 2011by studying the banking sector in Jordan to investigate the impact of liquidity through quick ratio on profitability through return on asset (ROA). Based on the statistical results, the study concluded that there is significant impact of independent variable quick ratio on dependent variable return on asset (ROA). That means profitability in Jordanian banks is significantly influenced by liquidity.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries and specificaly address 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. The regression model was estimated using ordinary least

squares. The result of the study showed that the volatility of cash-to-deposit ratio and money market interest rate have negative and significant effect on liquidity. Whereas, liquidity tends to be inversely related to the business cycle in half of the countries studied, suggesting that commercial banks tend to error on the side of caution by holding relatively more excess reserves during downturns. Generally, the results showed that on average, bank liquidity is about 8% less than what is consistent with economic fundamentals.

2.5.3 Empirical study in case of Least Developed Country (LDC):

Sunny (2013) works investigated the impact of liquidity management on the profitability of banks in Nigeria. The work is necessitated by the need to find solution to liquidity management problem in Nigerian banking industry.Elliot Rothenberg Stock (ERS) stationary test model was used to test the run association of the variables under study while regression analysis was used to test the hypothesis. The results of this study have shown that liquidity management is indeed a crucial problem in the Nigerian banking industry. The variables selected have not performed well in terms of their contribution towards the performance of the selected banks as represented by profit after tax. Mentioned is the fact that the management of cash and short term fund (CA) in the three selected banks contributed negatively. The rest of the independent variables did not contribute much to the profitability of the banks. The results are in line with the current global trend where liquidity has become a constant source of anxiety to the financial sector.

Victor, Sameul and Eric (2013), sought to find out the relationship between the liquidity and the profitability of banks listed on the Ghana Stock Exchange. The study was descriptive in nature. It adopted the longitudinal time dimension, specifically, the panel method. The trend in liquidity and profitability were determined by the use of time series analysis taking financial reports of the seven listed banks by computing of ratios. The main liquidity ratio was regressed on the profitability ratio. It was found that for

the period 2005-2010, both the liquidity and the profitability of the listed banks were declining. Again, it was also found that there was a very weak positive relationship between the liquidity and the profitability of the listed banks in Ghana.

2.5.5. Empirical study in case of Bank liquidity and Profitability:

In their work of, J.Jamber and Al-Khakvakdeh (2014) aimed to address the determinants of profitability on commercial banks in Jordan and examined to what extent the performance of commercial banks operating in Jordan had been affected by internal and external factors of companies listed on the Amman Stock Exchange for Jordanian Banks between 2007 and 2012. Their study addressed both the internal factors and external factors, namely, macroeconomic and financial market structures. The internal factors of capital adequacy, liquidity ratio, and size were found to be significant as well as all the external factors in these models. A third multivariate model which includes both internal and external factors included in this study but not in previous studies. This model was found to be significant. As a result, this research gave deeper insights into determinants influencing the profitability of Jordanian commercial banks within the Jordanian environment

Sarah, Willy,Andrew,Dennis (2014), their study determined the effect of internal factors on profitability of commercial banks in Kenya particularly the banks liquidity. The study employed a descriptive research design incorporating panel data. Internal factor was Liquidity, while Profitability was measured using ROA ratios. The findings of the study were showed that all the variables Liquidity, has statistically significant and positive relationship with banks' profitability. This study recommends that banks should invest heavily in assets if substantial gains have to be realized, maintain adequate liquidity levels though in the form of short term marketable securities in order to realize profits and aggressively identify viable investment opportunities and link such opportunities to customer deposits.

Shen et al. (2009) empirically investigate the causes of liquidity risk and the relationship between bank liquidity risk and performance. The study aimed to employ alternative liquidity risk measures besides liquidity ratios (i.e. financial gap measures provided by (Saunders and Cornett 2006)). The study further aimed to investigate the determinants of bank performance in terms of the perspective of the bank liquidity risk (bank liquidity risk and performance model). The empirical results indicated that the bank-specific variable had the same effect on bank liquidity risk in two financial systems and liquidity risk was the endogenous determinant of bank performance.

Usman (2014), in his work evaluated the profitability of the 23 commercial banks operating in Pakistan for the period of 2009 to 2012. His study undertakes the only internal factors that impact on the profitability of the commercial banks in Pakistan .This study was used the ordinary least square (OLS) method to look into the impact of cost efficiency, liquidity, capital adequacy, deposits and size of the bank on the profitability (ROA) of the commercial banks. The empirical findings of his study was that cost efficiency, liquidity and capital adequacy are those variables in the check of management that decide the profitability of commercial banks operating in Pakistan. Other variables like deposits and size of the bank did not demonstrate any impact on profitability.

2.5.6. Related empirical studies in Ethiopia:

Some related studies were conducted by different researchers in Ethiopia. Specifically,

Abera, (2012) studied Factors Affecting Profitabilityon Ethiopian Banking Industry. This study examined the bank-specific, industry-specific and macro-economic factors affecting bank profitability for a total of eight commercial banks in Ethiopia, covering the period of 2000-2011 using a mixed methods research approach by combining documentary analysis and in-depth interviews. The result of the interview revealed that the liquidity of banks was one of the major determinants of Ethiopian banks profitability. But, the output of the regression analysis and the interview were in

agreement in relation to the direction of the effect of liquidity as far as both of them proved the existence of negative or inverse relationship between liquidity and profitability of Ethiopian banks. The study concluded that the impact of Ethiopian banks' liquidity on their performance remains ambiguous and further research is required.

The study conducted by Tseganesh (2012) , to identify determinants of commercial banks liquidity in Ethiopia and then to see the impact of banks liquidity up on financial performance through the significant variables explaining liquidity for the data of eight commercial banks in the sample covered for the period 2000 to 2011,. The results of panel data regression analysis showed that capital adequacy, bank size, share of non-performing loans in the total volume of loans, interest rate margin, inflation rate and short term interest rate had positive and statistically significant impact on banks liquidity. Real GDP growth rate and loan growth had statistically insignificant impact on banks liquidity. Among the statistically significant factors affecting banks liquidity capital adequacy and bank size had positive impact on financial performance whereas, non-performing loans and short term interest rate had negative impact on financial performance. Interest rate margin and inflation had negative but statistically insignificant impact on financial performance. Therefore, the impact of bank liquidity on financial performance was non-linear/positive and negative.

Semu (2010), the study conducted using the Quantitative method particularly survey design approach with individuals working in both private and state owned banks in Ethiopia using self-administered questionnaire that was conducted to examine the possible factors that compel the banks to reduce or restrict lending and it's the impact of reducing or restricting loan disbursement on the performance of banks in Ethiopia. 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.

2.5.7. Summary and Knowledge Gap:

The present global economic meltdown is the justification for arise the importance of the study of the determinate factors that affect Commercial Banks liquidity and their impact on profitability. Apart from this liquidity, it has always been a source of concern with most banks profitability. The importance of liquidity has even acquired a new dimension in the advanced countries of the world in recent years. This is basically because of responses to structural changes and funds management techniques in the countries.

The key role played in any banking set-up further epitomizes it importance. Right from time liquidity has been associated with allocation of assets to their capacity to generate the cash necessary to satisfy creditors and depositor calls on the bank liabilities. However, with the emergence of active liability management strategies liquidity has been more than a function, particularly in some instance of the banks capacity to acquire additional funds in the market place.

Liquidity is important to all business specially for banking industry since their function is creation of liquidity both on the asset and liability side of their balance sheet. It also revealed that banks liquidity can be affected by different factors such as bank specific, macroeconomic and regulatory factors.

Since the banking industry in Ethiopia is in the growth stage with opening of new banks, expansion of new branches, and the re-capitalization of the banking industry has continued to change. Although, the change as positive as banks are now expected to play a role in the development of the country

economy and the main vehicle for the rapid economic growth in the absence of active secondary stock exchange in the country.

Like all businesses, banks profit by earning more money than what they pay in expenses. The major portion of a bank's profit comes from the fees that it charges for its services and the interest that it earns on its assets. Its major expense is the interest paid on its liabilities. The major assets of a bank are its loans to individuals, businesses, and other organizations and the securities that it holds, while its major liabilities are its deposits and the money that it borrows, either from other banks or by selling commercial paper in the money market.

Most of the empirical study shown above has been made so far using the impact of liquidity on the traditional measures of the profitability of any business are it return on assets (ROA) and return on equity (ROE).

Assets are used by businesses to generate income. Loans and securities are a bank's assets and are used to provide most of a bank's income. However, to make loans and to buy securities, a bank must have money, which comes primarily from the bank's owners in the form of bank capital, from depositors, and from money that it borrows from other banks or by selling debt securities—a bank buys assets primarily with funds obtained from its liabilities. However, not all assets can be used to earn income, because banks must have cash to satisfy cash withdrawal requests of customers. This vault cash is held in its vaults, in other places on its premises such as tellers' drawers, and inside its automated teller machines (ATMs), and, thus, earns no interest. Banks also have to keep funds in their accounts at the Federal Reserve paid no interest. A bank must also keep a separate account—loan loss reserves—to cover possible losses when borrowers are unable to pay back their loans. The money held in a loan loss reserve account cannot be counted as revenue, and, thus, does not contribute to profits. The ROA should have been determined by the amount of fees that it earns on its services and its net interest income which is depends partly on the interest rate spread, which is the average interest rate earned on it

assets minus the average interest rate paid on its liabilities. Therefore, Net interest margin shows how well the bank is earning income on its assets. High net interest income and margin indicates a well-managed bank and also indicates future profitability.

An important gap still exists in the empirical literature about liquidity and its impact on profitability measurement. Only few studies aimed to identify determinants of liquidity. Studies cited above suggest that commercial banks‟ liquidity is determined both by bank specific factors (such as size of the bank, profitability, capital adequacy and factors describing risk position of the bank), macroeconomic factors (such as different types of interest rates and indicators of economic environment) as well as the central bank decisions. There are also very limited number of studies appears to include factors that determine Commercial Bank liquidity as an explanatory variable for bank profitability which is traditional measured by ROA and ROE, this relationship is not the focus of those papers. To the knowledge of the researcher there is no empirical studies done regarding to determinants of banks liquidity and their impact on profitability using Net Interest Margin (NIM) in Ethiopia. Although the researches made by Semu (2010) and Abera (2012), focused on the impact of bank liquidity on financial performance) and also Tseganesh (2012) focused on the impact of bank liquidity on financial performance through the significant factors affecting liquidity using the traditional measurement of ROA and ROE. Therefore, the study examined some of bank specific and macroeconomic factors affecting banks liquidity and their impact on Profitability using Net interest margin which shows how well the bank is earning income on its assets. High net interest income and margin indicates a well-managed bank and also indicates future profitability.

Chapter Three

3. Research Design and Methodology

The literature review and empirical study section of the study has attempted to discuss the theories in relation to determinants of liquidity and its impact on profitability and also the knowledge gap.

The purpose of this chapter is to present the research approach adopted by the study. The chapter is organized as follows. Section 3.1 presents the research approach adopted by the study. The population and sampling design for the study explained in section 3.2. Then, data collection, analysis and presentation techniques were explained under section 3.3. The regression model for the study was discussed under section 3.4 and finally variableDescription, measurements and research hypotheses was discuses under section 3.5

3.1. Research approach adopted

3.1.1. Quantitative Research method:

Quantitative research is the systematic empirical investigation of observable phenomena via statistical, mathematical or computational techniques (Creswell 2009). The objective of quantitative research is to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomena. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships. Quantitative data is any data that is in numerical form such as statistics, percentages, etc. The researcher analyzes the data with the help of statistics. The researcher is hoping the numbers will yield an unbiased result that can be generalized to some larger population. Quantitative research is generally made using scientific methods, which can include:The generation of models, theories and hypotheses,the development of instruments and methods for measurement,Experimental control and

manipulation of variables,Collection of empirical data and Modeling and analysis of data

This study follows a deductive logic in describing the event. By applying the selected theory to explain the event, event characteristics will serve as empirical facts supporting the validity of the theory. By the way of approaching the research it is believed that this work is leaning towards a more deductive perspective since theory was the starting point and we have set out to prove the hypothesis by the testing of theory. Deduction is also the most commonly used research approach in combination with positivism (Sutrisna, 2009) However, it is believed the study is purely deductive as part of the research purpose were to find out determinatesof the Commercial banks liquidity and its impact on profitability.

A quantitative strategy is best suited as the research has a large focus on numbers and the use of hypothesis and statistical tools to analyze them. The knowledge that is sought-after has to be measured in order to answer the research problem and the knowledge gap. In this study, this approach enabled to see the determinants of the major firm specific and macroeconomic factors affecting banks liquidity in Ethiopia by establishing causal relationship. In addition, it is also intend to see the impact of bank liquidity on profitability through those significant factors affecting banks liquidity. Thus, this enabled to test the theory in the context of Ethiopia.

3.1.2. Population and sampling procedure

Population of the study

In this research, the target population is the banking sector in Ethiopia. According to NBE annual report (2013/14), Ethiopia consists of 19 Commercial banks. Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB),Development Bank of Ethiopia(DBE) 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(AB),Addis International Bank(ADIB),Debub Global Bank(DGB) and Enat Bank (EB). The first three are publically owned and the remaining sixteen are privately owned commercial banks.

Sample Frame

The study took eight banks as the sample frame to drawing sample size to the research. The rationality to choosing eight commercial banks was due to the availability of structured data for the specific duration of 2002/03 to 2013/14. The research excluded banks to their main objective is to create development in the country other than making profit like Development Bank Ethiopia. The eight commercial banks chosen for the study as follows: Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), 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) and Bank of Abyssinia S.C (BOA). Therefore, the matrix for the frame is 12*8 that includes 96 observations.

Sample Size:

Sampling size can be defined as the number of units in a population to be studied. Researchers need to have a large sample size in order to get more accurate results and have a high likelihood of detecting a true result. Since the number of banks in the country is small, the study assumed the data of all banks without taking sample. Therefore, the sampling frame and the sample was the same. According to the asymptotic theory, 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 to the overall population.

3.1.3. Data collection, presentation and analysis techniques

Data and data collection instruments

In order to analyze the determinate factors of bank specific variables, computed ratios for eight Commercial banks for twelve consecutive years .i.e. from 2002/03-2013/14EFY were collected from an audited financials report of commercial Banks and macro-economic variables, macroeconomic data were collected for the same years. Those macroeconomic data were mainly gathered from the records held by NBE and MoFED through structured document review. Conducting appropriate data gathering instruments helped researchers to combine the strengths and amend some of the inadequacies of any source of data to minimize risk of irrelevant conclusion. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul 2006). Accordingly, structured document review will be used for this research to collect required information, which would be relevant for addressing the objectives of the study. Data will be collected from audited financial statements (balance sheet and income statement) of each commercial bank included in the sample and various journals and publications of NBE and MoFED for the macroeconomic data from 2002\03 to 2013/14. All data were collected on annual base and the figures for the variables could be on July 07 of each year under study.

3.1.4. Data presentation and analysis:

To achieve the objective of the study, the study was primarily based on panel data, which were collected through structured document review. As noted in), the advantage of using panel data is that it controls for individual heterogeneity, less co linearity among variables and tracks trends in the data something which simple time-series and cross-sectional data cannot provide. The collected panel data were analyzed using descriptive statistics, correlations and multiple linear regression analysis. Mean values and standard deviations were also used to analyze the general trends of the data

from 2002/03 to 2013/14 based on the sample of eight commercial banks. Correlation matrix was used to examine the relationship between the dependent variable and explanatory variables. A multiple linear regression model and t-static was used to determine the relative importance of each independent variable in influencing liquidity and its impact profitability. The multiple linear regressions model was performed and thus ordinary least square (OLS) was conducted using EVIEWS 7 econometric software package, to test the casual relationship between the commercial banks liquidity and profitability and their potential determinants.

3.1.5. Fixed Effect Model

In this study, fixed effect model is used to analyze the data collected. The purpose of using fixed effect model is to examine the macroeconomic factors and banks' specific factors on 8 commercial bank's liquidity regardless of time effect. In this model, there are two conditions being applied. Firstly, data The Determinants Influencing Liquidity of Ethiopia Commercial Banks, and its Impact on profitability: Evidence from 8 Ethiopia Commercial Banks must exhibit different characteristic and has time effect or different characteristic and has no time effect. Secondly, the error terms and the independent variables are correlated which means autocorrelation problem doesn't exist in the fixed effect model.

3.1.6. Model specification:

In light of the above, to investigate the determinates of Banks specific and macroeconomic factors of Commercial Banks liquidity and its impact on profitability, the general multivariate /regression model was adapted from Vodova(2011) :

$$Yi\ t = \alpha + \beta xi\ t + \mu i\ t$$

With subscript i denote the cross-section and t representing the time-series dimension. Y it 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 proposed Regression models, adapted from Vodova (2011),which incorporate all of the variables to be test the hypotheses of the study were:

LIQit=β0it+β1NPLit+β2CAPit+β3BSZit+β4LGit+β5RRit+β6GDPit+β7INFit+β8IRLit+β9IRSit+β10STIRit+ μit..... (1)

Regression is more powerful than correlation. According to Brooks (2008), unlike correlation, in the case of regression if x has significant impact on y, thus change in y is influenced by change in x. Therefore, to see the impact of banks liquidity on profitability, the significant factors affecting liquidity were used as the representatives for the variation in liquidity.

Therefore, the second regression model, Adapted from Sufian (2011), which was used to see the impact of banks liquidity on profitability, was:

NIM$\boldsymbol{i}$t= $\boldsymbol{\alpha}$ + Sig$\boldsymbol{fa}$LiQ $\boldsymbol{it}$+, ... (2) Where,

LIQ i,t:is liquidity ratio of ith bank on year t

NPLi,t: is the non-performing loan of ith bank on the year t. The proxy was the share of non-performing loan from the total loan portfolio of a bank. $\boldsymbol{NPL=nonperformingloans/totalloans}$

CAPi,t:is capital adequacy of ith bank on the year t. the proxy was the ratio of total bank capital to total assets. $\boldsymbol{CAP=equity/totalassets}$

BSIZE i,t: is the size of ith bank on the year t. The proxy was natural logarithm of bank's total assets. $\boldsymbol{Size}$=($\boldsymbol{l}$og$\boldsymbol{oftotalassets}$)

LG i,t:is the loan growth of ith bank on the year t. The proxy was percentage change in loan.L is total loans and advances to customers $\boldsymbol{LG=Lt-(t-1)/Lt-1}$

RR i,t: the ratio of nonearning assets to total deposits for bank i in year t.**GDP t:**is the real domestic product/GDP growth of Ethiopia on the year t. The economic growth is measured as percentage change in Gross Domestic Product (GDP). The proxy was growth rate of real GDP.

INFt: is the overall inflation rate in Ethiopia on the year t.Ifr=If ($\boldsymbol{t}$) −Inf($\boldsymbol{t-1}$)/Inf ($\boldsymbol{t-1}$)

IRLt: is the yearly averagelending interest rate.

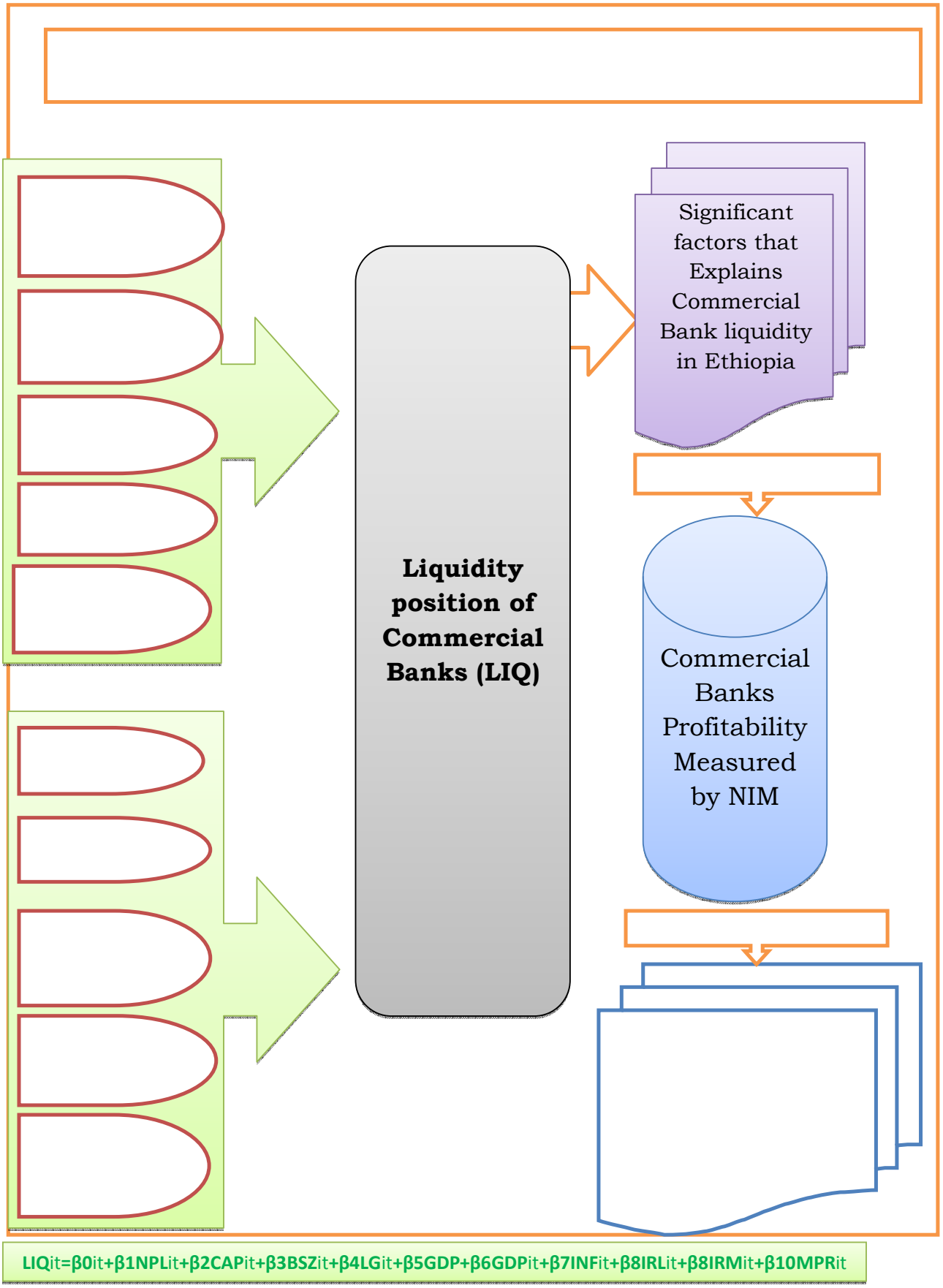
IRSt: is average interest rate spread on the year t. The proxy was the difference between the average annual lending and deposit interest rate.

STIRt: is the short term (monetary) interest rate on the year t. The proxy was the weighted average annual Ethiopian government Treasury bill rate.

μi t:is a random error term

NIMit: is Net interest rate Margin of bank i on year t

SigfaLiQ: are significant factors affecting banks liquidity



$$LIQ_{it}=\beta 0_{it}+\beta 1NPL_{it}+\beta 2CAP_{it}+\beta 3BSZ_{it}+\beta 4LG_{it}+\beta 5GDP+\beta 6GDP_{it}+\beta 7INF_{it}+\beta 8IRL_{it}+\beta 8IRM_{it}+\beta 10MPR_{it}$$

3.2.Variable description, measurements and research hypotheses

This study has attempted to see the relationship between the dependent and independent variables through testing the hypotheses regarding to the relationships between liquidity of banks and firm specific *and* macroeconomic factors affecting it and the impact of liquidity on profitability in the case of commercial banks in Ethiopia. It is apparent that the most significant task is to select the appropriate explanatory variables. The selection of variables was based on previous relevant studies likes (Vodova 2011 &Sufian 2011). We considered whether the use of the particular variable makes economic sense in Ethiopia condition. For this reason, the study excluded variables such as political incidents, impact of economic reforms or the exchange rate regime. The study also considered which other determinate factors could influence the liquidity of banks in the Ethiopia. The limiting factor then was the availability of some data. Therefore, the following hypotheses were developed to break down the above research questions.

Dependent Variable:

Liquidity of Banks: Bank liquidity is ability to meet customers demand and provide advances in the forms of loans and overdrafts.

Liquidity 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 (Bessis, 2009).

Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions. Various authors

like Moore (2010), Praet and Herzberg (2008) or Rychtárik (2009) provide various liquidity ratios:

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. 4168) 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 is the same for all banks in the sample.

$$L1=liquidassets/totalassets\ .$$

This measure of liquidity was taken as benchmark measurement.

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.

$$L2=loans\ /deposits+shorttermfinancing$$

Net Interest Margin (NIM):-

Profitability of Banks: one of the commonly observed measures of bank profitability is called the Net Interest Margin (NIM), the difference between interest income and interest expenses as a percentage of average value of (total loans and advances which includes deposits with foreign banks, treasury bills and other investments). One of a bank's primary intermediation functions is to issue liabilities and use the proceeds to purchase income-earning assets. If a bank manager has done a good job of

asset and liability management such that the bank earns substantial income on its assets and has low costs on its liabilities, profits will be high.

$$Net\,Interest\,Margin\,(NIM) = Net\,Interest\,Income / average\ value\ of\ Interest\ Earning\ Asset$$

It measure how well a bank manages its assets and liabilities, which is affected by the spread between the interest earned on the bank's assets and interest costs on its liabilities. This spread is exactly what the net interest margin measures. NIM was used as a measure of bank profitability by James Nguyen (2006), Ho and Saunders (1981), Angbazo (1997), Levine (2004), and Claeys et al. (2004).

Independent variables:

Non-performing loans (NPLs):

NPLs are loans that a customer fails his contractual obligations on either principal or interest payments exceeding 90 days.

Banks play "Risk Transformation" (riskless deposit to risky loans) in order to survive. This measures the quality of banks asset. Unlike other firms banks assets are composed of large amount of loans. If this loan is considered to be uncollectable that leads to reduction in banks profitability and make large number of depositors to fear and run against the bank. Therefore, it is expected that there is negative relationship between bank liquidity and the amount of non-performing loans. The proxy used for non-performing loans was the percentage of non-performing loans in the total amount of bank loan.

H1: The percentage of non-performing loan in the total volume of loan has no significant impact on banks liquidity

Capital Adequacy of Banks (CAP):

Capital adequacy is the sufficient funds to absorb losses to protect depositors, creditors, and official institutions in the interest of maintaining

banking system stability. It is consists of common stocks, surplus funds, undivided profit, reserve for contingencies and other capital reserves. Higher capital requirements provide higher liquidity to financial institutions. Where risk absorption theory is realized that "Higher capital improves the ability of banks to create liquidity".

In the resent empirical studies consistently found that bank capital increases bank liquidity through its ability to absorb risk and also agree that a positive and significant relationship exist between bank capital and liquidity. The proxy for capital adequacy used in this study was the ratio of equity to total assets.

H2: Capital adequacy has no significant impact on banks liquidity

Bank Size (Bsize): `

Bank size is defined broadly as the banks net total asset. It measures its general capacity to undertake its intermediary function. This variable is included to capture the economies or diseconomies of scale. There is consensus in academic literature that economies of scale and synergies arise up to a certain level of size. Beyond that level, financial organizations become too complex to manage and diseconomies of scale arise. There are two opposing arguments both theoretically as well as empirically regarding to the relationship between bank liquidity and size. The first view is too big to fail which considers negative relationship between size and liquidity while; the traditional transformation view suggests positive relationship. This study expected positive impact of bank size on liquidity as per the second argument. The proxy for bank size was the natural logarithm of total assets.

H3: Bank size has no significant impact on banks liquidity.

Loan Growth of Banks (LG):

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. As it was made by various empirical studies as well as the above argument the study expected negative relationship between banks loan growth and liquidity. The proxy for loan growth was annual growth rate of gross loans and advances to customers.

H4: Loan growth has no significant impact on banks liquidity.

Actual Reserve ratio:

Required reserves are the amount of funds that banks are required to keep on deposit in accounts designated for such purpose by the central bank. Required reserves constitute a monetary policy instrument which a central bank uses to varying degrees depending on the conditions of the financial system.

The degree of monetary policy tightening using this instrument is determined by the required reserve ratio, which may be uniform or differentiated, and by the reserving base to which the ratio is applied. To this effect, reserve requirement may be applied to either total or fraction of deposits, or reservable liabilities may include other categories, such as liabilities in respect of loans and proceeds derived from securities issued. By changing the reserve ratio, the central bank induces a reduction or expansion of commercial banks' lending potential, and withdrawal and/or creation of liquidity. In market economies, required reserve ratio is used as an instrument for regulating bank credit potential rather than bank liquidity. Reserve ratio RR As the ratio of nonearning assets to total deposits for bank i in year t.

H5: Reserve ratio has no significant impact on banks liquidity.

Gross Domestic Products (GDP):

The economy health of a nation is measured by its growth rate in national income. The economic growth is measured as percentage change in Gross Domestic Product (GDP) or Gross National Product (GNP). The GNP is broader than GDP, although both proxies are used to measure economic growth.

GDP is a macroeconomic factor that affects bank liquidity. For which, a major recession or crises in business operations reduces borrowers' capability to service obligations which increases banks' NPLs and eventually banks insolvency. Empirical researches on liquidity preference during different business cycle state that banks liquidity fondness is low in the course of economic boom. Where, banks confidently expect to profit by expanding loanable funds to sustain economic boom, while restrict loanable funds during economic downturn to prioritize liquidity. Therefore, the study expected negative relationship between banks liquidity and economic cycle. To proxy the economic cycle the real gross domestic products/GDP growth rate was used.

H6: GDP growth rate has no significant impact on banks liquidity.

Inflation Rate:

Inflation reflects a situation where the demand for goods and services exceeds their supply in the economy. Inflation causes many distortions in the economy. It affects the repayment of loans and discourages savings due to the fact that the money is worth more presently than in the future and inflation therefore affects the liquidity of the of the Commercial Banks.

The liquidity position of a bank is very sensitive to the increasing in inflation. 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, collateral security values deteriorate and value of loan repayments on banks loans declines. The amounts of liquid /short term assets held by banks rise with the rise in inflation. This way, it

has been found that inflation rate significantly determines bank liquidity. To proxy inflation the annual gross inflation rate was used.

H7: Inflation rate has no significant impact on banks liquidity.

Average Bank Lending Rate:

It is the rate of interest charged on loans made by banks. Keynesian liquidity preference theory states that when liquidity preference rises interest rates will also rise as people hold onto liquid assets. Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. The interest rate charged depends on the availability of money in the market, on prevailing rates and on the specific terms of the contract, such as term length. Bank lending rate is measured by average interest rate on lending.

H8: Bank lending rate has no significant impact on banks liquidity.

Interest Rate Spread/Liquidity Premium Paid by Borrower:

According to liquidity preference theory, the rate of interest for lenders to part their liquid money determines their holding of liquid assets. Therefore, the study expected that as the premium for parting liquidity increases due to the higher lending rate and lower deposit rate, the liquidity of banks will decrease. To proxy the liquidity premium paid by borrowers the difference between the annual average lending and deposit interest rates was used.

H9: liquidity premium paid by borrowers has no significant impact on banks liquidity.

Monetary policy Rate/Short Term/Money Market Interest Rate:

As short term interest rate increases and since it has less default risk, banks tend to invest more in Treasury bill and other short term instruments and enhance their liquidity position. Treasury bill is considered as liquid asset according to the NBE. Treasury bill market is the only regular primary market where securities are transacted on a fortnightly basis. Therefore, the proxy for short term/money market interest rate in this study was the weighted average yield on all types of Treasury bills annually (28 days, 91 days and 182 days). The annual rate was used due to the form of data used in this study (i.e. annual base).

H10: Short term/monetary interest rate have no significant impact on banks liquidity.

Bank Liquidity and Profitability:

This final hypothesis was used to test the third research question. There is often that, these two variables pose a conflicting relationship (dilemma of maintaining liquidity or profitability exist. Liquidity needs constrain a bank from investing all its cash though profitability comes from either investing it or bank lending activities. Since banks need to be both profitable (shareholders demands) and liquid (legal regulations), there is inherently conflicts between the two and the need to balance both. According to the bankruptcy cost hypothesis of Bergers (1995) we expect positive impact of liquidity on profitability whereas, negative impact according to the argument stating the opportunity cost of holding liquid assets as high return on investment. Hence, we can expect positive or negative impact of bank liquidity on profitability. But for this study it was expected as negative impact on profitability. To proxy liquidity the variables explaining liquidity significantly among the above independent variables were used.

H11: Banks liquidity has no significant impact on profitability.

Variable	Definition	Est. effect
NPL	The share of non-performing loans on total volume of loans	-
CAP	The share of own capital on total assets of the bank	+
BSIZ	Logarithm of total assets of the bank	+/-
LG	Annual loan growth rate	-
RR	Actual Reserve Ratio	+
GDP	Growth rate of real gross domestic product growth (GDP volume % change)	-
INF	Annual Inflation growth rate (CPI % change)	+
IRL	Interest rate on Lending	-
IRM	Difference between interest rate on loans (Average lending rate) and interest rate on deposits (Average deposit rate)	-
STIR	The weighted average yield on all types of Treasury bills annually (28 days, 91 days and 182 days).	+
LiQ	Significant factors explaining banks liquidity among the above Nine factors in Ethiopia	-

Chapter Four:

3. Theregression Result 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. The data was analyzed in terms fixed effect model of via eview7 version. 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 commercial banks those operate before 2002/03. The data for this study was drawn from eight commercial banks for 2002/03 to 2013/14 periods. To this end, 96 observations were analyzed to examine the determinants of liquidity of Commercial banks in Ethiopia and its impact on profitability.

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/Liq1 and loans to deposits and short term financing ratio/Liq2 and profitability measured by NIM. The independent variables are: non-performing loans, Bank size, capital adequacy, loan growth, and reserve ration, previous year liquidity position of banks, real GDP growth, general inflation rate, and interest rate on lending, interest rate margin, and Short term interest rate.

Table 4.1 Descriptive statistics of the dependent and independent variables.

Variable	Obs.	Mean	media	Maximum	Minimum	Std.dev.
Liq1	96	0.365	0.360	0.594	0.158	0.104
Liq2	96	0.699	0.687	1.196	0.297	0.199
NIM	96	0.090	0.091	0.160	0.025	0.028
NPL	96	0.112	0.074	0.535	0.003	0.112
Cap	96	0.113	0.111	0.280	0.037	0.040
Bsize	96	129.7Bil	98.7Bil	197.1Bil	314mil.	30.40
LG	96	0.237	0.208	0.779	-0.123	0.197
RR	96	0.178	0.161	0.508	0.014	0.104
GDP	96	0.099	0.109	0.123	-0.021	0.037
Inf.	96	0.160	0.147	0.364	-10.6	0.128
IRL	96	0.110	0.117	0.123	0.070	0.015
IRS	96	0.069	0.069	0.076	0.063	0.004
STIR	96	0.010	0.010	0.019	0.0004	0.006

Source: Financial statement of sampled commercial banks and own computation through Eviews 7

Bank liquidity measures the ability to meet customers demand and provide advances in the forms of loans and overdrafts. Liquidity is also banks' cash and cash equivalent such as commercial paper, treasury bills, etc.

The mean value of Liq1 was 36.5% which was above the NBE directive No.SBB/57/2014- Minimum Regulatory Liquidity Requirement of 15%. The giant Commercial bank of Ethiopia would have the maximum and minimum values of Liq1 in the year 2004/05 EFY and 2012/13EFY was 59.4% and 15.8% respectively. The standard deviations show that, there was 10.4% dispersion of liquid assets to total assets ratio from its mean value for the commercial banks in Ethiopia.

The mean value of Liq2 was 70% which was lower than the international standard for loans to deposit ratio (i.e. 75% (CBRC 2012)). If the ratio is too high, it means that banks might not have enough liquidity to cover any unforeseen fund requirements; if the ratio is too low, banks may not be earning as much as they could be. Liq2 ranged from a low of 29.7% in CBE to a high of 121.2% in CBB. This mean value of liq2 in Ethiopian commercial bank indicates on average a higher amount of volatile liabilities/deposits were tied up with illiquid loans. There was dispersion of Liq2 towards its mean value among banks that is shown by the standard deviation of 19.9%. Therefore, it can be concluded that loans to deposit ratio was dispersed by 19.9% among commercial banks in Ethiopia.

As far as profitability ratios concerned, NIM records a minimum of 2.50% and maximum of 16% with a mean value of 9.0%. It is the difference

between interest income and interest expenses as a percentage of total loans and advances which includes deposits with foreign banks, treasury bills and other investments. It measure how well a bank manages its assets and liabilities, which is affected by the spread between the interest earned on the bank's assets and interest costs on its liabilities. The mean value of NIM was 3.2%. The value of standard deviation (i.e. 2.8%) indicates the dispersion level from the mean value of NIM in the case of commercial banks in Ethiopia.

Among the bank specific independent variables, NPLs ratio measured by Nonperforming loans divided by total loan ranges from 0.3 percent to 53.5 percent. It has a mean of 11.2 percent and showing the deviation of 11.2% from its mean value. This indicates that Commercial banks in Ethiopia incurred 11.82% NPLs on averages from its total loan. According to Ethiopian context, the banking sectors are required to maintain the ratio of NPLs at least below 5% (NBE, 2008). However, as indicated above in table 4.2, the average NPLs of commercial banks in Ethiopia are more than the required threshold. Thus, NPLs problem are still serious for commercial banks in Ethiopia that envisaged by the maximum value of 53.5% indicates the presence of high credit risk in some of the banks.

The Capital adequacy also measured by total equity divided by total assets presents a minimum of 3.7 and maximum of 28 Percent% with a mean value and standard deviation of 11.3% and 4% respectively. This indicates that CAP for the sample commercial banks in Ethiopia during study period was above the minimum requirement, which is 8%. The standard deviation for CAP was 4% revealing the level of dispersion towards the mean among banks in Ethiopia.

Size of banks was seems highly dispersed from its mean value (i.e. 129.7Billions) with the standard deviation of 30.4%The maximum and minimum values were 197.1Bill and 314Mil respectively. The maximum value indicating the commercial bank of Ethiopia (CBE) and the minimum

value was some of privately owned commercial banks in Ethiopia which is UB. In terms of size CBE outweigh some banks more than 100%.

The mean value of the loan growth was 23.5% with maximum and minimum values of 77.9% and -12.3% respectively. In terms of loan growth, commercial banks in Ethiopia were seems highly differing with the standard deviation of 19.7%.

The other bank specific factor affecting liquidity of commercial banks was reserve ration that measures the portion (expressed as a percent) of depositors' balances banks must have on hand as cash. The minimum requirement determined by the country's central bank. The mean value of the percentage of reserve in the total amount of deposit was 18.3% with the maximum and minimum of 50.8% and 1.4% respectively with in the research period. The minimum value was the value for NIB bank in the year 2002.

Although the bank specific variables vary with each bank in the industry, general macroeconomic variables remain constant. The macroeconomic indicators that can affect banks liquidity position over time. The Ethiopian economy continued to grow and the overall economic performance reflected the rapid expansion of the country. Real GDP continued to grow on average by 9.8 percent in the past decade (2002/03- 2013/14). During the period, the maximum growth of the economy was recorded in the year 2005/06 (i.e. 12.6%) and the minimum was in the year 2003 (i.e. -2.1%). Since the year 2004 the country has been recording double digit growth rate with little dispersion towards the mean over the period under study with the standard deviation of 3.7%.

During the year under review, Ethiopia's monetary policy was geared towards containing inflationary pressure. The rate of inflation was dispersed over the periods under study towards its mean with standard deviation of 12.8%. Accordingly, the National Bank of Ethiopia has been closely monitoring monetary development so as to arrest the speed of inflation and inflation expectation. This was manifested in the reduction of the last two

years under the study down to single digit by the end of 2013/14 largely due to a slowdown in global food and fuel prices and the implementation of the base money nominal anchor.

The other macroeconomic factors were related with interest rate that are interest rate margin (the difference between annual average lending and deposit rate), the interest rate on lending and short term interest rate (the annual weighted average interest rate on Treasury bill). The mean value of the interest rate margin over the period under study was 6.9% with the maximum and minimum values of 7.63% (in the years 2009/10) and 6.3% (in the year 2012/13) respectively. There was variation of interest rate margin towards its mean value over the periods under study with the value of standard deviation 0.4%.

The mean value of the interest rate on lending over the period under study was 11% with the maximum and minimum values of 12.3% (in the years 2008/09 to 2010/11) and 7% (in the year 2002/03) respectively. There was variation of interest rate on lending towards its mean value over the periods under study with the value of standard deviation 1.5%. On average the rate on government Treasury bill was 1.0% with maximum rate of 31.31% in the year 2002/03 and the minimum rate of 0.04% in the year 2006. There was also the dispersion of short term interest rate towards its mean over the periods under study with standard deviation of 0.6%.The study noticed that the average growth rate of reserve ration varies significantly from year to another. This growth reported a maximum of 50.8% in 2009/10 and a minimum of 1.4% in 2002/03, with an overall average growth rate of 17.8 with standard deviation of 9.7%%.

4.2. Correlation analysis:

As noted by Gujarati (2004), the correlation analysis is made to describe the strength of relationship or degree of linear association between two or more variables. In Pearson correlation matrix, the values of the correlation coefficient range between -1 and +1. A correlation coefficient of +1 indicates that the two variables have perfect positive relation; while a correlation coefficient of -1 indicates as two or more variables have perfect negative relation. A correlation coefficient of 0, on the other hand indicates that there is no linear relationship between two variables.

Table4.2: correlation coefficient between the dependent variables and independent variables.

	LIQ1	LIQ2	NIM	BSIZE	CAP	GDP	INF	IRL	IRS	LG	NPL	RR	STIR
Liq 1	1	-0.421	-.335	0.02	0.06	0.08	0.25	0.14	0.24	-0.36	0.16	0.60	-0.12
Liq 2	-0 .421	1		-0.76	0.27	-0.05	-0.19	-0.44	0.33	0.24	0.18	-0.26	-0.37
NIM	-0.335	- 0.065	1	0.28	0.38	0.05	0.29	0.43	-0.25	0.12	-0.62	0.04	0.36

The sample size is the strategicindicator to determine whether or not the correlation coefficient is different from zero/statistically significant. As a sample size approaches to 100, the correlation coefficient of about or above 0.20 is significant at 5% level of significance (Meyers et al. 2006). The sample size of the study was 8*12 matrixes of 96 observations which was around 100, hereafter, the study used the above justification for significance of the correlation coefficient.

Bank size had statistically insignificant in case of liq1 and statisticallysignificance in case of liq2 but positive linear relationship with banks liquidity in Ethiopia having coefficient of correlation 0.02 and 0.76 respectively. This was in line with the study hypothesis that was based on the argument of small banks focus on traditional intermediation and transformation activities and hold less liquid asset. A Liq1 (liquid asset to total asset ratio) was positively correlated with CAP with the coefficient of correlation 0.06. But the linear relationship between CAP and Liq1 was

statistically not different from zero. Liq2 results have to be interpreted in reverse: positive sign of the coefficient means negative linear relationship with liquidity and conversely. As per Liq2 banks liquidity and CAP had statistically significant and negative linear relationship respectively. This was in accordance with financial fragility and crowding out of deposits hypothesis and opposite to the expectation of the study.

Loangrowth had negative and statistically significant relationship with banks liquidity measured by Liq1 and Liq2 with correlation coefficient of -0.36 and 0.240 respectively. Actual reserve ration had a positive and statistically significant relationship with Bank liquidity measured by both measurements. On the other hand, among bank specific factors NPL had positive linear relationship with liquidity as per Liq1 and negative as per Liq2 but statistically insignificant/not different from zero. Among the macroeconomic factors affecting liquidity, real GDP growth rate and interest rate margin had positive and significant correlation with liquidity of commercial banks in Ethiopia. This result was opposing to the expectation of the study. The negative and significant relationship of short term interest rate with banks liquidity was also opposite to the study hypothesis. The positive relationship of inflation rate on banks liquidity was in line with the expectation of the study. Except Real GDP growth Rate, Loan Growth and Actual reserve ratio all variables had statistically significant linear relationship with NIM. Among the significant variables only interest rate spread and non-performing loan had negative linear relationship with NIM.

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

This section provide test for the classical linear regression model (CLRM) assumptions such as normality, heteroscedasticity, autocorrelation and multicolinearity tests. The linearity of the parameter is assumed since the model applies linear ordinary least square (OLS). The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Thus, in order to maintain the validity and

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

4.3.1 Normality Test:

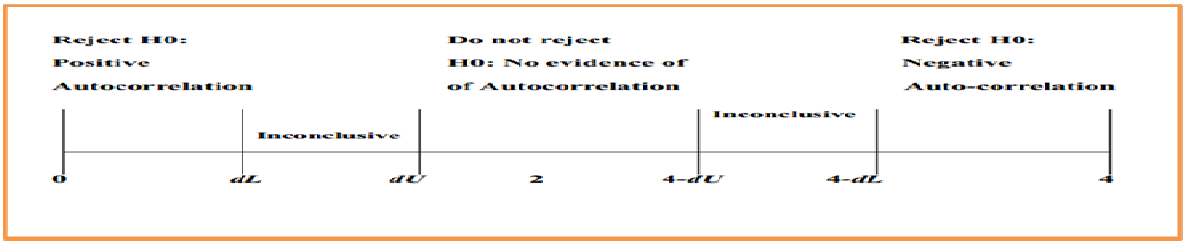
One assumption of classical linear regression model (CLRM) is the normal distribution of the residual part of the model. As noted by Gujarati (2004), OLS estimators are BLUE regardless of whether the ui are normally distributed or not. If the disturbances (ui) are independently and identically distributed with zero mean and constant variance and if the explanatory variables are constant in repeated samples, the OLS coefficient estimators are asymptotically normally distributed with means equal to the corresponding β's. However, as per the central limit theorem, if the disturbances are not normally distributed, the OLS estimators are still normally distributed approximately if there are large-sample data. Thus, since the sample size for this study is large enough, it is approximately considered as normally distributed. This implies that residuals are asymptotically normal in this study. As shown in the histogram in the appendix (2) kurtosis approaches to 3 (i.e. 3.22534 for Liq1, 3.127791 for Liq2 and 2.862622 for NIM), and the Jarque-Bera statistics was not significant even at 10% level of significance as per the P-values shown in the histogram in the appendix (i.e. 0.566853 for Liq1, 0.762275 for Liq2 and 0783547 for NIM). 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.

4.3.2 Heteroscedasticity Test:

In the classical linear regression model, one of the basic assumptions is Homoskedasticity assumption that states as the probability distribution of the disturbance term remains same for all observations. That is the variance of each ui is the same for all values of the explanatory variable. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity. Accordingly, in order to detect the heteroscedasticity problems, White test was utilized in this study. This test states that if the p-value is significant at 95 confidence interval, the data has heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem. Thus, as shown in appendix-3, there is no heteroscedasticity problem for this study hence the p value is 44.56%, 7.2% and 34.44% for liq1, liq2 and NIM respectively showing insignificant value.

4.3.3 Autocorrelation Test:

Furthermore, the study tested the autocorrelation assumptions that imply zero covariance of error terms over time. That means errors associated with one observation are uncorrelated with the errors of any other observation. As noted by Gujarati (2004), the best renowned test for detecting serial correlation is Durbin Watson test. In accordance to Brooks (2008), 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 figure 4.1 below. Figure4.1 Rejection and Non-Rejection Regions for DW Test Reject 0dLdU 2 4-dU 4-dL 4 :



The study used the dL and dU values for 95 observations as approximation of 96 observations. As per the DW table in the appendix (5) for 95 observations with 10 explanatory variables at 1% level of significance, the dL and dU values are 1.313 and 1.767 respectively. The DW values for Liq1, Liq2 and NIM for 96 observations were 1.485751, 1.189703 and 1.309712respectively. The DW value of Liq1 and NIM lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected whereas ,the DW inclusive value of Liq2 lies below the lower limit of the inconclusive region and indicate the presence of first order positive serial autocorrelation between the error term and its lag. Hence, the null hypothesis of no autocorrelation should be rejected in the case of Liq2. Generally, there is first order autocorrelation in the regression model of Liq2 but not in Liq1 and NIM. Hence, we focused up on the results of Liq1 for the determinants of liquidity.

4.3.4 Multicolinearity Test:

The term Multicolinearity indicates the existence of exact linear association among some or all explanatory variables in the regression model. When independent variables are multi collinear, there is overlapping or sharing of predictive power. Thus, if multicolinearity is perfect, the regression coefficients of the independent variables are undetermined and their standard errors are immeasurable (Gujarati, 2004). The multicolinearity makes significant variables insignificant by increasing p-value since increased p-value lowers the t-statistics value. Thus, the panel regression results with multicolinearity will shows significant variables as insignificant variables.

As it was sighted in Tseganesh (2012), how much correlation causes multicollinearity. However, is not clearly defined. While Hair et al (2006) argue that correlation coefficient below 0.9 may not cause serious multicollinearity problem. Malhotra (2007) stated that multicollinearity problem exists when the correlation coefficient among variables is greater than 0.75. Kennedy (2008) suggests that any correlation coefficient above

0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results. This indicates that there is no consistent argument on the level of correlation that causes multi-collinearity. According to Gujarati (2004), the standard statistical method for testing data for multi-collinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in this study correlation matrix for ten of the independent variables shown below in the table had been estimated. The results in the following correlation matrix show that the highest correlation of 0.667 which is between inflation rate and interest rate on lending. Since there is no correlation above 0.7, 0.75 and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, we can conclude in this study that there is no problem of multicollinearity.

Table4.3 correlation matrix of explanatory variables

	LIQ1	LIQ2	NIM	BSIZE	CAP	GDP	INF	IRL	IRS	LG	NPL	RR	STIR
LIQ1	1.000												
LIQ2	-0.421	1.000											
NIM	-0.335	-0.065	1.000										
BSIZE	0.028	-0.753	0.281	1.000									
CAP	0.074	0.230	0.378	-0.407	1.000								
GDP	0.080	-0.038	0.049	0.169	-0.137	1.000							
INF	0.255	-0.196	0.288	0.357	0.033	0.471	1.000						
IRL	0.154	-0.478	0.432	0.595	0.022	0.232	0.667	1.000					
IRS	0.222	0.324	-0.252	-0.387	-0.042	-0.087	-0.011	-0.330	1.000				
LG	-0.376	0.260	0.117	-0.148	0.197	0.194	-0.053	-0.233	-0.102	1.000			
NPL	0.154	0.165	-0.620	-0.223	-0.350	-0.291	-0.473	-0.511	0.392	-0.424	1.000		
RR	0.624	-0.313	0.005	0.230	-0.002	0.151	0.584	0.453	0.243	-0.367	-0.101	1.000	
STIR	-0.104	-0.360	0.364	0.379	0.171	-0.371	0.079	0.236	-0.593	-0.135	-0.272	0.007	1.000

Source: Financial statement of sampled commercial banks and own computation through Eviews 7

4.4. Choosing Random effect (RE) versus fixed effect (FE) models:

According to 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/FEM and random effect model/REM. Hence the choice here is based on computational convenience. On this score, FEM may be preferable. Since the number of time series (i.e. 12 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks) and also FEM is preferable in case where the number of explanatory variables exceeds the cross-sectional data.

4.5. Result of the regression Analysis:

This section presents the regression result of fixed effect model that made to examine the determinant variables of liquidity of commercial banks in Ethiopia and its impact on profitability. Thus, the model used to examine statistically significant determinants of commercial banks liquidity measured by Liq1 was:

$$LIQit=\beta 0it+\beta 1NPLit+\beta 2CAPit+\beta 3BSZit+\beta 4LGit+\beta 5GDPit+\beta 6INFit+\beta 7IBLRit+\beta 8IRSit+\beta 9MPRit+ \mu it \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Table 4.4 regression results for determinants of liquidity measured by liquid assets to total assets ratio (Liq1):

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.278492	0.545294	4.178466	0.0001
BSIZE	-0.100358	0.027505	-3.648776	0.0005*
CAP	-0.085322	0.306821	-0.278085	0.7817
GDP	0.957232	0.35191	2.720107	0.0080*
INF	0.00234	0.103163	0.022683	0.9820
IRL	2.760261	1.331269	2.073406	0.0414**
IRS	-3.442352	2.790067	-1.233788	0.2210
LG	-0.144138	0.055169	-2.612647	0.0108*
NPL	0.258343	0.126563	2.041223	0.0446**
RR	0.63012	0.095718	6.583068	0.0000*
STIR	5.975938	2.948877	2.026513	0.0461**

Note: R-squared: 0.677906; Adjusted R-squared: 0.607706; F-statistic: 9.656765; Prob(F-statistic) 0.000000 ; Durbin-Watson stat:1.485751

The starred coefficient estimates are significant at the 1 % (*), 5 % (**) and 10% (***) level.

Source: Financial statement of sampled commercial banks and own computation through Eviews 7.

Table 5 displays the results of the regression analysis regarding the determinant of explanatory variables on the liquidity of commercial banks in Ethiopia (liq1). The coefficient of determination in the this model was given by its R-squared of 0.67906, and Adjusted R-squared is used as a better measure of fit and it means that our models can be explained by 60.77% of variability in explanatory variables.. The explanatory power of models is substantially higher.

According to F-test, the model, as a whole are statistically significant and the empirical significance level is less than 1% (Pr> F is <, 00001). Individual t-tests revealed that Bank size, Loan Growth, non-performing loans, reserve ration, interest rate on lending, GDP and short term interest rate were the statistically significant factors affecting liquidity of commercial banks in Ethiopia. Bank size had negative and statistically significant impact on liquidity at 1% level whereas; GDP and Reserve ration had positive and statistically significant impact on liquidity at 1% level. Interest rate on lending and short term interest rate and Non-performing loan had positive and significant impact on liquidity at 5% level of significance. And Loan Growth had negative and statistically significant influence on banks liquidity in Ethiopia at 5% significance level. Whereas, Capital adequacy, inflation rate and interest rate margin were statistically insignificant.

The coefficient signs of non-performing loan, Capital Adequacy real GDP growth rate and interest rate on lending and loan growth were contrary to our expectation and in line with the findings of Czech's (Vodova 2011) and the case of emerging markets (Bunda and Desquilbet 2008) commercial banks analysis.

4.6. The impact of the significant factor affecting bank liquidity on Profitability-results:

This section presents the regression result made to examine the impact of the significant determinate variables of Bank liquidity on profitability. The model used to assess the impact of bank liquidity up on profitability through the significant factors explaining banks liquidity was:

$$\text{NIM}_{i,t} = \alpha + sfalnit + u_{i,t}$$

From the regression results of Liq1 , the significant factors affecting bank liquidity in Ethiopia were bank size, Real GDP growth, Loan growth, interest rate on lending, short term interest rate, Non-performing loan and Actual Reserve ration. Nonetheless, there is first order autocorrelation in the regression model of Liq2 but not in Liq1 Hence; we focused up on the results of Liq1 for the determinants of liquidity to assess its impact on profitability.

Therefore, bank size, Real GDP growth, non-performing loans, interest rate on lending, loan growth, Reserve ration, and short term interest rate were used.

Table 4.5regression result of the impact of statistically significant factors affecting banks liquidity on Profitability.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.149746	0.132038	-1.134111	0.2601
BSIZE	0.015362	0.007631	2.01305	0.0475**
GDP	-0.194171	0.09502	-2.043478	0.0443**
INF	0.019274	0.027506	0.700718	0.4855
IRL	-0.412838	0.364442	-1.132795	0.2607
LG	-0.022640	0.016063	-1.409511	0.1626
NPL	-0.169556	0.036726	-4.616755	0.0000*
RR	-0.047604	0.026911	-1.768984	0.0807***
STIR	-0.751295	0.727725	-1.032389	0.3050

Note: R-squared:0.606441; Adjusted-R-squared:0.532649; F-statistic:8.218229 Prob(F-statistic):0.000000; Durbin-Watson stat:1.309712

The starred coefficient estimates are significant at the 1 % (*), 5 % (**) and 10% (***) level.

Source: Financial statement of sampled commercial banks and own computation through Eviews 7.

The explanatory power of the model was high with the value of adjusted R2 of 53.26%. This indicates that 54% of the variation in NIM can be explained by the variation in those factors that can explain the variation in liquidity. Among the statistically significant factors affecting the liquidity of commercial banks in Ethiopia, Bank size, Real GDP growth, Non-performing loan and Actual Reserve ratio had statistically significant impact on banks profitability. Bank size had positive and statistically significant impact on financial performance at 5% level of significance. On the other hand, non-performing loans, Real GDP growth, and reserve ratio had negative and statistically significant impact on financial performance at 1%, 5% and 10 % level of significance respectively. Interest rate on lending, loan Growth and short term interest rate had negative but statistically insignificant impact on banks profitability while, inflation rate had positive but insignificant impact on it.

4.7. Discussion of the regression results:

4.7.1. Determinates of Banks liquidity-Discussion:

This section discussed the bank specific and macroeconomic determinants of banks liquidity and also tested the impact of those determinate of liquidity of commercial banks on profitability. Two model are tested; model 1 represents that the liquidity is measured by Liq1 (cash and cash equivalents to total assets) whereas model 2 represents that the liquidity is measured by Liq2 (loans and advance to total deposit and short term financing) which could not been used for this discussion of determinates of Bask liquidity.

4.7.1.1. Non-performing loan and Liquidity:

The regression output estimated contrasting results of non-performing loans, the results of the analysis presented a direct effect. This could be a sign of prudent policy of banks with a better portfolio quality, there is less incentive for bank to reduce lending and improvement may be the result of better internal risk management. The findings presented that taking all other independent variables constant, a one percent increase/decrease in nonperforming loans (credit risk) would lead to a 0.258% adjustment by increase /decrease on liquidity position by holding liquid asset in the total asset portfolio. This result is consistent with the results identified by (Vodova 2011). In generally, we should reject the hypothesis asserting that, the percentage of non-performing loan in the total volume of loan has no significant impact on banks liquidity.

4.7.1.2. Capital Adequacy:

Although we expected that the bank with sufficient capital adequacy should be liquid, too, the results of the regression show the opposite influence of the share of capital on total assets. It seems that bank with lower capital adequacy pay more attention to liquidity risk management and hold a sufficient buffer of liquid assets. Also, capital adequacy ratio that determines the risk taking behavior of banks, this study identifies statistically insignificant and negative impact of capital adequacy ratio on liquidity (liq1). Thus, regression result of fixed effect model is consistent with the

hypothesis developed in this study. The study hypothesized that, Capital adequacy has no significant impact on banks liquidity. This negative sign indicates an inverse relationship between capital adequacy ratio and liquidity position measured by liquid asset to total asset. Thus, it implies that for one unit change in the banks' capital adequacy ratio, keeping other thing constant had resulted 0.085 unit adjustments on the levels of liquid asset to total asset in the portfolio in opposite direction.The coefficient sign of capital adequacy in this equation was opposite to hypothesis (1) and in line with findings of Czech commercial banks analysis (Vodova 2011). This is based on the argument of risk absorption. According to this argument the higher capital to total assets ratio of banks the higher the capacity of the bank to absorb risks and create higher level of liquidity to the external public through deposits and loans. In other words, higher capital ratio of banks create positive signal to the external public and attract more deposits. In turn this enable banks to hold more liquid assets that create better potential to liquidity creation to the external public. But since the coefficient was statistically insignificant we could not say it show negative impact on banks liquidity. Hence, our conclusion for the impact of capital adequacy on banks liquidity should be based on the first model/Liq1.

4.7.1.3. Bank Size

It is one of explanatory variable which has statistically significant and negative influence on the liquidity is the size of bank. Liquidity is decreasing with the size of the bank. Thus, regression result of fixed effect model is inconsistent with the hypothesis developed in this study. The study hypothesized that, Bank size has no significant impact on banks liquidity. This negative sign indicates an inverse relationship between bank size and liquidity position measured by liquid asset to total asset. Thus, it implies that for one unit change in the banks' size, keeping other thing constant had resulted 0.100358 unit adjustments on the levels of liquid asset to total asset in the portfolio in opposite direction. The result was consistence with (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. 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. The coefficient sign of bank size in this equation was similar to hypothesis and in line with also the findings of Czech commercial banks analysis (Vodova 2011).In generally, based on model one result, the study rejected the hypothesis saying bank size has no significant impact on banks liquidity.

4.7.1.4. Loan Growth of Banks (LG):

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 commercial Banks. Liquidity is decreasing with increasing the rate of loan growth. Thus, regression result of fixed effect model is inconsistent with the hypothesis developed in this study. The study hypothesized that, Loan growth has no 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. Thus, it implies that for one percent change in the loan growth rate, keeping other thing constant had resulted 0.144 unit adjustments on the levels of liquid asset to total asset 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.

4.7.1.5. Real GDP Growth Rate:

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. Real GDP growth rate has statistically significant and positive influence on the liquidity of 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. The study hypothesized that; real GDP growth rate has no significant impact on banks liquidity. This positive sign indicates a direct relationship between real GDP growth and liquidity position measured by liquid asset to total asset. Thus, it implies that for one percent change in the real GDP growth rate, keeping other thing constant had resulted 0.957 unit adjustments on the levels of liquid asset to total asset (liq1) in the portfolio in same direction In generally, based on model one result, the study rejected the hypothesis saying real GDP growth rate has no significant impact on banks liquidity.

4.7.1.6. Inflation Rate:

Inflation had positive impact on banks liquidity measured by Liq1which was in line with hypothesis that, Inflation rate has no significant impact on banks liquiditywhich 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 exacerbate the credit market rationing and prefer to hold risk free/liquid assets. The value of the coefficient in case of Liq1 (i.e. 0.00234) indicates for a percentage rise/decline in the general inflation rate of the country, commercial banks holding of liquid assets rise/decline by 0.23% (reduce long term/ capital investments by 0.18%). Hence, the study failed to reject the hypothesis stating INF has no significant impact on banks liquidity.

4.7.1.7. Average Bank Lending Rate:

Contrary to the expectations of the existence of an inverse relationship betweenbank liquidity and lending rates, Bank lending rate is found to be significant in almost all specifications. It is statistically significant and positive.The results show that,the positive link between interest rate on lending rate and bank liquidity. The possible explanation for this was, Banks probably focus more on the interest margin or it can highlight the fact that higher lending rates do not encourage banks to lend more. This is consistent with the problem of credit crunch and credit rationing. Interest rate on lending has statistically significant and positive influence on the liquidity of commercial Banks. Liquidity is increasing with increasing interest rate on lending. Thus, regression result of fixed effect model is inconsistent with the hypothesis developed in this study. The study hypothesized that; interest rate on lending has no significant impact on banks liquidity. This positive sign indicates a direct relationship between interest rate on lending and liquidity position measured by liquid asset to total asset. Hence it does not correspond to previous expectations, whereas the size of the coefficient is almost high. One of the possible explanations for this relationship is the low return on highly liquid assets. That is, banks with higher amounts of highly liquid assets try to compensate for their lower return through higher interest income. Thus, it implies that for one percent change in the interest rate on lending, keeping other thing constant had resulted 2.76 unit adjustments on the levels of liquid asset to total asset in

the portfolio in same direction. In generally, based on model one result, the study rejected the hypothesis saying interest rate on lending has no significant impact on banks liquidity.

4.7.1.8. Interest Rate Spread/Liquidity Premium Paid by Borrower:

Results show the negative impact of interest margin which is logical: increase in interest margin stimulates bank to focus more on lending activity and as a result, the share of liquid assets is decreasing. If the structure and the level of interest rates (which remain high) and their implications for the efficiency of the banking sector, where high intermediation margins may imply inefficiency of the financial sector and could act as a disincentive to investment and may also slow the economic growth.

Similar to hypothesis that, liquidity premium paid by borrowers has no significant impact on banks liquidity, which is contrary to the liquidity preference theory, premium paid by borrowers/interest rate margin had negative and statistically insignificant impact on banks liquidity. This result is consistent with the results identified by (Bunda and Desquilbet 2008; and Vodova 2011). The negative effect of interest rate margin highlights the fact that higher interest rate margin do not encourage banks to lend more rather it encourage banks to hold more liquid assets. This is consistent with the problem of credit crunch and credit rationing even though it is not supported by empirical evidence. Liquidity availability at the bank level is negatively related with the interest rate spreads. Banks that are highly liquid are associated with lower spreads as they do not have to incur extra costs of sourcing funds when faced with increased demand for credit.

The higher value of the coefficient in Liq1 (i.e. -3.442352) shows that, more than triplicate rise/decline in the liquidity position of commercial banks in Ethiopia for a decline/rise in the interest rate margin. Holding liquid assets reduces the risk that banks may not have sufficient cash to meet deposit withdrawals or new loan demand (i.e. liquidity risk), thereby forcing them to borrow at excessive costs. Thus, as the proportion of liquid assets increases,

a bank's liquidity risk leading to a lower liquidity premium component of the net interest margin (Angbazo, 1997 and Drakos, 2003).

4.7.1.9. Short term interest rate and liquidity:

As short term interest rate increases and since it has less default risk, banks tend to invest more in Treasury bill and other short term instruments and enhance their liquidity position. Short term interest rate had positive and statistically significant impact on banks liquidity measured by Liq1. The significance of short term interest rate in Liq1 was inconsistent with hypothesis. The coefficient value of STIR in Liq1 (i.e.5.975938) indicate taking all other independent variables constant, for a percentage rise/decline in annual average short term interest rate, the liquidity position of banks rise/decline by more than 5%. The study rejected the hypothesis saying short term interest rate has no significant impact on banks liquidity.

4.7.2. Impact of significant variables affecting bank liquidity on profitability- discussion:

The natural log of total assets is found to have the positive and statistically significant impact on the profitability of commercial banks in Ethiopia. The impact of bank size on profitability is certain a prior for the fact that on the one hand bank size implies increased diversification and hence less risk with low return, on the other hand, bank size ensures economies of scale contributing positively for profitability through reducing costs and also large banks in large market take riskier investments resulting higher returns.

The coefficient sign of bank size in the case of liquidity equation as well as profitability equation were opposite to each other and statistically significant. This indicates the negative relationship between liquidity of commercial banks and their profitability. In the other word, banks had large size would benefit from the decrease cost of funding and allows them to invest in riskier assets through implicit guarantee; hence their motivation to hold liquid assets is limited. This is also consistent with the relative market power hypothesis. The relative market power hypothesis states that only larger banks are able to exercise market power in pricing their products to earn above normal profits. The finding of the study provides support to the earlier studies finding economies of scale for larger banks (Flamini18 et al., 2009; Sufian and Habibullah19, 2009).

A negative and significant association between bank profitability and real GDP growth rate has been found in previous studies (sufian (2011), Aminu (2013) and Antonina (2011)). The negative sign of this variable supports the notion that at least partly supports the view that high economic growth improves business environment and lowers bank entry barriers. The consequently increased competition dampens banks' profitability. The other support for the result was due to diversify their income sources by incorporating non-traditional banking services. Industry structure is found to have different impact on banks with different ownership types. The impacts of real GDP growth on bank profitability are conflicting across ownership types but there

is some evidence that the growth of GDP may induce competition, resulting in a decrease of bank profits.

On the other hand, NPL and RR had negative and statistically significant impact on profitability measured by NIM. The negative and statistically significant impact of non-performing loans up on profitability was in line with the argument that a rise in the credit risk reduces the profitability of commercial banks through the reduction of loan provision. The negative sign of RR rate is also quite expected that it would reduce the availability of loanable fund and increase non-earning liquid asset. The coefficient signs of nonperforming loans and short term interest rate were positive in the liquidity equation whereas, negative in the NIM equation. These results indicate the negative relationship between liquidity of commercial banks in Ethiopia and their profitability. In other words, when NPL and RR increase banks‟ holding of liquid assets increase, at the cost of decreasing loan provision by banks, and reduce the profitability of commercial banks in Ethiopia. The coefficient values indicate for a percentage increase/decrease in NPL and RR, banks holding of liquid assets increase/decrease by 0.258% and 0.63% respectively whereas, profitability of banks decrease/increase by 0.169% and 0.047% respectively.

The other statistically significant factors affecting banks liquidity like interest rate on lending, loan growth and short term interest rate had statistically insignificant impact on profitability. Interest rate on lending and short term interest rate had positive and statistically significant impact on liquidity nonetheless, had negative and insignificant impact on profitability. The loan growth had negative and statistically significant impact on liquidity while, the negative and statistically insignificant impact on profitability. Therefore, results suggested that a nonlinear relationship exists, whereby profitability was improved for banks that hold some liquid assets, however, there was a point beyond which holding further liquid assets diminishes a banks‟ profitability, all else equal. Conceptually, this result is consistent with the idea that funding markets reward a bank, to some extent, for holding liquid assets, thereby reducing its liquidity risk. However, this

benefit is can eventually be outweighed by the opportunity cost of holding such comparatively low-yielding liquid assets on the balance sheet. At the same time, estimation results provide some evidence that the relationship between liquid assets and profitability depends on the bank's business model and the risk of funding market difficulties.

Table 4.7: Summary of actual and expected signs of explanatory variables on the dependent variables

Explanatory Variables	Expected impact on Liquidity	Actual Impact		
		Liquidity		Profitability
		Liq1	Liq2	NIM
NPL	Negative and insignificant	Positive And significant	Positive and insignificant	Negative and significant
Cap	Positive and insignificant	Negative and insignificant	Positive and significant	
Bsize	Positive/Negative and insignificant	Negative and significant	Positive and insignificant	Positive and significant
LG	Negative and insignificant	Negative and significant	Positive and significant	Negative and insignificant
RR	Positive and insignificant	Positive and significant	Negative and significant	Negative and significant
RGDP	Negative and insignificant	positive and significant	Negative and significant	Negative and significant
Inf	Positive and insignificant	Positive and insignificant	Positive and significant	Positive and insignificant
IRL	Negative and insignificant	Positive and significant	Negative and significant	Negative and insignificant
IRS	Negative and insignificant	Negative and insignificant	Positive and insignificant	
STIR	Negative and insignificant	Positive and significant	Negative and significant	Negative and insignificant

Chapter five

5.0 Conclusion and Recommendations:

An important role of banks in the economy is to provide liquidity by funding long term, illiquid assets with short term, liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. 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. The main purpose of this study was to identify determinants of liquidity of Ethiopia commercial banks and its impact on profitability. The study was used the panel data for eight commercial banks in Ethiopia which had continuous twelve years banking service from 2002/03to 2013/2014. Data was presented by using descriptive statistics correlation analysis and balanced fixed effect regression analysis for two liquidity ratios and profitability measured by NIM. Test for OLS regression the models were conducted for the classical linear regression model assumptions. There was problem of first order positive serial autocorrelation in the case of L2 and the models fulfill other assumptions of the CLRM. The study were consider five bank specific and five macroeconomic factors .The results of models enable us to make following conclusions.

The study found that share of nonperforming loans has positive and statistically significant impact on liquidity measured by Liq1.Therefore, the study rejects the hypnosis that NPL has no statistically significant effect on the liquidity of Ethiopia commercial banks.

The coefficient sign for capital adequacy revealed negative and insignificant impact on liquidity as per Liq1. Bank liquidity decreases with the size of the

bank: big banks rely on the interbank market or on a liquidity assistance of the Lender of Last Resort, small and medium sized banks hold buffer of liquid assets which is fully in accordance with “too big to fail” hypothesis.

It is also found that loan growth rate and Actual reserve ration had statistically significant effect on the liquidity of Ethiopia’s commercial banks. The relation between the growth rate of GDP and bank liquidity found that positive and statistically significant effect on the liquidity of Ethiopians commercial banks.

Liquidity is negatively influenced also by interest margin but it is statistically insignificantly. Interest rate on lending and monetary policy interest rate was statistically significant and had positive impact on liquidity measured by Liquid asset to Total asset/Liq1. Even though, the number of statistically significant factors affecting liquidity different in the two measures their coefficient signs give the same conclusion except for the non-performing loan.

Therefore, the study failed to reject three hypotheses that indicate the relationship between bank liquidity and capital adequacy, inflation and short term interest rate whereas, the study reject the remaining seven hypostasis indicating the relationship between bank liquidity and the variables are insignificant. Four of the statistically significant variables affecting banks liquidity affect banks performance. These are the share of Non-performing loans on total bank loan, bank size, Actual reserve ration and Real GDP growth rate. Bank size had positive and significant impact on commercial Banks profitability just likes on liquidity of banks. Non-performing loan and actual Reserve ration had negative and significant impact on commercial Banks profitability. The other statistically significant variables, inflation rate, interest rate on lending Loan growth and short term interest rate affecting banks liquidity had insignificant impact on commercial banks profitability but their coefficient signs were opposite to in the case of liquidity. Therefore, it can be concluded that the impact of banks liquidity on profitability was non-linear (positive and negative).

Based on the findings of the research the following recommendations were given:

- Due to limited studies done in Ethiopia, more researchers are encouraged to conduct research on liquidity issues faced by banks. This would actually benefit the policy makers to setup a better and new workable policy. Researchers have examined the relationship between dependent variable (bank liquidity) and independent variables (bank size, capital adequacy, non-performing loan, Loan growth , gross domestic product, interest rate on lending ,Reserve ratio, General inflation rate,and Short term interest rates). Therefore, future research is recommended to use more challenging independent variables (for example, Ownership, political influence, unemployment, government implications and others) to explain the dependent variable of bank liquidity ratio. Besides, future researchers are also recommended to use a more complicated econometric model or dynamic panel model where it could capture the possible effect of independent variable on dependent variable that lags behind.

- Ethiopian Banks should consider both internal and macroeconomic variables in their strategy design. The study finds that the real GDP growth rate which measures the economy growth of Ethiopia has impacted negatively and significantly on the profitability of commercial banks. The findings in this direction implies that the commercial banks do not respond to the dynamics of economic growth which can be taken as an indication of ineffective competition and efficiency in the Banking sector. Hence, at national level there is a need to reduce concentration and spur competition. In addition, the inflation rate which appears to be significant to affect commercial banks liquidity need to be monitored. In such endeavor the effect of inflation on the debt repayment capacity of borrowers, the saving potential of depositors, and the resource mobilization and profitability of Banks.

- 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.

- The Results suggested that there is a nonlinear relationship exists between liquidity and profitability in Ethiopian Banking sector, whereby profitability was improved for banks that hold some liquid assets, however, there was a point beyond which holding further liquid assets diminishes a banks‟ profitability, all else equal. Conceptually, this result is consistent with the idea that funding markets reward a bank, to some extent, for holding liquid assets, thereby reducing its liquidity risk. However, this benefit is can eventually be outweighed by the opportunity cost of holding such comparatively low-yielding liquid assets on the balance sheet. At the same time, estimation results provide some evidence that the relationship between liquid assets and profitability depends on the bank's business model and the risk of funding market difficulties. The researchers recommended that adopting a more traditional i.e., deposit and loan-based business model allows a bank to optimize profits with a lower level of liquid assets.

References:

Abera (2012) Factor Affecting Profitability: an Empirical Study on Ethiopian Banking Industry Addis Ababa University.

Addison T, Alemayehu G (2001).“Ethiopia’s New Financial Sector and its Regulation”, Discussion Paper No. 2001/55, World Institute for Development Economic Research).

Adrian, Tobias, and Hyun Song Shin, [2009], «Money, Liquidity and Monetary Policy», American Economic Review, Papers and Proceedings 99, pp. 600–05.

Afza, T. and Nazir, M. (2009).Impact of aggressive working capital management policy on firm’s profitability. The IUP Journal of Applied Finance, Vol 15:20-30.

AhmeadArefAlmazari(2014), The Impact of Internal Factors on Banks profitability Comparative study between Saudi Arabia and Jordan

Ahokposis (2013): What factors drive interest rate spread of commercial banks: Empirical evidence from Kenya?

Alemayehu G (2006). “The structure and Performance of Ethiopia’s Financial Sector in the Pre-and Post-reform period with a Special Focus on Banking”, Research paper No. 2006/112,

Ali, K.; Akhtar, M.F. and Ahmed, H.Z. (2011), Bank specific and Macroeconomic Indicators of Profitability- Empirical Evidence from the Commercial Banks of Pakistan. International Journal of Business and social sciences, Vol.2, No. 6, pp: 237-241, April. Retrieved July 12, 2011.

Allen, F and Gale, D 2004, Financial intermediaries and markets‟, Journal of Econometrical, Vol. 72, pp. 1023-1061”.

Almeida, H. and M. Campello, 2002, .Financial Constraints and Investment-Cash Flow Sensitive.

Al-Tamimi, H.A. (2010). Factors influencing performance of UAE Islamic and national conventional banks. Global

Aminu, B.A. (2013). The Determinants of Bank’s Profitability in Nigeria. Thesis submitted to the Institute of Graduate Studies and Research in Partial fulfillment of the Requirements for the Degree of Master of Science in Banking and Finance Eastern Mediterranean University January, 2013

Angabazo, L 1997, „Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking‟, Journal of Banking and Finance, Vol. 21, pp. 55-87.

Antonina, D. (2011). Determinants of Bank Profitability in Ukraine. Undergraduate Economic Review Journal, Vol.7 Issue1: Article 2.

Anyanwu, J. C. (1993). Monetary Economics: Theory, Policy and Institutions. Benin City. HybridProfessional Publishers Ltd,

Aspachs, O, Nier, E and Tiesset, M 2005, „Liquidity, Banking Regulation and the Macroeconomy: Evidence on bank liquidity holdings from a panel of UK-resident banks", Bank of England Working Paper.

Baltagi (2005): Econometric analysis of panel data

Barclay, M., & Smith, C. Jr. (1995), The maturity structure of corporate debt, Journal of Finance, 50, 609–631.

Barr, R, Seiford, L and Siems, T 1994, „Forecasting Banking Failure: A Non-Parametric Frontier estimation Approach", Researches Economiques de Lovain, Vol. 60, pp.417-429.

Barth, R, Nolle, E, Phumiwasana, T and Yago, G 2003, „A cross-country analysis of the bank supervisory framework and bank performance", Financial Markets, Institutions & Instruments, Vol. 12, pp.67-120.

Basel Committee on Banking Supervision (BCBS) establishes "a global framework for promoting stronger liquidity buffers at financial institutions" (Working Group 1 of the G20 2009).

Basel Committee on Banking Supervision 2006, The Management of liquidity risk in financial groups, Bank for International Settlement.

Basel Committee on Banking Supervision 2008, Principles for sound liquidity risk management and supervision, Bank for International Settlements.

Baumol, W. (1952).The Transactions Demand for Cash: Inventory Theoretic Approach. The Quarterly Journal of Economics. 66(4-11) 545-556.

Berger, A and Bouwman, C 2007 , Bank Liquidity Creation", Working Paper.

Berger, AN 1995, „The relationship between capital and earnings in banking", Journal of Money, Credit and Banking, Vol. 27, No.2, pp.432-456.

Berger, and Bouwman, C 2009, „Bank liquidity creation", Review of Financial Studies, Vol. 22, No.9, pp.3779-3837.

Bernanke, B 2008, „Liquidity Provision by the Federal Reserve, Risk Transfer Mechanisms and Financial Stability Workshop", Basel: Switzerland.

Bernanke, Bens, Cara S, Lown, Benjamin, M and Friedman 1991, „The credit crunch", Brookings Papers on Economic Activity, united states council of economic advisory Vol.91, No.2, pp.205-247.

Bessis, J 2009, Risk Management in Banking, 3rd ed.

Bloem, MA and Gorter NC 2001,Treatment of Non-Performing Loans in Macroeconomic Statistics", International Monetary Fund, Working Paper 2001-209.

Bordeleau, E and Graham, C 2010, The Impact of Liquidity on Bank Profitability", Financial Stability Department, Bank of Canada, Working Paper 2010-38.

Bordo, M, Eichengreen, B, Klingebiel, D and Martinez-Peri, M 2001, „Is the Crisis Problem Growing More Severe? Economic Policy, Vol.16, No. 32, pp.51-82.

Bourke, P 1989, „Concentration and other determinants of bank profitability: in Europe, North America and Australia", Journal of Banking and Finance, Vol. 13, pp. 65-79.

Brock, P and Suarez, R 2000, „Understanding the behavior of bank spreads in Latin America", Journal of Development Economics, Vol. 63, pp.113–134.

Brooks, C 2008, Introductory Econometrics of Finance, 2nd ed., the ICMA Center, University of Reading, CAMBRIDGE University press.

Bryant, J 1980, „A model of reserves, bank runs, and deposit insurance", Journal of Banking and Finance, Vol. 4, pp. 335-344.

Bunda, I and Desquilbet, J 2008, the bank liquidity smile across exchange rate regimes", International Economic Journal, Vol. 22, No. 3, pp. 361-386.

Calomiris, C. W., and L. Schweikart (1991). The Panic of 1857: Origins, Transmission, and Containment, Journal of Economic History, 807-834.

Calomiris,C and Kahn, C 1991, „The role of demandable debt in structuring optimal bank arrangements", American Economic Review, Vol. 81, No. 3 pp. 497-513.

CALZA, A. – GARTNER, C. – SOUSA, J. (2001). Modelling the Demand for Loans to the Private Sector in the Euro Area. ECB Working Paper 2001-55. Frankfurt: European Central Bank.

Cameron, A C and Trivedi, P K 2009, Micro econometric Using Stata, Stata Press Publication: USA. „Central bank lowers reserve requirements marginally", Addis Fortune, January, 2012, Vol. 12, No. 611.

Chakraborty, K. (2008). Working capital and Profitability.Icfai Journal of Management research, Vol 34:32-47.

Chantapong, S. (2005), ―Cost Efficiency of Domestic and Foreign Banks in Thailand: Evidence from Panel Data‖, Dissertation at University of Hannover (Germany).

Charles C., Florian H., & Marie H. (2012). Theory of Bank Liquidity Requirements, Columbia University, Graduate School of Business Press.

Chen, B, Cheng, X and Wu, L 2005, „Dynamic interactions between interest rate, credit, and liquidity risks: Theory and evidence from the term structure of credit default swap spreads", Working Paper Series.

Churchill, G A And Iacobucci, D 2005, Marketing Research: Methodological Foundations, 9th edn., Thomson South-Western, USA.

Comptroller‟s Handbook 1998, Loan portfolio management‟, Comptroller of the Currency Administrator of National Banks, USA. „Credit limit boosts the profit in most of the banks in Ethiopia‟, Reporter, and Saturday, 13 March 2010.

Creswell, J W 2009, Research design: Qualitative, quantitative, and mixed methods approaches, 3rd ed., Sage Publications, New York.

Crosse, H and Hempel, G 1980, Management Policies for Commercial Banks, 3rd ed., Prentice Hall Inc., Englewood Cliffs, New Jersey.

David Longworth, Deputy Governor of the Bank of Canada, to the Investment Industry Association of Canada, Toronto, 3 October 2007.

Deep, A and Schaefer, G 2004, Are banks liquidity transformers? Harvard University Faculty Research, Working Paper.

Demirgüç-Kunt, A and Huizinga, H 1999, „Determinants of commercial bank Interest margins and profitability: Some international evidence‟, World Bank Economic Review, Vol. 13, pp.379-408.

Demirgüç-Kunt, a, Laeven, L and Levine, R 2003, "The Impact of Bank Regulations, Concentration, and Institutions on Bank Margins", World Bank Policy Research, Working Paper: 3030.

Denzin, N K and Lincoln, Y S 1994, Introduction: Entering the field of qualitative research, In: N.

Diamond and Rajan.(2002) "Banks and Liquidity". American Economic Review Papers and Proceedings, Vol 1:8-23.

Diamond, D W 1984, Financial intermediation and delegated monitoring, Review of Economic Studies, Vol. 51, pp.393-414.

Diamond, D W and Dybvig, P H 1983, „Bank runs, deposit insurance, and liquidity‟, Journal of Political Economy, Vol. 105, No. 91, pp. 401-419.

Diamond, D W and Rajan, R G 2000, „Theory of bank capital", Journal of Finance, Vol. 100, No. 55, pp. 2431-2465.

Diamond, D W and Rajan, R G 2001, „Liquidity risk, liquidity creation, and financial fragility: a theory of banking", Journal of Political Economy, Vol. 109, No. 2, pp.287-327.

Diamond, D W. and Rajan, R G 2005, „Liquidity shortages and banking crises", Journal of Finance, Vol. 60, No. 2, pp.615-647.

Dinger, V. (2009). Do foreign-owned banks affect banking system liquidity risk? Journal of Comparative Economics, Vol 4: 647–657.

Drakos, K 2003, „Assessing the success of reform in transition banking 10 years later: an interest margin analysis", Journal of Policy Modeling, Vol. 25, pp.309-317.

Drehman, M and Nikolau, K 2009, „Funding liquidity risk: definitions and measurement", ECB working paper, No. 1024.Dryden Press, Orland

Eakins, G.S. (2008),Financial Markets and Institutions, Sage Publications Beverly Hills.

Eichengreen Barry and Carlos Arteta (2000)"Banking Crisis in Emerging Markets Presumption and evidence Working Paper C00-115

Etienne Bordeleau, Christopher Graham (2010) The impact of Liquidity on Bank Profitabilty, Bank of Canada Working paper

Fadare, O S 2011, „Banking Crisis and Financial Stability in Nigeria", International Research Journal of Finance and Economics, Issue 63 (2011) pp. 1450-2887.

Fielding and Shortland 2005, „Short land Political Violence and Excess Liquidity in Egypt", Journal of Development Studies, Vol. 41, No. 4, pp.542-557.

Flamini, V., C. McDonald, and L. Schumacher, 2009, "The Determinants of Commercial Bank Profitability in Sub-Saharan Africa," IMF Working Paper No. 09/15 (Washington: International Monetary Fund).

Freixas, X., Martin, A. &Skeie, D. (2010, February). Bank liquidity & interbank

Friedman, M and Schwarz, A 1963, monetary history of the United States, Princeton University Press: Princeton.

Garber, P and Weisbrod, S 1992, „The Economics of Banking, Liquidity, and Money, Lexington", MA: D.C. Heath and Company.

Gavin, M. &Hausmann, R. (1998, January 27). The roots of banking crises: The

Gil-Diaz, F. - The Origin of Mexico's 1994 Financial Crisis, The Cato Journal, vol.17,

Golin, J. L. (2001): The bank credit analysis handbook: A guide for analysts, bankers and investors. Singapore: John Wiley and Sons; ISBN: 0-47-84217-6; 2001

Gorton, G and Winton, A 2000, "Liquidity provision, bank capital, and the macro economy", University of Minnesota, Working Paper.

Greuning,H.V.,&Bratanovic,S.B. (2004),"Analyzing and managing banking risk: a framework for assessing corporate governance and financial risk", World Bank Publications.

Guba, E G and Lincoln, Y S 1994:110, competing paradigms in qualitative research, In: Denzin N K & Lincoln Y S (eds), Handbook of Qualitative Research. Thousand Oaks, CA: Sage, pp. 105–117.

Gujarati, (2004) Basic Econometrics, Fourth Edition Front Matter Preface

Gul S, Irshad F, Zaman K (2011).Factors Affecting Bank Profitability in Pakistan, Romanian Econ. J. 14(39):61-87.

Heffernan, S., (2005). Modern banking: John Wiley and Sons Ltd, West Sussex.

Hempel, GH, Simonson, DG and Coleman, AB 1994, Bank Management, 4th ed., John Wiley & Sons: New York.

Holmstrom, B and Tirole, J(1998), „Private and public supply of liquidity", Journal of Political Economy, Vol. 106, No. 1, pp.1-40.

Horne, John M. Wachowicz. Prentice Hall PTR, Jun 1, 2000 - Fundamentals of Financial management, Business & Economics - 848 pages.

Huybens, E and Smith, B (1999), "Inflation, financial markets, and long-run real activity", Journal of Monetary Economics, Vol. 43, pp.283-315.

Huybens, E and Smith, B 1998, „Financial Market Frictions, Monetary Policy, and Capital Accumulation in a Small Open Economy", Journal of Economic Theory, Vol. 81, pp.353-400.

Iannotta, G, Nocera, G, and Sironi, A 2007, "Ownership Structure, Risk and Performance in the European Banking Industry", Journal of Banking & Finance, Vol. 31, pp. 2127-2149.

Jamil J. Jaber1 & Abdullah A. Al-khawaldeh(2014) The Impact of Internal and External Factors on Commercial Bank Profitability in Jordan, International Journal of Business and Management; Vol. 9, No. 4; 2014 Journal Business Research. 4(2),1-7.

Kamau, A W 2009, „Efficiency in the Banking Sector: An Empirical Investigation of Commercial Banks in Kenya", Ph.D Thesis, University of Nairobi, Nairobi.

Kashyap, A K, Rajan, R G and Stein, J K (2002),"Banks as liquidity providers: an explanation for the coexistence of lending and deposit taking", Journal of Finance, Vol. 58, No. 1, pp.33-73.

Kassim, N M (2001), „Determinants of customer satisfaction and retention in the cellular phone market of Malaysia", PhD Thesis, Southern Cross University: Lisbon.

Keynes, J. (1936). "The General Theory of Employment, Interest and Money". United Kingdom: Palgrave Macmillan

Khrawish, H.A; Siam, W.Z. and Khrawish.A.H. (2011). Determinants of Islamic Banks Profitability: Evidence from Jordan. Middle Eastern Finance and Economics Journal, Issue 13: 42 – 57.

Kiyotaki, N. and Moore, J. (2008)."Liquidity, business cycles and monetary policy". Princeton University,unpublished.

Koch, T., MacDonald, W., Scott, S. (2000), Bank management,

Krueger, T. (2002). An analysis of working capital management results across industries. American Journal of Business, Vol 2:11-18.

Lelissa (2014) Tesfaye Boru, PHD student at University of South Africa (UNISA) The Determinants of Ethiopian Commercial Banks Performance

Longworth, D 2010, Bank of Canada Liquidity Facilities: Past, Present, and Future, Remarks, Howe Institute. Loose, J 1993, A Historical Introduction to the Philosophy of Science. 3rd ed., Opus: Oxford.

Lucchetta, M 2007, „What Do Data Say About Monetary Policy, Bank Liquidity and Bank Risk Taking?", Economic Notes by Banca Monte deiPaschi di Siena SpA, Vol. 36, No. 2, pp.189-203.

Lynch, D. (2007) the Art and Science of Financial Management. (Quality in the finance function) Longman Inc. Newyork.

Maness, T. and Zietlow, J. (2004), "Short-term financial management", Australia: Southwestern Press.

Miller, M., & Orr, D. (1966), A model of the demand for money by firms, Quarterly Journal of Economics, 80, 413-435

Mohammed Nayeem Abdullah &Nusrat Jahan (2014) The Impact of liquidity on profitability in Banking Sector of Bangladish

Molyneux, P and Thornton, J 1992, „Determinants of European Bank Profitability: A Note", Journal of Banking and Finance, Vol. 16, pp.1173-1178.

Moore, W 2010, „How do financial crises affect commercial bank liquidity?: Evidence from Latin America and the Caribbean", MPRA Paper, No. 21473.

Muncher al Niamer(2013) ,The Impact of liquidity on Jordanian Banks the profitability through return on Asset

Munyambonera Ezra fraancis (2013), Determinant of Commercial Banks Profitability in Sub Saharan African

Naceur, S B and Kandil, M 2009, „The Impact of capital requirements on banks' cost of intermediation and performance: The case of Egypt", Journal of Economics and Business, Vol. 61, pp. 70-89.

National bank of Ethiopia 2002-2014,Annual report.

Nasar Ail YadollahzadwehTabari, Mohammed Ahmmed (2013), the effect of liquidity risk on the performance of Commercial banks in case of Iran

Niehans, J 1978, the theory of money, John Hopkins University Press, Baltimore.

Ho, T. S., Saunders, A., 1981. The determinants of bank interest margins: Theory and empirical evidence. Journal of Financial and Quantitative Analysis 16 (4), 581–600.

Olweny, T., &Shipho, T. (2011), Effects of banking sectorial factors on the profitability of commercial banks in

Ongore, V.O, Kusa, G.B. (2013), Determinants of financial performance of commercial banks in Painceira,

Owolabi, S. A., Obiakor, R. T. &Okwu, A. T. (2011). Investigating Liquidity – Profitability Relationship in Business Organisation: A Study of Selected Quoted Companies in Nigeria. British Journal of Economics, Finance and Management Sciences, Vol (1), No 2.

Painceira, J. (2010).The Role of Banks in the Korean Financial Crisis of 1997: An Interpretation Based on the Financial Instability Hypothesis, research on money and finance, Department of Economics, School of Oriental and African Studies.

Pandey, I.M. (2010). Financial Management, Tenth Edition, Vikas Publishing House PVT LTD,

Patheja, A 1994, financial management of commercial banks, South Asia Publications: Delhi.

PavlaVodova,SilesianUniversty in Opava: determinant of Commercial Banks Liquidity in Hungary

PavlaVodova:(2011) Silesian Universty in Opava, recent research in applied and computation mathimatics ISBN:978-1-61804-002-2: Determinant of Commercial Banks Liquidity in the Czech Republic

Peek, J., E. S. Rosengren, and G. M. Tootell, (1999) "Is Bank Supervision Central to Central Banking," Quarterly Journal of Economics 124 and Ioannidou, V. P., (2005) "Does Monetary Policy Affect the Central Bank's Role in Bank Supervision?," Journal of Financial Intermediation.

Pilbeam, K 2005, Finance and Financial markets, 2nd ed., Palgrave Macmillan: New York.

Popa, G, Mihallescu, Land Caragea, C 2009, 'EVA - Advanced method for performance evaluation in banks', EconomiaSeria management Journal, Vol.12, No.1, pp.268-173.

Praet, P and Herzberg, V 2008, „Market liquidity and banking liquidity: linkages, vulnerabilities and the role of disclosure", Banque de France Financial stability Review, pp. 95-109.

Qasim Salem, RamizurRehman (2013) The Impact of liquidity rations on Profitability in case of Pakistan oil companies

Raghavan, R. (2003). Risk Management in Banks. Chartered Accountant

Ramlall, I. (2009). Bank specific, Industrial Specific and Macroeconomic Determinants of Profitability in

Rauch, C, Steffen, S, Hackethal, A and Tyrell, M 2008, „Determinants of bank liquidity creation - evidence from savings banks", Working Paper: Germen.

Rauch, C, Steffen, S, Hackethal, A and Tyrell, M 2009, „Savings Banks, Liquidity Creation and Monetary Policy"

Repullo, R (2004), "Capital requirements, market power, and risk taking in banking", Journal of Financial Intermediation, No 13, pp.156-182.

Rochet, J C(2008), "Liquidity Regulation and the Lender of Last Resort", Banque de France Financial Stability Review, pp. 45-52.

Rychtárik, S 2009, „Liquidity Scenario Analysis in the Luxembourg Banking Sector", Working Paper BCDL 41.

Samuel Antwi,EricKofie (2013) The relationship between Liquidity and Profitability of listed Banks in Ghana

Sarah NabalayoLukorito, Willy Muturi…. (2014) Assessing the effect of liquidity on profitability of Commercial Banks in Kenya

Saunders, A and Cornett, M 2006, Financial Institutions Management: A Risk Management Approach, McGraw-Hill: Boston.

Semu, ZS 2010, „Impact of reducing loan by Ethiopian banks on their own performance", MSc research report: Addis Ababa University.

Sharma, D.S. and Iselin, E. (2006) ,'The Decision Usefulness of Reported Cash Flow Information versus Accrual Information for Banker's Assessment of Corporate Solvency', Western Decision Sciences Conference, Maui, Hawaii.

Shen, CH, Chen, YK, Kaol, LF and Yeh, CY 2009, Bank Liquidity Risk and Performance, Department of Finance: National University of Kaohsiung.

Shen, CH, Kuo, CJ and Chen, HJ 2001, „Determinants of Net Interest Margins in Taiwan Banking Industry", Journal of Financial Studies, Vol. 9, pp. 47-83.

Sinkey, J. (2000), Commercial Bank Financial Management, Prentice

Soyemi, K.A.; Akinpelu, L. and Ogunleye, J.O. (2013), the Determinant of Profitability Among DMBs in Nigeria Post Consolidation. Global Advanced Research Journal of Economics, Accounting and Finance Vol. 2. No.5 pp. 93-103, August, 2013.

Soyemi, K.A.; Akinpelu, L. and Ogunleye, J.O. (2013), the Determinant of Profitability Among DMBs in Nigeria Post Consolidation. Global Advanced Research Journal of Economics, Accounting and Finance Vol. 2. No.5 pp. 93-103,

Srairi, S.A. (2009), Factors Influencing the Profitability of Conventional and Islamic Commercial Banks in GCC Countries. Journal of Islamic Economics, Vol.13, No.1, pp: 5-30.

Su, F.C. (2002). The impact of the change of business cycle in manufacturing industry.Taiwan: Unpublished master's dissertation Department of Accounting, National cheng chi.

Sufian, F.(2011). Profitability of the Korean Banking Sector: Panel Evidence on Bank Specific.

Sunny,o,Ibe (2013) The Impact of liquidity management on the profitability of Banks in Nigeria

Sutrisna, M 2009, Research Methodology in Doctoral Research: Understanding the Meaning of Conducting Qualitative Research. Working Paper presented in ARCOM Doctoral Workshop. Liverpool: John Moores University.

Thakor, AV 1996, „Capital requirements, monetary policy, and aggregate bank lending: theory and empirical evidence", Journal of Finance, Vol. 51, pp.279-324.

Thorne, M and Giesen, M 2002, Statistics for the behavioral sciences, McGraw-Hill, New York.

Tirole, J. (2010). Overcoming Adverse Selection: How Public Intervention Can Restore Market Functioning, American Economic Review, forthcoming.

Tobin, J 1965, the theory of portfolio selection, in: The Theory of Interest Rates, MacMillan, and Press London.

Toby, A. J.(2008). Monetary policy, capital adequacy regulation and banking Trochim, G1998, Positivism and post-positivism,

Tseganesh (2012), Determinates of bank liquidity and its impact on financial performance.

Usman Dawood (2014), Factors impacting profitability of Commercial Banks in Pakistan for the period of (2009-2012)

Uzhegova, O 2010, "The Relative Importance of Bank-specific Factors for Bank Profitability in Developing Economies"/P 2010/02.

Valla, N., Saes-Escorbiac, B. &Tiesset, M. (2006, December) ,Bank liquidity and Risk Management.

Vento, G. A. and Ganga, P. L. (2009), Bank Liquidity Risk Management and Supervision, Journal of Money, Investment and Banking, Vol 10: 79-126.

Victor Curtis, Lartey,; Antwi, Samuel; Boadi, Eric Kofi,(2013) The Relationship between Liquidity and Profitability of Listed Banks in Ghana, International Journal of Business & Social Science;Mar2013, Vol. 4 Issue 3, p48

Wang, Y. J. (2002). Liquidity Management, Operating Performance, and Corporate Value: Evidence from Japan and Taiwan. Journal of Multinational Financial Management, 12, 159-169.

Weisel, J., Harm, N., & Bradley, C. (2003), the Cash Factor. Strategic Finance, 85(3), 29-33.

Yuqi, L. (2008). Determinants of Banks' Profitability and its Implication on Risk Management Practices: Panel Evidence from the UK in the period 1999 – 2006. Unpublished Dissertation, University of Nottingham, UK.

Appendix-1:Fixed Effect Regression Outputs

Dependent Variable: Liq1

Method: Panel Least Squares

Date: 05/14/15 Time: 11:39

Sample: 2002 2013

Periods included: 12

Cross-sections included: 8

Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.278492	0.545294	4.178466	0.0001
BSIZE	-0.100358	0.027505	-3.648776	0.0005
CAP	-0.085322	0.306821	-0.278085	0.7817
GDP	0.957232	0.35191	2.720107	0.0080
INF	0.00234	0.103163	0.022683	0.9820
IRL	2.760261	1.331269	2.073406	0.0414
IRS	-3.442352	2.790067	-1.233788	0.2210
LG	-0.144138	0.055169	-2.612647	0.0108
NPL	0.258343	0.126563	2.041223	0.0446
RR	0.63012	0.095718	6.583068	0.0000
STIR	5.975938	2.948877	2.026513	0.0461

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.677906	Mean dependent var	0.364865
Adjusted R-squared	0.607706	S.D. dependent var	0.103395
S.E. of regression	0.064760	Akaike info criterion	-2.468905
Sum squared resid	0.327118	Schwarz criterion	-1.988089
Log likelihood	136.5074	Hannan-Quinn criter.	-2.274551
F-statistic	9.656765	Durbin-Watson stat	1.485751
Prob(F-statistic)	0.000000		

Dependent Variable: Liq2

Method: Panel Least Squares

Date: 05/14/15 Time: 12:25

Sample: 2002 2013

Periods included: 12

Cross-sections included: 8

Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.312898	0.750208	0.417081	0.6778
BSIZE	0.025358	0.03784	0.670133	0.5048
CAP	0.953003	0.42212	2.25766	0.0268
GDP	-1.212511	0.484153	-2.504398	0.0144

INF	0.454003	0.14193	3.198781	0.0020
IRL	-3.158955	1.831542	-1.724752	0.0885
IRS	3.517462	3.838538	0.916355	0.3623
LG	0.246747	0.075901	3.250893	0.0017
NPL	0.281493	0.174124	1.616623	0.1100
RR	-0.539255	0.131688	-4.094944	0.0001
STIR	-12.33950	4.057027	-3.041512	0.0032

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.820167	Mean dependent var	0.700943
Adjusted R-squared	0.780973	S.D. dependent var	0.190374
S.E. of regression	0.089096	Akaike info criterion	-1.830853
Sum squared resid	0.619166	Schwarz criterion	-1.350038
Log likelihood	105.8809	Hannan-Quinn criter.	-1.636500
F-statistic	20.92569	Durbin-Watson stat	1.189703
Prob(F-statistic)	0.000000		

Dependent Variable: NIM

Method: Panel Least Squares

Date: 05/14/15 Time: 12:15

Sample: 2002 2013

Periods included: 12

Cross-sections included: 8

Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.149746	0.132038	-1.134111	0.2601
BSIZE	0.015362	0.007631	2.01305	0.0475
GDP	-0.194171	0.09502	-2.043478	0.0443
INF	0.019274	0.027506	0.700718	0.4855
IRL	-0.412838	0.364442	-1.132795	0.2607
LG	-0.022640	0.016063	-1.409511	0.1626
NPL	-0.169556	0.036726	-4.616755	0.0000
RR	-0.047604	0.026911	-1.768984	0.0807
STIR	-0.751295	0.727725	-1.032389	0.3050

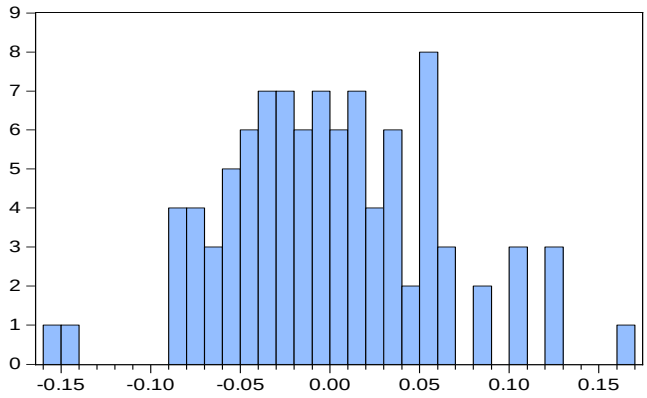
Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.606441	Mean dependent var	0.09026
Adjusted R-squared	0.532649	S.D. dependent var	0.02778
S.E. of regression	0.018992	Akaike info criterion	-4.938633
Sum squared resid	0.028854	Schwarz criterion	-4.511242
Log likelihood	253.0544	Hannan-Quinn criter.	-4.765874
F-statistic	8.218229	Durbin-Watson stat	1.309712
Prob(F-statistic)	0.000000		

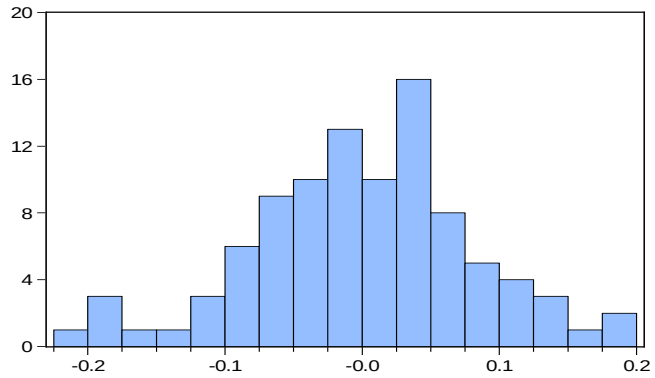
Appendix-2: Normality Test

Normality Test for Liq1



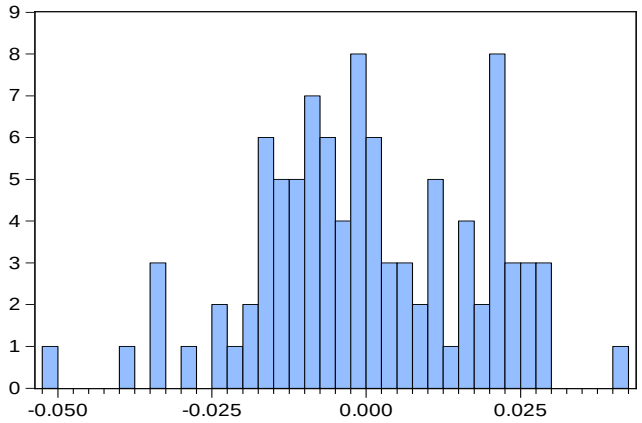
Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	2.87e-18
Median	-0.004147
Maximum	0.162198
Minimum	-0.153554
Std. Dev.	0.058680
Skewness	0.241376
Kurtosis	3.225340
Jarque-Bera	1.135310
Probability	0.566853

Normality Test for Liq2



Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	2.60e-18
Median	0.002830
Maximum	0.196507
Minimum	-0.202279
Std. Dev.	0.080731
Skewness	-0.172767
Kurtosis	3.127791
Jarque-Bera	0.542895
Probability	0.762275

Normality Test for NIM



Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	3.61e-19
Median	-0.002119
Maximum	0.041637
Minimum	-0.050878
Std. Dev.	0.017428
Skewness	-0.160538
Kurtosis	2.862622
Jarque-Bera	0.487848
Probability	0.783547

Appendix-3 Hetroskedasyicity Test

Heteroskedasticity Test: White liq1

F-statistic	1.009454	Prob. F(61,34)	0.4991
Obs*R-squared	61.84942	Prob. Chi-Square(61)	0.4456
Scaled explained SS	71.71197	Prob. Chi-Square(61)	0.1641

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/13/15 Time: 12:33
Sample: 1 96
Included observations: 96
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.800635	13.72782	0.058322	0.9538
BSIZE	-0.146329	0.287511	-0.508952	0.6141
BSIZE^2	0.003683	0.004040	0.911630	0.3684
BSIZE*CAP	0.086454	0.203420	0.425005	0.6735
BSIZE*GDP	-0.101457	0.284451	-0.356676	0.7235
BSIZE*INF	0.001049	0.068466	0.015323	0.9879
BSIZE*IRL	0.169029	0.800899	0.211049	0.8341
BSIZE*IRS	-0.680860	2.419892	-0.281359	0.7801
BSIZE*LG	0.012281	0.029748	0.412839	0.6823
BSIZE*NPL	0.033838	0.076755	0.440857	0.6621
BSIZE*RR	2.67E-02	0.051907	0.515283	0.6097
BSIZE*STIR	-0.656655	1.702365	-0.385731	0.7021
CAP	1.039721	4.955890	0.209795	0.8351
CAP^2	1.218183	3.036410	0.401192	0.6908
CAP*GDP	-3.453565	4.424867	-0.780490	0.4405
CAP*INF	0.317188	1.134122	0.279677	0.7814
CAP*IRL	-0.391288	15.81419	-0.024743	0.9804
CAP*IRS	-43.48987	31.59962	-1.376278	0.1777
CAP*LG	0.423174	0.866869	0.488164	0.6286
CAP*NPL	-1.155379	2.814551	-0.410502	0.6840
CAP*RR	1.813164	1.193547	1.519139	0.1380
CAP*STIR	-33.03210	25.52098	-1.294311	0.2043
GDP	32.82839	208.6455	0.157341	0.8759
GDP^2	-118.5523	323.8880	-0.366029	0.7166
GDP*INF	59.91535	110.3029	0.543189	0.5905
GDP*IRL	9.103138	167.1906	0.054448	0.9569
GDP*IRS	-129.4641	2297.704	-0.056345	0.9554
GDP*LG	-0.154512	1.336583	-0.115602	0.9086
GDP*NPL	0.168873	2.317456	0.072870	0.9423
GDP*RR	-1.710042	2.965007	-0.576741	0.5679
GDP*STIR	-257.2036	1419.809	-0.181154	0.8573
INF	-12.15975	18.41188	-0.660430	0.5134
INF^2	3.650041	13.76374	0.265192	0.7925
INF*IRL	9.681044	88.58667	0.109283	0.9136
INF*IRS	38.21847	192.1783	0.198870	0.8435
INF*LG	-0.011016	0.306439	-0.035949	0.9715
INF*NPL	-0.251513	0.906428	-0.277477	0.7831
INF*RR	0.810796	0.784779	1.033153	0.3088
INF*STIR	83.36241	96.38566	0.864884	0.3932
IRL	-5.377625	148.9971	-0.036092	0.9714
IRL^2	-70.97818	252.9129	-0.280643	0.7807
IRL*IRS	151.5991	1260.543	0.120265	0.9050
IRL*LG	-2.129196	3.940891	-0.540283	0.5925
IRL*NPL	-6.083302	8.349166	-0.728612	0.4712
IRL*RR	-4.942643	8.142631	-0.607008	0.5479
IRL*STIR	362.1481	1415.470	0.255850	0.7996
IRS	9.291159	200.8718	0.046254	0.9634
IRS*LG	6.423476	11.33326	0.566781	0.5746
IRS*NPL	18.48668	30.86902	0.598875	0.5532
IRS*RR	-18.54848	16.58255	-1.118554	0.2712
LG	-0.429973	0.894774	-0.480538	0.6339
LG^2	-0.077940	0.135295	-0.576070	0.5684
LG*NPL	-0.488030	0.640625	-0.761803	0.4514
LG*RR	-0.099227	0.294336	-0.337122	0.7381

LG*STIR	1.656329	8.643762	0.191621	0.8492
NPL	-1.018956	2.726770	-0.373686	0.7110
NPL^2	-0.465603	0.843627	-0.551907	0.5846
NPL*RR	-0.196672	0.962074	-0.204425	0.8392
NPL*STIR	1.072039	22.84137	0.046934	0.9628
RR	1.165754	2.096473	0.556055	0.5818
RR^2	0.065597	0.325925	0.201265	0.8417
RR*STIR	-8.769407	12.69404	-0.690829	0.4944

R-squared	0.644265	Mean dependent var	0.006528
Adjusted R-squared	0.006034	S.D. dependent var	0.011286
S.E. of regression	0.011252	Akaike info criterion	-5.882903
Sum squared resid	0.004304	Schwarz criterion	-4.226761
Log likelihood	344.3793	Hannan-Quinn criter.	-5.213464
F-statistic	1.009454	Durbin-Watson stat	1.973175
Prob(F-statistic)	0.499147		

Heteroskedasticity Test: White-Liq2

F-statistic	2.385462	Prob. F(61,34)	0.0037
Obs*R-squared	77.81749	Prob. Chi-Square(61)	0.0720
Scaled explained SS	85.09179	Prob. Chi-Square(61)	0.0225

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 05/14/15 Time: 12:33

Sample: 1 96

Included observations: 96

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.40268	20.57584	0.554178	0.5831
BSIZE	-0.562502	0.37549	-1.498046	0.1433
BSIZE^2	0.007651	0.005203	1.470431	0.1506
BSIZE*CAP	-0.047053	0.254211	-0.185095	0.8543
BSIZE*GDP	-0.193875	0.350951	-0.552429	0.5843
BSIZE*INF	-0.065375	0.084734	-0.771528	0.4457
BSIZE*IRL	1.138201	0.995683	1.143135	0.261
BSIZE*IRS	1.489701	3.01176	0.494628	0.624
BSIZE*LG	0.046975	0.039128	1.200539	0.2382
BSIZE*NPL	-0.000683	0.098599	-0.006927	0.9945
BSIZE*RR	0.044964	0.064788	0.694008	0.4924
BSIZE*STIR	0.128197	2.045607	0.062669	0.9504
CAP	-2.286898	6.252433	-0.365761	0.7168
CAP^2	-1.593769	4.00755	-0.397691	0.6933
CAP*GDP	-1.770597	5.468627	-0.323774	0.7481
CAP*INF	-1.161764	1.441983	-0.805671	0.426
CAP*IRL	23.90895	19.6695	1.215534	0.2325
CAP*IRS	21.3843	39.94379	0.53536	0.5959
CAP*LG	0.633374	1.112675	0.569235	0.5729
CAP*NPL	-4.60452	3.642145	-1.264233	0.2147
CAP*RR	0.485601	1.508719	0.321863	0.7495
CAP*STIR	-6.001461	31.32636	-0.191579	0.8492
GDP	-190.6016	269.5722	-0.707052	0.4844
GDP^2	334.0524	483.2037	0.691328	0.4941

GDP*INF	-112.8473	174.1388	-0.648031	0.5213
GDP*IRL	5.413135	161.9423	0.033426	0.9735
GDP*IRS	1888.07	2608.061	0.723936	0.4741
GDP*LG	-2.142727	1.756475	-1.219902	0.2309
GDP*NPL	-2.191327	3.101758	-0.706479	0.4847
GDP*RR	-7.057321	3.955366	-1.78424	0.0833
GDP*STIR	519.9757	1274.744	0.407906	0.6859
INF	-1.713107	15.71689	-0.108998	0.9138
INF^2	-17.02465	24.44247	-0.696519	0.4908
INF*IRL	35.34609	89.96119	0.392904	0.6968
INF*IRS	271.0467	330.8116	0.819338	0.4183
INF*LG	0.221317	0.37719	0.586751	0.5612
INF*NPL	1.111863	1.126507	0.987	0.3306
INF*RR	0.068578	1.018254	0.067349	0.9467
INF*STIR	-60.75302	47.99306	-1.265871	0.2142
IRL	150.8742	157.7058	0.956681	0.3455
IRL^2	-168.7331	285.2149	-0.5916	0.558
IRL*IRS	-1998.386	1524.674	-1.310697	0.1987
IRL*LG	-10.36158	4.934115	-2.099987	0.0432
IRL*NPL	-10.21225	10.93312	-0.934066	0.3569
IRL*RR	-5.980086	10.73653	-0.556985	0.5812
IRL*STIR	-568.6467	1512.08	-0.376069	0.7092
IRS	-69.33823	273.2392	-0.253764	0.8012
IRS*LG	-1.58969	13.07114	-0.121618	0.9039
IRS*NPL	23.17643	39.56217	0.585823	0.5619
IRS*RR	-2.389158	21.0784	-0.113346	0.9104
LG	0.647354	1.060735	0.610288	0.5457
LG^2	-0.285418	0.17413	-1.639109	0.1104
LG*NPL	-1.094286	0.821437	-1.33216	0.1917
LG*RR	0.056795	0.376267	0.150944	0.8809
LG*STIR	-8.223857	10.51115	-0.782394	0.4394
NPL	0.647729	3.479033	0.186181	0.8534
NPL^2	-0.524599	1.067936	-0.491227	0.6264
NPL*RR	-1.733946	1.285668	-1.348673	0.1864
NPL*STIR	14.1786	29.5891	0.479183	0.6349
RR	0.672466	2.730905	0.246243	0.807
RR^2	0.342935	0.426292	0.804461	0.4267
RR*STIR	-13.39906	17.02043	-0.787234	0.4366

R-squared	0.810599	Mean dependent var	0.011675
Adjusted R-squared	0.470791	S.D. dependent var	0.019602
S.E. of regression	0.01426	Akaike info criterion	-5.409049
Sum squared resid	0.006914	Schwarz criterion	-3.752908
Log likelihood	321.6344	Hannan-Quinn criter.	-4.73961
F-statistic	2.385462	Durbin-Watson stat	1.678225
Prob(F-statistic)	0.003667		

Heteroskedasticity Test: White:NIM

F-statistic	1.119573	Prob. F(44,51)	0.3469
Obs*R-squared	47.16755	Prob. Chi-Square(44)	0.3444
Scaled explained SS	38.76127	Prob. Chi-Square(44)	0.6951

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 05/14/15 Time: 12:39

Sample: 1 96

Included observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.05207	0.097328	-0.534996	0.595
BSIZE	-0.000383	0.003708	-0.103413	0.918
BSIZE^2	-4.64E-05	9.64E-05	-0.481293	0.6324
BSIZE*GDP	-0.000195	0.008038	-0.024205	0.9808
BSIZE*INF	-0.001692	0.001313	-1.288657	0.2033
BSIZE*IRL	0.008218	0.021245	0.38683	0.7005
BSIZE*LG	0.001178	0.000854	1.379523	0.1738
BSIZE*NPL	0.002609	0.001808	1.443017	0.1551
BSIZE*RR	0.003132	0.001407	2.226086	0.0305
BSIZE*STIR	0.096885	0.039558	2.449222	0.0178
GDP	0.768392	0.484285	1.586652	0.1188
GDP^2	-1.929008	1.096769	-1.75881	0.0846
GDP*INF	0.487797	0.392366	1.24322	0.2195
GDP*IRL	-2.485947	3.18377	-0.780819	0.4385
GDP*LG	-0.08447	0.040916	-2.06449	0.0441
GDP*NPL	-0.064631	0.061467	-1.051474	0.298
GDP*RR	-0.115099	0.103316	-1.114045	0.2705
GDP*STIR	-18.87669	13.75987	-1.371865	0.1761
INF	-0.249637	0.203464	-1.226932	0.2255
INF^2	-0.103765	0.099248	-1.045511	0.3007
INF*IRL	2.257196	1.718133	1.31375	0.1948
INF*LG	0.022471	0.009697	2.317396	0.0245
INF*NPL	0.023295	0.027882	0.835476	0.4073
INF*RR	0.021544	0.020388	1.056706	0.2956
INF*STIR	-0.318217	1.111229	-0.286365	0.7758
IRL	0.631434	1.540462	0.409899	0.6836
IRL^2	-3.592039	6.022373	-0.596449	0.5535
IRL*LG	-0.290934	0.13644	-2.132313	0.0378
IRL*NPL	-0.336989	0.251249	-1.341253	0.1858
IRL*RR	-0.36585	0.206631	-1.770549	0.0826
IRL*STIR	9.450359	15.05885	0.627562	0.5331
LG	0.022117	0.012929	1.710712	0.0932
LG^2	-0.006398	0.005047	-1.267672	0.2107
LG*NPL	-0.048403	0.024386	-1.984867	0.0526
LG*RR	-0.008114	0.010624	-0.763693	0.4486
LG*STIR	-0.3437	0.230858	-1.488791	0.1427
NPL	0.018306	0.037171	0.492468	0.6245
NPL^2	-0.056839	0.026966	-2.107754	0.04
NPL*RR	-0.042446	0.028711	-1.478383	0.1455
NPL*STIR	-0.204634	0.573103	-0.357063	0.7225
RR	-0.001985	0.029564	-0.06714	0.9467
RR^2	-0.012597	0.011434	-1.101635	0.2758
RR*STIR	-0.61744	0.367471	-1.680241	0.099
STIR	-0.25122	2.159474	-0.116334	0.9078
STIR^2	-37.79438	18.60531	-2.031376	0.0474

R-squared	0.491329	Mean dependent var	0.000407
Adjusted R-squared	0.052475	S.D. dependent var	0.000579
S.E. of regression	0.000564	Akaike info criterion	-11.81968
Sum squared resid	1.62E-05	Schwarz criterion	-10.61765
Log likelihood	612.3448	Hannan-Quinn criter.	-11.3338
F-statistic	1.119573	Durbin-Watson stat	1.908311
Prob(F-statistic)	0.346894		

Appendix -4: Correlation Matrix

Correlation Matrixes

	LIQ1	LIQ2	NIM	BSIZE	CAP	GDP	INF	IRL	IRS	LG	NPL	RR	STIR
LIQ1	1			0.024	0.055	0.075	0.254	0.137	0.242	-0.360	0.159	0.601	-0.115
LIQ2		1		-0.764	0.268	-0.054	-0.188	-0.437	0.325	0.236	0.175	-0.264	-0.373
NIM			1	0.281	0.378	0.049	0.288	0.432	-0.252	0.118	-0.620	0.044	0.364
BSIZE	0.024	-0.764	0.281	1	-0.407	0.169	0.357	0.595	-0.387	-0.145	-0.225	0.195	0.379
CAP	0.055	0.268	0.378	-0.407	1	-0.137	0.033	0.022	-0.042	0.198	-0.348	0.054	0.171
GDP	0.075	-0.054	0.049	0.169	-0.137	1	0.471	0.232	-0.087	0.200	-0.291	0.141	-0.371
INF	0.254	-0.188	0.288	0.357	0.033	0.471	1	0.667	-0.011	-0.042	-0.475	0.617	0.079
IRL	0.137	-0.437	0.432	0.595	0.022	0.232	0.667	1	-0.330	-0.228	-0.512	0.481	0.236
IRS	0.242	0.325	-0.252	-0.387	-0.042	-0.087	-0.011	-0.330	1	-0.081	0.387	0.219	-0.593
LG	-0.360	0.236	0.118	-0.145	0.198	0.200	-0.042	-0.228	-0.081	1	-0.432	-0.346	-0.139
NPL	0.159	0.175	-0.620	-0.225	-0.348	-0.291	-0.475	-0.512	0.387	-0.432	1	-0.141	-0.271
RR	0.601	-0.264	0.044	0.195	0.054	0.141	0.617	0.481	0.219	-0.346	-0.141	1	0.054
STIR	-0.115	-0.373	0.364	0.379	0.171	-0.371	0.079	0.236	-0.593	-0.139	-0.271	0.054	1

Appendix-5-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

k'=1	k'=2	k'=3	k'=4	k'=5	k=6	k'=7	k'=8	k'=9	k'=10
N	dLdUdLdUdLdUdLdUdLdUdLdUdLdUdLdUdLdU								
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