ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DETERMINANTS OF COMMERCIAL BANKS' LIQUIDITY IN ETHIOPIA

BY

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JANUARY 22, 2018

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DECLARATION

I, **Asnake Feleke Belihu**, would declare this thesis is my original work prepared under guidance of **Zenegnaw Abiy Hailu (PhD)**. All source materials utilized for this thesis exertion have been duly recognized. I similarly confirm that this thesis hasn't be given to either partially or entirely too any other learning institutions for obtaining any degree.

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St. Mary's University, Addis Ababa, January 22, 2018

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ABSTRACT

This study is about determinants of CBs' liquidity in Ethiopia. Liquidity is a life blood and corner stone for commercial banks existence and prosperity. The foremost objective of this study was to identify and examine determinants of CBs' liquidity in Ethiopia. The study adopted explanatory research design by applying quantitative research approach via employing secondary panel data of seven commercial banks for the period covering from 2000-2016. The study used purposive sampling method with selection criteria of longest establishment years, panel financial data availability, strong capital and assets share and ample operational experience for selection of seven from total of seventeen CBs. Bank specific, industry specific and macroeconomic factors determine liquidity are analyzed by descriptive statistics, correlation and regression analysis techniques by balanced panel fixed effect multiple regression analysis model. The results revealed that capital adequacy, non-performing loans and advances, interest rate on loans and advances, national bank bill purchase policy and general inflation rate have positive and statistically significant whereas bank size, profitability, interest rate margin and money market interest rate have negative and statistically significant influence on CBs' liquidity in Ethiopia. But real GDP growth rate and unemployment have statistically insignificant influence on CBs' liquidity in Ethiopia. The study advices CBs manage assets and liability by drawing orthodox liquidity management strategy, policy and procedure/guideline that enable them to alleviate significant influential factors and maintain reputation, remain competitive and profitable in banking industry. NBE shall establish secondary money market for easy liquidity access, draw equally applicable directive for public and private CBs regarding liquidity creation, distribution and holding and build public confidence by stabilize banking system efficiency. MoFEC and PFEA shall establish strategic policy that facilitate CBs' liquidity position by minimizing failure risks and create sustainable economic development and growth that can alleviate inflation and unemployment rate in order to increase financial soundness, strength, competiveness, development and growth of banking industry.

Key words: Asset and Liability Management, CBs' Liquidity, Balanced Panel Fixed Effect Multiple Regression Analysis, Liquidity Determinants, Public Finance Enterprise Agency

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LIST OF ACRONYMS

CAP	Capital
CBs	Commercial Banks
CBE	Commercial Bank of Ethiopia
CSA	Central Statistical Agency
DBE	Development Bank of Ethiopia
FS	Financial Statement
GDP	Gross Domestic Product
IMF	International Monetary Fund
INF	Inflation Rate
IRLA	Interest Rate on Loans and Advances
MoFEC	Ministry of Finance and Economic Cooperation
MMIR	Money Market Interest Rate
NBE	National Bank of Ethiopia
NIM	Net Interest Margin
NPLA	Non-Preforming Loans and Advances
PFEA	Public Finance Enterprise Agency
ROA	Return on Asset

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CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Commercial banks are playing pivotal role for triumphant, comprehensive and greater achievement of business growth, development and operational excellence. Their operation is dependent upon micro and macro economic movement conditions of the country (Joh and Kim, 2008). They obtain deposit from financial resources provider (surplus economic units or depositors) and provided to borrower (deficit economic units). Hence, they create liquidity by transforming maturity via mobilizing short-term deposits. And then they offer this short term liquidity for illiquid long-term loans and advances simultaneously through protecting depositors' potential liquidity needs. Thus, they can generate liquidity on asset and liability sides by reconditioning balance sheet items maturity (Tesfaye, 2012).

Commercial banks are vulnerable to liquidity problem when they convert their money market deposits in to long term loans and advances due to maturity mismatch. Consequently, they are require holding adequate liquidity to remain profitable and meet commitment and obligations in operational excellence. Therefore, they have to have reliable liquidity management system mainly to alleviate liquidity problem and to protect banking industry from wide ramification. However, retaining bulky liquid asset has impact on their profitability and may signify liquidity management vitality at tolerable level for best operations (Yimer, 2016). Global financial catastrophe are keenly emerged from CBs' liquidity deficiencies because unharmonious management practices, universal aggravated dangers and unregulated financial modernizations (Munteanu, 2012). So, liquidity is key indicator and predictor of bankruptcy and solvency. Financial researchers undergoing investigation of factors that influences CBs' liquidity creation, allocation and holding level by providing appropriate consultation (Maore, 2006).

Commercial banking business in Ethiopia is under development and growth stage. There are stiff competition increasingly in many perspective in both public and private CBs in commencing different business services. These banks are competing in deposit resource mobilization, increasing branch networks, new banking technology adoptions and new strategy execution to withstand global financial conditions. These activities have direct influence on their liquidity creation, distribution and holding requirements. Perhaps, they also influencing by political circumstances, different geographical locations operations culture, customers' banking behavior changes, domestic and global economic conditions, frequent

technological advancements, government regulations and interventions changes, internal administration capability and other unforeseen conditions. These factors are influencing CBs by aggravating liquidity problems upon bank specific, industry specific and macroeconomic environments. But their influence may vary from country to country, situation to situation, development and growth level and inherent micro and macroeconomic nature. Therefore, this study is indispensable to identify and examine determinants of CBs' liquidity in Ethiopia by classifying into bank specific, industry specific and macroeconomic factors.

1.2. Ethiopian Banking History

The contemporary commercial banking history in Ethiopia was begun in 1905. On February 15, 1906, Bank of Abyssinia was launched by H.E. Emperor Menelik II. In 1943, the Ethiopian government was established State Bank of Ethiopia to provide both commercial and central bank operation until 1963. It separated and changed them into today's National Bank of Ethiopia and the Commercial Bank of Ethiopia. Thus, issuing bank and commercial banking functions were officially separated in 1963. And so the former was became central and the later issuing bank to segregate central banking duties from commercial banking operations (Fola, 2015).

In the country, several government owned as well as private financial institutions were established between 1963 and 1974 to run financail services for the public (Tesfaye, 2012). Subsequent to command economy pronouncement in 1974, the government was completely nationalized and controlled all private CBs by amalgamating into one unit. However, it was set aside only National Bank of Ethiopia, Commercial Bank of Ethiopia and Agricultural and Industrial Development Bank (Mortgage Bank). Following this, in 1976, however, Ethiopian Investment and Savings S.C. was combined with the Ethiopian government saving and mortgage company and created Housing and Savings Bank. The Agricultural and Industrial Development Bank was continued its operation until later renamed as Development Bank of Ethiopia in 1974 (NBE, 2010).

Subsequent to market-orientated economic system introduction, private economic sectors are emerging and spreading by replacing centrally planned and command system in Ethiopia. And yet, previous 84/1914 proclamation was revoked and changed by new banking law in January 1994. After this new law was commenced banking business undergone new flourishing era in Ethiopia. Following this, National Bank of Ethiopia was issued 84/1994 Banking Business Proclamation. And so, it was encouraging private CBs formation with minimum capital requirement of Br. 19 million (USD 1.7 million) and capital adequacy ratio (8% of risk weighted assets) (Fekadu, 2016). And hence, as the result

of banking legislations endorsement distinguishable number of private CBs are launched for profit making by issuing shares under licensing, controlling and supervision of the NBE (2010). As of June 30, 2016, CBE, DBE and sixteen private owned CBs, totally eighteen banks, are operating in Ethiopia (Appendix J). Hence, CBE and DBE are the two public owned banks. All these banks are delivering financial intermediation and transformation functions in a continuous expansion with highly profitable manner with a total number of 3,187 branch networks throughout the country (NBE, 2016).

Thus, number of branches to population ratio was reached 1: 28,732 as of June 2016 from 1:33,448 previous year same period. So, banking business is flourishing in service quality, overstretching, capital and assets strength, resource mobilization, customer bases, credit disbursement, collections and assets quality, human capital and automation development. Liquidity of banks measured by broad money supply (M2) was reached Birr 445.3 billion. Total capital strength and total resources mobilization (deposit, loan collection and borrowing) were reached Birr 43.0 billion and 147.6 billion respectively as of June 30, 2016 (NBE, 2016). In these regard, there are many micro and macroeconomic that are internal and external factors influencing operational existence of CBs in various dimensions. So, this study is fundamental to identify and examine the determinants that influence CBs' liquidity in Ethiopia.

1.3. Statement of the Problem

After the year 2008 international financial crisis, many CBs are under liquidity difficulty. Every financial markets are shifting into excessive liquidity shortage. CBs are tremendously challenging with funding sources deterioration, liquid assets reduction, assets and liability maturity mismatch incremental and liquidity risk vulnerability increases problems. All these problems are happening due to banking environment, business model, funding sources, technology, government regulations and management changes problems. Liquidity creation, allocation and holding are under failure. CBs are distressing for liquidity crunch and abnormality by operational failure, uncontrollable external pressures increase as well as liquidity creation, distribution and holding imbalance problems. They are exposing for financial feebleness, run out and bankruptcy by impairing their profitability, increasing holding costs, making operational functions disorder, losing customer bases and trustworthiness (Konovalova and Zarembo, 2015). CBs are starving liquidity for serving existing and potential depositors and borrowers' needs. They are under pressure of inability of meeting obligations and commitments, utilizing investment opportunities and continuing planned objectives and operations due to various internal and external generated factors by triggering inherent liquidity risks. They are under suspecting sudden collapse due to

unsecured and frozen up interbank money market system. Liquidity problems is spreading by unhealthy transaction through aggravating failure and creating systemic risk throughout banking system (Ifeoma et al, 2013; Tesfaye, 2012).

In Ethiopia, CBs' branch expansions, weak capital strength, inadequate asset growth and quality, ineffective earning capability, managemnet failurity, high centeral bank and government interventions presures, secondary market absences and other factors are diminishing liquidity in many ways. Since the past three years, there are market wide liquidity shocks, minimal and constraint presures arasing from internal and external or micro and macroeconomic factors by challenging all banks in day to day operations. These factors may be happen due to expected and unexpected circumstances or endlessly increasing uncontrollable and unforeseen circumistances. The bank specific, industry specific and macroeconomic factors are highly challenging critically and consistently their liquidity position. They are suffering by stiff competition amongst and other institutions in deposit gathering and in problem of meeting loans and advances growing demand due to liquidity problems. Therefore, all CBs are under liquidity problem due to social, political and economic factors in the country. Its financial system is warning liquidity creation, distribution and holding problems. Depositors may anticipate low deposit repayement in worest states (Berihun, 2015; Limodio and Strobbe, 2016; Yimer, 2016).

NBE 27 percent bills purchase policy requirement directive is under creation of high liquidity disparity in all private CBs. It is subscribed for five years on 40% short term loans limit. It is impacting liquidity by mismatching assets and liability maturity, decreasing profitability, freezing up productive resources for five more year at lower interest rate (3%) less than funding cost (5%) and by exposing provision of short term loans for illiquid long term loans and advances (IMF, 2012; Wami, 2017; Zwedu, 2014).

As to this study researcher's knowledge is concerned, Fekadu (2016), Yimer (2016), Berihun (2015), Fola (2015), Melese (2015), Hailu (2013) and Tesfaye (2012) were studied determinants of CBs' liquidity in Ethiopia. However, their findings have numerous inconsistencies among each other, for instance, Fekadu (2016), Yimer (2016), Berihun (2015), Fola (2015), Melese (2015), Hailu (2013) and Tesfaye (2012) were found capital adequcy, bank size, non-performing loans and advances, profitability, interest rate margin, interest rate on loans and adavnces, money market interest rate, real GDP growth rate and general inflation rate had positive and statistically significant impact on liquidity. Whereas Fekadu (2016), Berihun (2015), Fola (2015), Melese (2015) and Hailu (2013) were found capital

adequcy, bank size, real GDP growth rate and profitability and had negative and statistically significant impact on liquidity. Fekadu (2016) was the only studied national bank bill purchase policy and found negative and statistically significant impact on liquidity. Whereas Fekadu (2016), Yimer (2016), Berihun (2015), Fola (2015), Melese (2015) and Tesfaye (2012) were found that capital adequacy, bank size, non-performing loans and advances, interest rate margin, interest rate on loans and adavnces, money market interest rate, real GDP growth rate and general inflation rate had statistically insignificant impact on liquidity. They overlooked unemployment rate impact and failed considering industry specific separately from macroeconomic determinants infulence on CBs' liquidity. Moreover, their study periods and number of observations were also less than this study time periods.

Accordingly, this study is very important to fill existing literature gaps by identifying and examining determinants of CBs' liquidity in Ethiopia by categorizing into bank specific, industry specific and macroeconomic factors for time span of 2000-2016.

1.4. Research Questions of the Study

This study will addresses eleven theoretical and empirical literatures driven research questions to meet broader objective of identify and examine determinants of CBs' liquidity in Ethiopia as raised as:

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

1.5. Objectives of the Study

1.5.1. General Objective

This study general objective is to identify and examine the determinants of CBs' liquidity in Ethiopia.

1.5.2. Specific Objectives

This study specific objectives are to examine the influence of:

- Capital adequacy on CBs' liquidity in Ethiopia.
- Bank size on CBs' liquidity in Ethiopia.
- Non-performing loans and advances on CBs' liquidity in Ethiopia.
- Profitability on CBs' liquidity in Ethiopia.
- Interest rate margin on CBs' liquidity in Ethiopia.
- Interest rate on loans and advances on CBs' liquidity in Ethiopia.
- Money market interest rate on CBs' liquidity in Ethiopia.
- National bank bill purchase policy on CBs' liquidity in Ethiopia.
- Real GDP growth rate on CBs' liquidity in Ethiopia.
- General inflation rate on CBs' liquidity in Ethiopia.
- Unemployment rate on CBs' liquidity in Ethiopia.

1.6. Hypothesis of the Study

Hypothesis is used for finding sufficient observations closer to hypothesized value so that reject or not the stated hypothesis. Hypothesis testing theory is give due attention for rules development or decision procedures whether to reject or to not reject null hypothesis. In statistics, to reject null hypothesis, findings result must have statistically significant impact and vice versa. Significance testing is test statistic (estimator) and sampling distribution of such statistic under the null hypothesis (Gujarati, 2004). Thus, this study employed testing hypothesis on causal relationships, causes and consequence between CBs' liquidity and bank specific, industry specific and macroeconomic factors to attain main objective of identifying and examining determinants of CBs' liquidity in Ethiopia. To achieve such comprehensible significant activity, choosing utmost convenient explanatory variables is vibrant to explore dependable and accurate answers for research questions as discoursed as ensued.

H_1: Capital adequacy has positive and statistically significant influence on CBs' liquidity in Ethiopia.

H_2: Bank size has positive and statistically significant influence on CBs' liquidity in Ethiopia.

H_3: Non-performing loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia.

H_4: Profitability has negative and statistically significant influence on CBs' liquidity in Ethiopia.

H_5: Interest rate margin has negative and statistically significant influence on CBs' liquidity in Ethiopia.

H_6: Interest rate on loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia.

H_7: Money market interest rate has positive and statistically significant influence on CBs' liquidity in Ethiopia.

H_8: NBBP has negative and statistically significant influence on CBs' liquidity in Ethiopia.

H_9: Real GDP growth rate has positive and statistically significant influence on CBs' liquidity in Ethiopia.

H_{10}: General inflation rate has negative and statistically significant influence on CBs' liquidity in Ethiopia.

H_{11}: Unemployment rate has negative and statistically significant influence on CBs' liquidity in Ethiopia.

1.6. Scope and Limitations of the Study

This study delimited to identify and examine determinants of CBs' liquidity in Ethiopia by categorizing into bank specific, industry specific and macroeconomic factors for time span 2000-2016. Thus, Awash Bank, Bank of Abyssinia, Commercial Bank of Ethiopia, Dashen Bank, Nib International Bank, United Bank and Wegagen Bank were selected amid seventeen banks found in the populations. Amid these, CBE is public whereas the rest are private banks. Seventeen years and seven CBs are employed those having balanced panel data, longest establishment years, ample operational experience, strong capital and asset shares and to increase number of observations. But, the study encountered difficulty of obtaining non-performing loans and advances data because of unwillingness from CBs and NBE side. Thus, it was used proxy provision for loans losses as a good non-performing loans and advances estimator but cannot exactly indicate to achieve anticipated objectives.

1.8. Significance of the Study

This study has significance for MoFEC, PFEA, NBE, CBs' management and further researchers. Thus far, findings will benefit MoFEC, PFEA and NBE as an input sources to formulate policies, directives, procedure/guidelines and make pertinent decisions that enhance, stabilize and promote intensively banking industry of Ethiopia. Findings will also help them to investigate further what, which, how, why and when do internal and external or micro and macroeconomic factors directly or indirectly influences CBs' liquidity in Ethiopia. All CBs' management will benefit a lot by gaining benchmark input to comprehend potential factors that influence their liquidity creation, distribution, holding level and its

management failure susceptibility associate with bank specific, industry specific and macroeconomic factors that impair day to day operations. It also enable them to prepare for unforeseen events and adjust timely liquidity management policy, procedure/guideline, to draw lesson and strengthen liquidity risk management practices. Findings will also add ample contribution to existing body of knowledge by filling previous researchers' inconsistent and overlooked finding gaps and useful as breakthrough benchmark for further study on determinants of CBs' liquidity in Ethiopia.

1.9. Organization of the Study

This study encompasses five chapters. The first chapter consists of Background of the Study, Ethiopian Banking History, Statement of the Problem, Research Questions of the Study, Objective of the Study, Scope of the Study, Limitations of the Study and Significance of the Study. The second chapter dwells on Review of Related Literatures, the third chapter cope with Research Design and Methodology and the fourth chapter offers Major Findings and Analysis. Finally, the fifth chapter provides Summary, Conclusion and Recommendations of the study.

CHAPETER TWO

REVIEW OF RELATED LITERATURE

This part of the study familiarizes and undoubtedly explain overlooked literature gaps so that to convey hypotheses exploration regarding determinants of CBs' liquidity in Ethiopia. The chapter discourses Review of Related Theoretical Literatures, Review of Related Empirical Studies, Summary and Literature Gaps and Conceptual Framework Model of the study as ensued.

2.1. Review of Related Theoretical Literature

2.1.1. CBs' Liquidity Concepts

Commercial banks' liquidity is the life blood and corner stone of existence and prosperity in banking business. It is cash and cash equivalents availability in stock to satisfy all payment obligations and commitments when they fall due without any disruptions and additional cost. CBs' liquidity represents capability to finance transactions at reasonable cost (Rocheteau and Rodriguez-Lopez, 2014). Precautionary liquidity is the ratio of total cash, demand deposit at central bank and other CBs to total asset. Involuntary liquidity is the ratio of total traded securities of central bank, government and others to total asset. Credit, saving and deposit affect precautionary liquidity of CBs activities. CBs' liquidity funding is a zero-sum game concept when they may or may not resolve their commitment. Furthermore, it is a moment-in-time concept because their funding position probably depends on time horizon consideration and settling future obligations ability or raising cash at short moments. Market liquidity is the balancing ability of a given asset by or nearby current market. The asset nature may change over time because of market awareness or incidence and disproportionate information spread which affects the degree of market liquidity (Wuryandani, 2012).

2.1.2. CBs' Liquidity Management Theory

This theory depends on assets and liabilities management. Liquidity management is an ongoing standardization between current assets and current liabilities for repaying short-term liabilities

successfully. Balance sheet liquidity is most cash and cash equivalent assets in the CBs balance sheet. It shows assets and liabilities maturity breakdown arises from money market for providing reliable cash assets assurance and keeping depositors' confidence during bank run or disparity (Berihun, 2015).

2.1.2.1. Liquidity Shift-ability Theory

This theory bases itself on "liquidity creation exposes CBs to risk" meaning that the higher liquidity creation the higher likelihood and losses severity relate with selling-off illiquid assets to substantiate customers demand timely (Johannes et al, 2016). The theory assumes they can protect themselves from immense deposit withdrawals by holding liquidity reserve available in secondary market. It provides more emphasizes on keeping liquid assets that easily convertible into cash on demand, assets salability and transferability for liquidity assurance of CBs. They can strengthen liquidity by readily assets into cash conversion and central bank accessibility in the secondary market at discount window. In addition, the theory is also deal with holding highly marketable security and loan and advance commitments as exceptional liquidity source (Mugenyah, 2015).

2.1.2.2. Keynes Money Theory /Keynes–Liquidity Preference Theory

This theory explained interest rate interaction with money supply and depositors' desire for holding savings in cash or near cash items. Keynes (1936) defines this theory as "the rewards of not hoarding but the rewards for parting with liquidity for the specified period". It is characterized by interest rate monetary theory. Interest rate determines money market and money supply factors. Money demand may depends on money held for financing expenditures other than medium of exchange motives. Money theory was known on transaction, precautionary and speculative motives of why CBs need and choose liquidity. In the transaction motive, they hold liquid cash for assuring cash inflow and outflow requirements during businesses operation. In such cases cash demand may jeopardize by their income level, income receiving time gap and expenditure patterns. In the precautionary motive, CBs hold cash for urgent situation funding to gratify short-term obligations. In speculative motive, they hold cash to meet special opportunity.

2.1.2.3. Financial Fragility Theory

Commercial banks acquire liquid assets by mobilizing liquid money market deposit from customers for survival and playing pivotal economic role. They provide liquid cash and hold illiquid loans and advances for long term duration by availing to borrowers, participating in alternative investment opportunities and performing crucial function in both sides of their balance sheet. For example, they

provide loans and advances to long term borrowers in assets side and avail liquidity to depositors on demand in liability side of balance sheet (Yimer, 2016).

2.1.3. CBs' Liquidity Determinants

As Gautam (2016) stated CBs' management is an artistic art that maintain optimal liquidity alongside assurance to achieve business objectives. Commercial banking is dependent on liquidity to meet obligations and commitment on demand and protect from liquidity crisis and systemic risks of the industry. So, there are a number of internal and externals sources or micro and macroeconomic factors that determine CBs' liquidity creations, distributions and holding positions. Thus, according to Singhn and Sharma (2016), Laštůvková (2016, 2015), Munteanu (2012), Trenca et al (2012), Vodova (2011, 2012), Hackethal et al (2010) and many others were categorized CBs' liquidity determinants into micro and macroeconomic or bank specific, industry specific and macroeconomic factors in their study. The micro economic factors are bank specfic determinants interlink with basic functions such as deposits, capital adequacy/equity, profitability, loans and advance, ownership, funding cost, profitability and bank size while macro-economic factors are external and beyond CBs' management control elsewhere in the economy such as GDP, financial crisis, unemployment rate, monetary policy and inflation rate.

In Ethiopia, Yimer (2016), Fekadu (2016), Berihun (2015), Fola (2015), Melese (2015) and Tesfaye (2012) were mentioned bank specific and macroeconomic determinants of CBs' liquidity in their study. The bank specific factors comprises bank size, capital adequacy, non-performing loan and advances, profitability and others while macroeconomic factors includes real GDP growth rate, interbank rate, inflation rate, financial crisis and unemployment rate. Among others Yimer (2016) mentioned CBs' liquidity determinants such as liquidity holding opportunity cost, bank specific physiognomies, moral hazard drives, macroeconomic rudiments and central bank/government driven factors.

2.1.3.1. Bank Specific Determinants

This part of the study reveal bank specific factors that determine CBs' liquidity as ensued.

Capital Adequacy (CAP) and CBs' Liquidity

Yimer (2016), Ayanda et al (2013), Moh'd and Fakhris (2013) and Al-Khouri (2012) were mentioned that CBs' liquidity creation, distribution and holding capability more influenced by capital and highlighted contrasting relationship between them. CBs hold capital for withstanding liquidity crunch, bank runs and other catastrophes. They were also stated capital play fundamental key role towards upholding security and harmonize financial strength cornerstone for supporting and continuing

operations in a sound and viable manner. It helps also for decreasing or resolving liquidity problems and helping as a buffer for absorption of unanticipated losses or any hazard occurrence as well as safekeeping of banking systems.

Bank Size (BSIZE) and CBs' Liquidity

In line with Vodová (2011) bank size is expressed by total assets value and annual revenues growth size to reveal its effect on CBs' liquidity. As general approach, when size is big, CBs will holds less liquidity and highly depends on financial markets funding by realizing "too big to fail" concept. If big CBs oversee this concept, they limit liquid assets holding capacity and worry for creating high liquidity. However, they may suffer unforeseen circumstances of selling illiquid assets to please customer's liquidity demands. Laeven et al (2014) argued that big CBs have better diversification options for portfolio risks reduction, less capital holding and less stable funding usage. But, small CBs can create and hold more liquid assets more easily by relying on their own internal rather than external financing sources. Berger and Bouwman (2009) recognized positive relationship between bank size and liquidity by confirming that small CBs incline to intermediation and transformation by holding lesser liquidity.

Non-Performing Loans and Advances (NPLA) and CBs' Liquidity

NBE Directive No.SBB/43/2008 stated "non-performing loan and advance is quality deterioration of loans and advances in principal and/or interest fully collection is consistently in question with contractual repayment terms and conditions". Yet, NPLA is uncollected principal and/or interest payments beyond repayment schedule due to miscarriage of CBs' borrowers as per predetermined contractual agreement. Increase in NPLA negatively and significantly influence business performance and assets quality by distressing lending ability and confidence loss and increase liquidity problems.

Profitability (ROA) and CBs' Liquidity

According to Rauch et al (2008, 2010) profitability has influence on CBs' financial soundness, income bearing and liquidity transformation capability. Similarly, Athanasoglou et al (2005) said sound and profitable CBs will tolerate destructive surprises and underwrite financial system permanency. Pandey (2005) as cited by Maore (2006) proposed risk-return trade-off between CBs' liquidity and profitability during employing conservative policy for investing in lower return and risky investments or an aggressive policy of higher return and risky investments.

Goddard et al (2004) claimed holding liquid asset enforces CBs for opportunity cost and has opposite association with profitability and stated they must balance between profitability and liquidity. Yet,

return on equity is apprehensive about how much CBs earn on owners' equity investment instead of earning assets. Net interest margin focuses only on income related to interest by disregarding income like fees, commissions and service charges. However, the aforementioned two profitability measurements are not show fully the overall performance of CBs. Therefore, due to mentioned drawback of ROE and NIM, this study prefer ROA as CBs' profitability measurements tool which consider all their income category.

2.1.3.2. Industry Specific Determinants

This part reveals industry specific factors that determine CBs' liquidity as ensued.

Interest Rate Margin (IRM) and CBs' Liquidity

Liquidity Preference Theory stated CBs need high interest rate in excess of liquidity premium for lending their money and prefer short period financing whereas borrowers prefer borrowing for long term by paying interest rate margin for them (Yimer, 2016). In monetary intermediation process, CBs gathers money from surplus unit by pay interest and offering loans and advances to deficit unit for earning interest income. So, they measure spread between interest earned on assets and interest costs on liabilities by insuring how well assets and liabilities are managed. It expressed as difference between interest income generated and interest paid. IRM increases when maturity period upsurges by surrendering liquid money to acquire higher premium. So, high IRM encourages CBs to provide more loans and advances via diminishing liquid assets holding with negating relationship among them (Azeez and Gamage, 2013).

Interest Rate on Loans and Advances (IRLA) and CBs' liquidity

Keynesian Liquidity Preference Theory was stated that when CBs hold liquid assets their liquidity preference may increases interest rates on short, medium and long-term loans and advances. Normally, it depends on borrowers' creditworthiness and business objective, money market accessibility, tenure, collateral type and value, economic sector and contractual agreement terms and conditions. Funding interest rate is determine anticipating and encouraging loans and advances granting when interest rate is high. Interest rate on loans and advances has negative relationship with CBs' liquidity (Keynes, 1936).

Money Market Interest Rate (MMIR) and CBs' Liquidity

Money market instruments have interest rate applicable on short term loans and advances provided for shorter maturity periods like Treasury bills (TB), commercial papers, banker's acceptances, certificates

of deposit and repurchase agreements. These instruments are plausibly essential for CBs as part of reserves and borrowing collateral from central bank to minimize default risk. Though, high MMIR on such instruments encourage them to make more investment and increase liquidity position. Thus far, MMIR has positive relationship with CBs' liquidity (Pilbeam, 2005). TB is high liquid asset. It is fortnightly the only regular primary market securities in Ethiopia. Hence, MMIR is proxy weighted average yield of TB annually (28 days, 71 days and 182 days) for this study (Tesfaye, 2012).

National Bank Bill Purchase (NBBP) and CBs' Liquidity

National Bank of Ethiopia Directive No. MFA/NBEBILLS/001/2011 was issued to finance long term projects. It is applicable to private CBs on loan disbursement activities those having minimal below 20 percent by comparing with public CB and major activities in money market loan granting of profit maximization. Hence, the directive shows five years long-term obligation by enforcing and imposing private CBs. It states "each bank shall calculate their own allotment based on 27 percent of monthly plan of loan and advances disbursement" at the time of bill purchases. Therefore, after the policy being implemented, private CBs' liquidity position is consistently deteriorating than before. They are complaining and rising questioning on liquidity problems and unfavorable consequence on their financial performance (Wolde, 2013). The directive also stated that to set aside 40 percent minimum requirement on total money market loans and advances provision which constraining, enforcing, questioning and imposing restructure on their loan portfolios. The NBE 27 percent bill purchase requirement policy is also influencing maturity mismatch, reducing profitability, freezing up productive resources for five years at rates lower than funding costs, negatively impacting intermediation activities and crowding out financing potential of private CBs. For instance, NBE pays 3% interest for the bill however, private CBs pay minimum 5% interest for the deposit they mobilized (IMF, 2012).

2.1.3.3. Macroeconomic Determinants

Commercial banks' liquidity creations, distributions and holdings can be affected positively or negatively by macroeconomic development, growth and depressions beyond controls. To abide such negative cash flow surprises outcomes, CBs may maintain adequate liquid assets to respond for macroeconomic instable, actively amending and generating cross-sectional liquid assets for business operations (Maore, 2006).

Real GDP Growth Rate (GDP) and CBs' Liquidity

GDP can influence CBs' liquidity in many ways. Liquidity may lowdown during economic booming. Because CBs may develop high confidence on market conditions by expecting high profit making opportunities. As a result they may intensify long term loans and advances financing. On the other hand, during economic depression, they limit financing by prioritize liquidity. Economic boom may enhances funding additional assets capability and meeting any obligations and commitment at desirable cost whereas economic depression surrender opposite outcome for CBs. Thus, real GDP may impact CBs' liquidity positively and singnificantly during economic growth (Johannes et al, 2016; Painceira, 2010).

General Inflation Rate (INF) and CBs' Liquidity

General inflation is obvious when demand for goods and services increase much more than economy can supply. Monetary theory states inflation increases liquidity holding opportunity cost but falsify resources allocation for business transaction liquidity. General inflation increase can be manifested by asset prices decline, high interest rates and worsen credit expansion. Therefore, high inflation rate and its sudden changes have a negative impact on interest rates, liquidity and capital of CBs. Hence, inflation influence negatively and singnificatly CBs' liquidity position (Johannes et al, 2016; Yimer, 2016).

Unemployment Rate (UER) and CBs' Liquidity

Commercial banks' liquidity creation, distributions and holding may infulenced by unemployment rate in connection with loans and advances demand negatively. An unemployment rate is proxy for general economy health. High unemployment rate increases exsiting and potential borrowers credit risk. CBs loans and advances delivery to borrowers will reduce and increase liquidity holding specially during strong influencial financial crisis period. Unemployement rate increase will increase CBs' liquidity consistently during recession period (Rauch et al, 2010). When unemployment rate is extremely high social liquidity become optimally scarce. Unemployment rate will increases when liquidity crisis affect private assets acceptable as collateral by broadening the rate of return difference between private and public liquidity (IMF, 2012). Optimal liquidity provision depends on labor market frictions due to trade-off between public liquidity provision and ineffective reduction of high unemployment rate. Economy supply affects liquidity by assets weighted-sum as serving medium of exchange, interest rates and unemployment issues. Public liquidity increase will raises up real interest rate, crowding out private liquidity and increases unemployment rate (Rocheteau and Rodriguez-Lopez, 2014).

2.2. Review of Related Empirical Studies

This part discourses specific relevant studies made by many authors' on bank specific, industry specific and macroeconomic statistically determinants of CBs' liquidity continental countries wise as ensued.

2.2.1. Related Empirical Studies in Asia countries

Singhn and Sharma (2016) investigated bank-specific and macroeconomic factors that determine liquidity of Indian CBs. They utilized OLS, fixed effect and random effect estimates to explore association by using 57 CBs data from 2000-2013. They found bank specific factors like bank size, profitability, funding cost, capital adequacy and deposits and among macroeconomic factors like GDP, inflation and unemployment were determined liquidity of Indian CBs. They found bank specific factors (except funding cost) and macroeconomic (except unemployment) were significantly affected bank liquidity. And said that bank size and GDP negatively whereas deposits, profitability, capital adequacy and inflation positively affected bank liquidity. But funding cost and unemployment insignificant effected bank liquidity.

Raeis et al (2016) studied relationship amid banks' liquidity and internal and external factors by using multiple regression analysis of 18 CBs panel data of Islamic Republic of Iran's bank from 2000-2013. They found relationship amid bank's liquidity and internal factors like capital, bank stability, asset quality, interbank funds, income to cost ratio, demand and savings deposits, number of internal branches and external factors like interest rates on daily short-term and long-term investments, inflation rate and unemployment rate. They found capital, bank stability, interbank funds, income to cost ratio, demand and saving deposits, interest rates on daily short-term, number of internal branches and inflation rate had positively and assets quality and unemployment rate had negatively impacted CBs' liquidity.

Horváth et al (2014) as cited by Singhn and Sharma (2016) found unemployment negatively and significantly impacted CBs' liquidity. And suggested high unemployment rate reduces capital and hamper liquidity creation by reducing solvency and lowing liquidity in troubled economic times.

Malik and Rafique (2013) examined bank specific and macroeconomic determinants of liquidity in Pakistan by employing E-views, SPSS software and panel data regression analysis of 26 CBs in Pakistan from 2000 to 2011. They measured liquidity by cash and cash equivalents to total assets (L_1) and loans and advances net of provisions to total assets (L_2) and estimated two models based on these measurments. Model 1 (L_1) result indicated bank specific fundamentals and monetary policy interest rate

positively whereas inflation and financial crisis negatively and significantly determined liquidity. Model 2 (L_2) result indicated bank size, monetary policy interest rate and financial crisis positively and significantly determined liquidity. They revealed total asset and interest rate positively and capital share of bank assets, inflation rate, equity return and loans to total loans share negatively affected liquidity in Pakistan. They also found L_1 negatively and significantly influenced by Non-Performing Loan and Return on Equity. But Capital adequacy and inflation negatively and significantly related with L_2.

Subedi and Neupane (2013) studied determinants of liquidity and their impact on financial performance in Nepalese CBs. They found capital and NPL negatively and significantly influenced liquidity while loan growth, gross domestic product growth rate on basis price level, liquidity premium paid by borrowers and money market interest rate negatively and insignificantly affected liquidity. They revealed positive and significant effect of bank size whereas inflation rate positive and insignificant influence CBs' liquidity.

Karlee et al (2013) investigated determinants of influential 15 Malaysia CBs' liquidity from 2003-2012. They identified bank specific factors like bank size, capital, profitability, credit and macroeconomic factors like GDP, interbank rate and financial crisis influenced liquidity. They found all determinants except interbank lending rate, were affected significantly liquidity. They also found non-performing loan, profitability and GDP influenced positively liquidity. In contrast, they found bank size, capital adequacy and financial crisis negatively, but interbank rate insignificantly affected CBs' liquidity.

Choon et al (2013) aimed to identify factors significantly Malaysia CBs' liquidity. They categorized independent factors into bank specific and macroeconomic factors. The bank specific factors were bank size, capital adequacy, profitability and non-performing loans whereas the macroeconomic factors were GDP, interbank rate and financial crisis. They utilized secondary data of 15 Malaysia CBs from 2003-2012. They expressed factors in ratios, percentage and dummy variable qualitatively suing fixed effect model (FEM) panel data annually. They found all factors except interbank rates had significant influence. Hence, non-performing loan, profitability and GDP positively influenced whereas bank size, capital adequacy and interbank rate negatively and insignificant influenced CBs' liquidity.

Munteanu (2012) studied "Bank Liquidity and its Determinants in Romania" for 27 Romania CBs from 2002-2010 using panel data regression analysis. He found internal factors like capital adequacy, assets quality, inter-bank money, financing costs and income to costs ratio and external factors like interest

rate, credit risk interest, inflation rate, unemployment rate and GDP were determinants of liquidity. He revealed CAP, inter-bank money, income to costs ratio, interest rate, inflation rate and GDP positively and assets quality, financing costs, credit risk rate and unemployment rate negatively determined CBs' liquidity.

2.2.2. Related Empirical Studies in European Countries

Elahi (2017) examined factors influencing liquidity of leading CBs operating in United Kingdom (market based economy) and Germany (bank based economy) to compare both countries' economy findings. He employed leading 8 UK and 8 Germany CBs listed in London Stock Exchange Market. Data were collected from internet, annual reports and some previous records of selected CBs for recent ten years before, during and after financial crisis period from 2006-2015 with each 80 number of observations from UK and Germany. The dependent variable was liquidity whereas independent variables were NIM, credit risk, bank size, profitability, income diversification and financial leverage. The Panel data was analyzed using pooled least square, fixed and random effects regression techniques. He conducted Hausman specification test and redundant fixed effects tested to identify the most appropriate model. He also executed Pesaran's test for cross sectional independence, descriptive and correlation analysis of UK and German CBs'. He found NIM significantly and negatively impacted both UK and Germany CBs' liquidity. Financial leverage had significant and negative for Germany but insignificant impacted for UK CBs' liquidity. Bank size, credit risk, profitability and income diversification were insignificantly impacted both UK and German CBs' liquidity.

Trenca et al (2015) examined macroeconomic factors' impact on bank liquidity of Greece, Portugal, Spain, Italy, Croatia and Cyprus. They applied General Method of Moments (GMM) for 40 CBs panel data from 2005q1-2011q4. They found inflation rate, public deficit, unemployment rate, GDP and liquidity ratio were determined liquidity. Inflation rate and liquidity ratio were significantly impacted while GDP significantly impacted liquidity.

Vodová (2013) examined determinants of Hungarian CBs' liquidity using data from 2001-2010. His panel data regression analysis results were showed capital adequacy, interest rate on loans and profitability had positively and bank size, interest margin, monetary policy interest rate and interest rate on interbank transactions had negatively impacted liquidity. GDP impact on liquidity was ambiguous.

Vodová (2013) examined determinants of CBs' liquidity in Hungary using panel data regression analysis from 2001-2010. He was employed variables like assets, equity, inter-bank interest rate, NPL,

CAP, interest rate, unemployment rate and GDP. He found equity, interest rate, inter-bank interest rate, GDP had positively and NPL, equity share and unemployment rate impacted negatively CBs' liquidity.

Vodova (2013) examined determinants of CBs' liquidity in Poland using panel data regression analysis from 2001-2010. He found overall GDP, financial crisis, economic downturn and unemployment rate increase were significantly impacted CBs' liquidity. He also found high profitability, interest rate margin and large bank sizes were decreased liquidity. But high capital adequacy, inflation rate, non-performing loans share and interest rates on loans and interbank lending were increased liquidity.

Vodová (2012) examined determinants of CBs' liquidity in Polish by employing panel data regression analysis from 2001-2010. He revealed overall economic conditions, financial crisis and economic downturn dropped and unemployment rate increased were determined liquidity. High profitability, high interest rate margin and bigger bank size were decreased liquidity. But, high capital, inflation, non-performing loans and interest rates on loans and interbank transaction were increased CBs' liquidity.

Vodova (2012) examined determinants of CBs' liquidity in Slovak by considering bank specific and macroeconomic panel data regression analysis data from 2001-2010. He found high profitability, high CAP and bank size were decreased liquidity. GDP was increased liquidity measured by CBs' lending activity whereas higher unemployment rate was decreased CBs' liquidity. Key interest rates, IRM, inflation and NPL were effected insignificantly Slovak CBs' liquidity.

2.2.3. Related Empirical Studies in African Countries

Moussa (2015) examined determinants of liquidity in Tunisia using sampled 18 CBs from 2000-2010. He estimated liquidity measures: liquid assets to total assets and total loans to total deposits by employing static panel dynamic methods. He found financial performance, capital to total assets, operating costs to total assets, GDP and inflation were significantly whereas bank size, total loans to total assets, financial costs to total credits and total deposits to total assets were insignificantly impacted CBs' liquidity.

Mashamba (2014) examined determinants of CBs' liquidity in Zimbabwe. He was adopted explanatory research design and Ordinary Least Squares (OLS) analysis model. He also used Pearson's correlation analysis to examine correlation between repressors and regressed variables. He found NPL highly and negatively and bank size, capital ratio and loan growth were positively impacted CBs' liquidity.

Chagwiza (2014) examined determinants of CBs' liquidity. He found capital, total assets, GDP and bank rate were positively influenced on liquidity. But, inflation and GDP were negatively influenced liquidity. Mehdi and Abderrassoul (2014) examined determinants of CBs' liquidity in Morocco using panel data regression from 2001-2012. They found bank size, capital to total assets, external funding to total liabilities, foreign assets, were positively impacted liquidity. However, return on assets, inflation rate, growth rate of GDP, public deficit and financial crisis were negatively impacted liquidity. Yet, return on equity, equity to total assets and unemployment rate had no impact on Moroccan CBs' liquidity.

2.2.4. Related Empirical Studies in Ethiopia

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

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

Fufa (2016) examined NBE Bill Purchase impact on financial performance (Profitability and Liquidity) of private CBs in Ethiopia from 2006-2016. He was hypothesized that NBE bills purchases had negative and significant impact on profitability and liquidity of private CBs. He was adopted quantitative research approach, explanatory design and utilized secondary data of selected 6 private CBs using purposive sampling technique. He also used fixed effect regression model using E-Views 8 econometric package. He found NBE Bill Purchase negative and significant was impacted financial performance with insignificant severity. He mentioned that pre and post policy periods comparison result were revealed

relatively better profitability record during policy restrictions. Bill policy was contributed positively to performance via moping excess liquidity holding by investing excess funds on earning government securities than normal liquid asset holding practice in zero earning accounts at NBE by private CBs.

Melese (2015) examined determinants of CBs' liquidity in Ethiopia by utilizing secondary data 2000-2013 for sampled 10 CBs. She was analyzed bank specific and macroeconomic variables by employing balanced panel fixed effect regression model (FEM). She found capital adequacy, profitability and real GDP growth rate were negatively and significantly impacted whereas bank size was positively and significantly impacted liquidity. But nonperforming loan, loan growth, inflation rate and interest rate margin were insignificantly impacted CBs' liquidity in Ethiopia.

Melese and Laximikantham (2015) examined bank specific factors affected CBs' liquidity in Ethiopia using secondary data from 2000-2013 for sampled 10 CBs. They analyzed variables by employing balanced panel fixed effect regression model (FEM). They found capital adequacy and profitability were statistically and significantly impacted liquidity whereas bank size was positively and significantly impacted liquidity. But, NPL and loan growth were insignificantly impacted CBs' liquidity in Ethiopia.

Fola (2015) examined bank specific and macro-economic factors affected CBs' liquidity in Ethiopia for sampled 8 CBs from 2002-2013 by employing balanced fixed effect panel regression. He was adopted mixed methods research approach by combining documentary analysis and in-depth interviews. He found capital strength, interest rate margin and inflation were positively and significantly impacted liquidity. Yet, loan growth had negatively and significantly impacted liquidity. However, profitability, non-performing loans, bank size and GDP were insignificantly impacted CBs' liquidity in Ethiopia.

Berihun (2015) examined determinants of liquidity and its impact on profitability of CBs in Ethiopia by collecting secondary data from sampled 8 CBs from 2002/03 to 2013/14. He was analyzed them using panel data regression analysis model. He found bank size and loan growth were negatively and significantly impacted CBs' liquidity. GDP, interest rate on lending, non-performing loans in the total volume of loans, bank size, actual reserve ratio and money market interest rate were positively impacted liquidity. He also found bank size was positively and significantly impacted profitability whereas GDP, actual reserve rate and non-performing loans in the total volume of loans were negatively impacted profitability. He also stated that the impact of CBs' liquidity on profitability was non-linear.

Hailu (2013) examined determinants of liquidity and its impact on profitability of Development Bank of Ethiopia (DBE). He was used Ordinary List Squire (OLS) regression model to analyze data from 1990-2013. He found MMIR and inflation were positively and insignificant impacted DBE's liquidity. Whereas NPL ratio was positively and significantly impacted liquidity. He also found GDP was negatively and significantly impacted liquidity. He found GDP and loan growth rate were positively impacted financial performance whereas inflation was positively but insignificant impact on financial performance.

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

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

2.3. Summary and Literature Gaps

In light of theoretical and empirical literature reviews discussed above, CBs play essential role in liquidity creation, allocation and holding. They transform short-term liquid deposit into long-term illiquid loans and advances in economy. So, economic operation and obligation have repercussion on CBs' liquidity. Liquidity is prominently obtained new dimensional attention after beginning of 2000 financial crisis and U.S. subprime mortgage turmoil structural alteration in fund management techniques. The mid-2000 global market monetary disasters and disorder were demonstrating highly liquidity meltdown and illiquidity existence in ever banking industry. Though, liquidity is an assets distribution for generating compulsory cash to satisfy creditors, borrowers and depositors' immediate needs. It is active emergency liability management strategy to acquire additional funds from financial markets instantly. It is also classically vital for simplification of normal, continuation and developmental functions without interruption in both sides of balance sheet. However, CBs' liquidity problems apart from global monetary catastrophe were recognized exceedingly operation in particular and financial system as a whole. These problems may be upraised from several loopholes as indicated in various liquidity and its determinants literatures reviews as discussed preceding chapter of this study. These

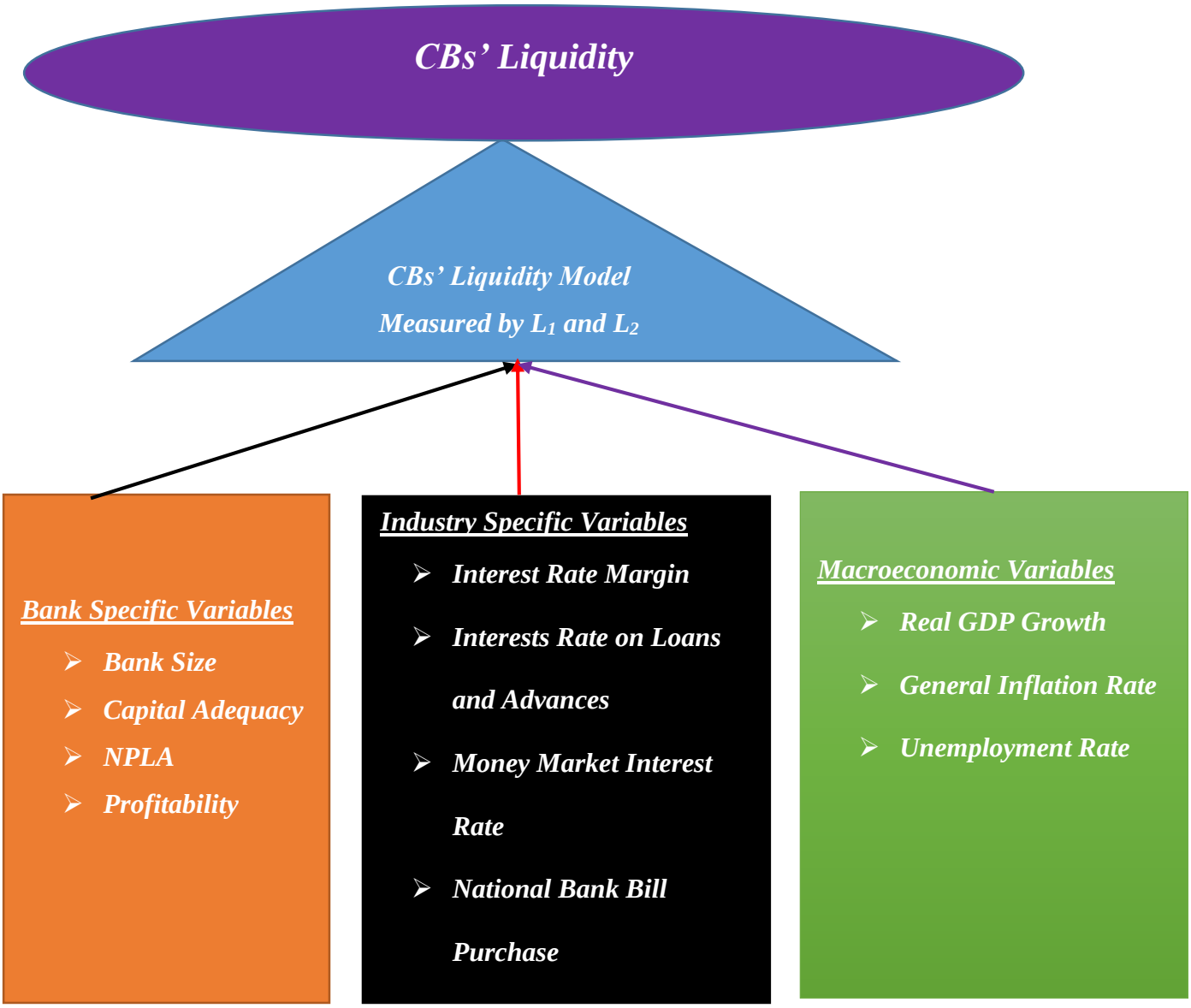
loopholes in one country are dissimilarly influenced in another country due to many divers variation from country to country.

Moreover, there are immense number of factors identified and examined by scholars that significantly influenced CBs' liquidity. It is highly influenced by bank specific, industry specific and macroeconomic factors. In this regard, as theoretical and empirical studies revealed, CBs' liquidity strongly influenced by bank specific factors (for instance, bank size, profitability, capital adequacy, ownership, non-performing loans and advances, loan growth rate and others), industry specific factors (for instance, interest rate margin, money market interest rate, interest rate on loans and advances, NBE bills, and others) and macroeconomic factors (for instance, real GDP growth rate, general inflation rate, unemployment rate and other economic environment indicators). Only minimal number of studies were conducted to investigate determinants of CBs' liquidity by separating macroeconomic factors in to industry specific and macroeconomic factors. There are few number of empirical studies conducted on determinants of CBs' liquidity in Ethiopia.

Commercial banks in Ethiopia are playing economic growth and developmental partner role. Thus, the industry is under flourishing phases by hosting new entrants, branch expansions, banking technology, banking business continual changing without secondary market existence and the likes. However, as all empirical studies suggested, there are many more literature gaps regarding influential determinants of CBs' liquidity. As far as the researcher's knowledge is concerned only Fekadu (2016), Yimer (2016), Melese (2015), Berihun (2015), Fola (2015), Hailu (2013) and Tesfaye (2012) were studied determinants of CBs' liquidity in Ethiopia. Their findings are inconsistent amongst each other on the same issues. They overlooked the industry specific influence by amalgamating with external factors rather than classifying into industry specific and macroeconomic factors. They were also disregarded some important variables that considerably determine CBs' liquidity in Ethiopia, for instance, unemployment rate among others. The number observations and study periods were also minimal to see impact on liquidity clearly. For these and other reasons, this study is mainly imperative and intended to identify and examine determinants of CBs' liquidity in Ethiopia by categorizing into bank specific, industry specific and macroeconomic factors on selected seven CBs covering from 2000-2016. Hence, the study will contributes enormously by filling literature gaps conducting via quantitative research approach and utilizing balanced secondary panel data (document survey) methods.

2.4. Conceptual Framework of the Study

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



Sources: Own drawing

Figure 3.1. Conceptual Framework of the Study

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Theoretical and empirical literature reviews of determinants of CBs' liquidity was demonstrated in previous chapter. This chapter discoursed Research Design, Research Approaches, Data Sources and Data Collection Instruments, Study Population and Sampling Frame, Sampling Technique and Sample Size, Data Analysis Methods, Operational Variables Definitions, Literature Driven Hypotheses, Data Presentation Techniques and Multiple Regression Model Specification to attain the basic objective of identifying and examining determinants of CBs' liquidity in Ethiopia as ensued.

3.1. Research Design

Research methodology is commenced by presenting overall research design to offer vital framework and guidelines to collect and analyze data. This study adopted explanatory research design to identify and examine the determinants of CBs' liquidity in Ethiopia. It incorporated data obtained from audited financial statements of sampled seven CBs in Ethiopia based on data availability of seventeen years from 2000-2016 to increase number of observations. Operational ratios were computed for liquidity measurements, capital adequacy, non-performing loan and advances and profitability for both dependent variable and independent variables from audited financial statements.

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

study utlized explanatory research design (theory driven and secondary data) for attaining intended broader objective.

3.2. Research Approaches

This study was employed quantitative (post-positivist) research approach for testing objective theories by examining relationship amongst dependent variable and independent variables. It rely on statistical data measurements and amount analysis to make quantifiable conclusions. It helps for attaining intended boarder objective, testing hypotheses, answering research questions, investigating research problem and comprehending causal relationship between CBs' liquidity and bank specific, industry specific and macroeconomic factors that determined their liquidity in Ethiopia (Creswell, 2009).

3.3. Data Sources and Data Collection Instruments

This study was employing fundamental data collection instruments for increasing consistency and finding soundness. It utilized structured and balanced secondary documents review panel data to maximize reliability and significance, to reduce inappropriate conclusion from unforeseen events and data source insufficiency of research findings. The nature of secondary balanced panel data (gathered via structured document review) was quantitative and encompasses seventeen years audited financial statements (balance sheet and income statement) of sampled seven CBs and macroeconomic indicator data of concerned government organs. Moreover, all dependent variable and bank specific data were collected from audited financial statements of selected seven CBs found in sample frame. Yet, industry specific and macroeconomic data were collected from NBE, MoFEC and CSA from 2000-2016 as of June 30 annually for identifying and examining determinants of CBs' liquidity in Ethiopia.

3.4. Study Population and Sampling Frame

The populations of this study are seventeen CBs, one public and sixteen private, as per NBE June 30, 2016 annual report. These are Abay Bank S.C., Addis International Bank, Awash Bank, Bank of Abyssinia S.C., Berehan Bank S.C., Buna International Bank S.C., Commercial Bank of Ethiopia, Cooperative Bank of Oromia S.C., Dashen Bank S.C., Debub Global Dank, Enat Bank, Lion International Bank S.C., Nib International Bank S.C., Oromia International Bank S.C., United Bank S.C., Wogagen Bank S.C. and Zemen Bank S.C. The study was employed Population Census to have the most appropriate picture of banking industry by consideration of coexistence relationship, data collection for specific time period from entire populations and examination of small and special population groups and data availability to reach conclusion regarding general population.

Commercial Bank of Ethiopia is the only public owned bank in the populations. Hence, the sample frame comprises one public and six private CBs. These banks have at least seventeen years panel data, huge capital and assets strength, strong customer bases, large branch network, ample experience and the likes in banking industry of Ethiopia from June 30, 2000-2016. Seventeen years data were utilized to maximize number of observations, have structured balanced data availability and depict the most expected relationship between dependent variable and independent variables on 119 observations crosswise for sampled seven CBs (hence, the sample frame matrix was 7*17 equals 119 observations).

3.5. Sampling Technique and Sample Size

This study was considered all seventeen CBs in Ethiopia in population. It employed purposive sampling technique with selection criteria of longest establishment years, financial data availability, ample experience, strong capital and assets shares, strong customer bases, large branch network and entire population representative power. So, only seven CBs from the population were selected as per these criteria. Yet, only Commercial Bank of Ethiopia is sampled public bank. Hence, from the sixteen private CBs, Awash Bank, Bank of Abyssinia S.C, Dashen Bank S.C., Nib International Bank S.C, United Bank S.C. and Wegagen Bank S.C were fulfilled the study's criteria in order to generate generalized conclusion about population for designated period from 2000-2016. They also have representative power of the population with regard to market and assets share banking industry.

On the other hand, Abay Bank S.C., Addis International Bank S.C., Berehan International Bank S.C., Buna International Bank S.C., Cooperative Bank of Oromia S.C., Debub Global Dank S.C., Enat Bank S.C., Lion International Bank S.C., Oromia International Bank S.C. and Zemen Bank S.C. were excluded as per the criteria. Because they have no balanced seventeen years panel data, none existence during designated study period and minimal experience in banking industry in the country. Henceforth, this study comprises a sample size of seven CBs and their seventeen years data to draw relationship among dependent and independent variables via 119 observations (7 CBs * 17 years data).

3.6. Data Analysis Methods

Subsequent to gathering and structuring all required data and financial ratios of dependent and bank specific variables computation for each chosen CBs, analyzing and interpreting data were followed to achieve identification and examination of CBs' liquidity determinants in Ethiopia. This study was utilized descriptive statistics and fixed effect multiple regression analysis model to infer consequence

and relationship of explanatory (independent) variables over dependent variable by testing proposed hypotheses. The descriptive statistics analyzed for both dependent and independent variables to convert raw data into expressive form to obtain clear idea for time span from 2000-2016. Hence, following this steps, findings were interpreted with statistical description like mean, maximum, minimum and standard deviation. Then after, to examine correlation matrix the correlation analysis was made amid dependent and independent variables. Finally, a multiple linear regression and t-test analysis were employed to determine independent variables impact on CBs' liquidity in Ethiopia. It was also commenced Ordinary Least Square (OLS) by utilizing E-view 8 econometric software and diagnostic tests to assure whether Classical Linear Regression Model (CLRM) assumption tests were violated or not.

3.7. Operational Variables Definitions

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

3.7.1. Operational Dependent Variable Definitions

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

CBs' Liquidity (L_1) = Liquid Asset to Deposit and Short Term Borrowing Ratio

As per NBE directive No SBB/57/2014 "liquid asset includes cash (local and foreign currency), deposits with National bank and other local and foreign CBs having acceptance by National bank, other assets readily convertible into cash expressed and payable in Birr or foreign currency having acceptance by the National bank and other assets as the National Bank may declare to be liquid assets from time to time". Simultaneously, "deposit means sum total of demand (current), savings and fixed time deposits of CBs whereas short term borrowing is any borrowing secured from National Bank of Ethiopia or any other interbank loans with maturity period of less than one year". Unexpected withdrawal of money market

commitments and obligations can be meet by liquid assets. Liquidity (L_1) ratio ensures CBs money market liability payout by readily available short-term assets. CBs' liquidity plays crucial role during unexpected deposits withdrawal. This ratio give emphasis on selected funding types like customer deposit sensitivity. Thus, the higher the ratio is the higher CBs withstand liquidity shock absorption capability will be while the lower the ratio is the higher deposit withdrawals sensitivity would be (Vodová, 2011; Yimer, 2016).

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

CBs' Liquidity (L_2) = Liquid Asset to Total Asset Ratio

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

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

3.7.2. Operational Independent Variables Definitions

In this study part, independent variables definitions were discoursed by categorizing into bank specific, industry specific and macroeconomic variables to achieve broad objectives as ensued.

3.7.2.1. Operational Bank Specific Variables Definitions

Bank specific variables are management controllable internal bank factors that directly influence CBs operations as discoursed hereunder.

Capital Adequacy (CAP): Capital is CBs own fund and available buffer for business operations and adverse conditions. It incorporate paid up capital, retained earnings, legal or other reserves and surplus fund kept aside for contingencies (Athanasoglou et al, 2005). Capital adequacy is measured by total capital to risk weight asset and total capital to total asset ratios. This study was measured capital adequacy by total capital to total asset ratio of sampled CBs. This ratio measures how much owner's

money financed assets compositions and indicates losses absorption potential of them (Yimer, 2016). The relationship between CBs' liquidity and capital strength have two opposing theoretical views. The "financial fragility-crowding out" theory stated that higher capital reduces liquidity creation and presence of negative relationship between capital adequacy and CBs' liquidity (Diamond and Rajan, 2000, 2001). On the other hand, CBs' liquidity may increase by capital through absorbing adverse shocks. And yet, the higher CBs capital ratio is the higher liquidity creation would be (Al-Khouri, 2012). Therefore, this study expects positive relationship between capital adequacy and CBs' liquidity as measured by the ratio of:

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

Bank Size (BSIZE): CBs' liquidity can be influenced by total asset size. The overall CBs intermediary capability may be measured by asset size. CBs' liquidity and size relationships have two opposing arguments. The first arguments was "too big to fail" which states CBs' liquidity and size have negative relationship while the second arguments states that they have positive relationship. So, this study assumes negative relationship amid BSIZE and CBs' liquidity measured by natural logarithm of total asset size.

$$\text{BSIZE} = \text{Logarithm of Total Asset}$$

Non-performing Loans and Advances (NPLA): As per NBE directive No SBB/43/2008 "the non-performing loans and advances means deteriorated quality of loans and advances in which principal and/or interest fully collection impaired as per agreed contractual repayment terms". NPLA portfolios increase may significantly influence CBs by distressing financial conditions and exposing operational funding insufficiency (basically liquidity and profitability). Due to lack of data on non-performing loans and advances of sampled CBs, this study was employed proxy percentage of provision to loan losses to total outstanding loans and advances. Provision for loan losses is a good estimator of NPLA because it will calculated based on amount loans and advances expected to be deteriorated. As previous studies revealed CBs' liquidity and non-performing loans and advances have negative relationship and then this study proxy measured as the ratio of:

$$\text{NPLA} = \frac{\text{Provision to Loan losses}}{\text{Total Outsanding Loans and Advances}}$$

Profitability (ROA): CBs' liquidity position may restrict full investment of available fund. CBs may suffer inherent balancing conflict between being profitable and remaining liquid. Their profitability can increase with the expense of liquidity because more liquid assets being invested on earning assets like loans and advances. So, they may continually outbreak balance between liquidity and profitability to meet liquidity requirements and shareholders wealth maximization desire (Yimer, 2016). The trade-off between profitability and liquidity has inverse relationship which means that an increase of either would decrease the other. CBs' profitability is measured by return on asset (ROA) and return on equity (ROE) which has negative impact on liquidity (Vodová, 2013). This study employed return on asset (ROA) for overall profitability measurement with proxy net profit before tax and provision to total asset ratios as:

$$\text{ROA} = \frac{\text{Net Profit Before Tax and Provision}}{\text{Total Assets}}$$

3.7.2.2. Operational Industry Specific Variables Definitions

The industry specific variables are amongst external to CBs beyond management control that direct or indirect influence their operational activities as presented as ensued.

Interest Rate Margin (IRM): CBs may mobilize deposit from surplus unit and delivery loans and advances to deficit unit in economy. They bring together business units who have and who need money. Thus, they generate interest from loans and advances in excess of interest paid to depositors in intermediation process. They manage asset and liability for substantially to earn income from assets and pay low costs for liabilities. Hence, CBs' management is artistically act over assets and liabilities by measuring spread between interest to be earned on assets and interest costs on liabilities. Though, this study employed proxy difference between interest income from loan and advances as percentage of total loan and advances and the interest paid on deposit as a percentage of total deposits ratio (Azeez and Gamage, 2013). Thus, when interest rate margin increases, CBs can be motivated to provide more loans and advances by lowering their liquidity positions.

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

Interest Rate on Loans and Advances (IRLA): is lending interest rate that CBs charge on money provided to borrowers. Their lending interest rate may differ based on loans and advances tenure, type, economic sector, collateral type and value and others conditions that enable them to acquire the best advantages there in. This study was defined interest rate on loans and advances proxy percentage of

interest rate on loans and advances to total loans and advances. The higher the interest rate on loans and advances is the higher CBs motivate granting more loans and advances to borrowers. As per Choon et al (2013), Vodová (2013) and others preceding studies on area, interest rate on loans and advances and CBs' liquidity had anticipated negative relationship. And hence, this study assumed same and measured:

$$\text{IRLA} = \text{Interest Rate on Loans and Advances Percentage}$$

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

$$\text{MMIR} = \text{Annual Weighted Average Interest Rate of Treasury Bills}$$

National Bank Bill Purchase (NBBP): is long-term obligation imposed by NBE on private CBs with maturity period of five years. It enforces entirely to invest on bonds at an amounts 27% of total loans and advances provided to borrower or it is percentage proportion of NBE Bills to net loans and advances (NBE, 2011). It is apparently affecting their liquidity as a result large sum loanable money tied up on NBE Bills (Fekadu, 2016). This study was expected that NBBP and CBs' liquidity has negative relationship and considered as dummy variable (1 for bill purchase enforcement time periods 0 otherwise) because there were non-existence period before policy introduction.

$$\text{NBBP} = \text{Dummy Variable}$$

3.7.2.3. Operational Macroeconomic Variables Definitions

Macroeconomic variables are external variables significantly influence CBs and banking sector operations over which management has no control Trenca et al (2015) discoursed as hereunder.

Real Gross Domestic Product (GDP) growth rate: is an economic health indicator and living and economic activity measurement standard. During booming/growth or declining/recession economic phase, CBs much more influenced may by. Likewise during booming economic phases, CBs hopefully

increase their loans and advances as a result of which liquid assets holding decreases. Conversely, during recession period, borrowers' business operations and debt payment capability declines, as a result it CBs default rate (NPLA) increases substantially and they ultimately decreases their liquidity creations, distribution and holding (Yimer, 2016). Yet, this study employed GDP proxy measure of annual real growth rate and anticipated CBs' liquidity and GDP have negative relationship.

$$\text{GDP} = \text{Annual Real Growth Rate}$$

General Inflation Rate (INF): During inflationary period, central bank increases cost of borrowing to reduce lending capacity of CBs. As recent theories highlighted, informational asymmetries are vital for credit markets how inflation rate increases unfavorably influence credit market frictions and has negative repercussions on CBs' performance. Thus, during this period they may anticipate decline loans and advances and so increase liquid or money market assets holding. Inversely, living cost may increases and deposits amount may decline as a result CBs' liquidity may be affected negatively (Yimer, 2016). Therefore, this study was proxy measured general inflation rate by annual general consumer price index (CPI) and expected that CBs' liquidity and general inflation rate have negative relationship.

$$\text{INF} = \text{Annual General Consumer Price Index (CPI)}$$

Unemployment Rate (UER): is annual percentage of unemployed workforce of the country (Singhn and Sharma, 2016). It is not seasonally adjusted data so has negative effect on CBs' liquidity creation, distribution and holding (Trenca et al, 2015; 2012). During adverse economic conditions either low or negative growth in the country, high unemployment rate, interest rates and inflation may lead into unfavorable commercial banking crisis. Unemployment rate can provide additional information regarding economic conditions impact. Hence, an increase in unemployment rate can influence negatively households' cash flow streams and increases debt burden. With regards to CBs, unemployment rate increases may be a signal for decrease in production as a consequence of dropdown demand of goods and services which directly decrease revenues and fragile debt condition.

High unemployment rate can represents weak or failed economic condition which in turn indicates it significantly impacts CBs' loans and advances portfolio and adversely affects customers' loan and advances demand aptitude. Thus far, when unemployment rate decreases then loan and advances demand increases as a result of it CBs hold more liquidity. Inversely, when unemployment rate increase then loan and advances demands decreases which in turn increase liquidity of CBs (Horváth et al, 2014).

Hence, this study was employed proxy annual unemployment workforce rate percentage of the country as measurement of it and anticipated CBs' liquidity and unemployment rate have negative relationship.

$$\text{UER} = \text{Annual Unemployment Workforce Rate Percentage of the Country}$$

3.9. Data Presentation Techniques

This study all relevant data were collected for each bank specific, industry specific, macroeconomic and dependent variables to attain main objective of identifying and examining determinants of CBs' liquidity in Ethiopia. And then all indispensable ratios were computed for dependent variable and bank specific variables. Then analyzed and interpreted them for all sampled CBs. Statistical analysis tools (descriptive statistics) and inferential statistics/multiple regression analysis (correlation and multiple linear regression analysis) were applied to test developed hypothesis and distinguish impact, causes and casual relationship among independent (explanatory) variables and dependent variable for period covering from 2000-2016. All relevant raw data were converted into comprehensive and meaningful ways by using descriptive statistics on both dependent and independent variables for sampled CBs. Then after these all were performed figure interpretations and tabulation continued by statistical description such as mean, median, maximum, minimum and standard deviation for analyzing variables data (Malhotra, 2007). Subsequently, correlation analysis among independent and dependent variables were accomplished to infer comprehended relationship followed by multiple linear regression model and t-test to examine influence of all independent variables on CBs' liquidity. The ordinary least square (OLS) together with all its relevant assumptions, classical linear regression model (CLRM) assumptions correctness tests and fixed effect model (FEM) were commenced for diagnostic testing to gain valuable assurances on examining bank specific factors, industry factors and macroeconomic factors on sampled seven CBs' liquidity from 2000-2016. Testing fixed effect model (FEM) is useful for exhibiting different characteristics and time effect or different characteristic and no time effect and for checking autocorrelation problem exist or not in the error terms and independent variables of sampled CBs for period under investigation. Thus far, multiple linear regressions model and ordinary least square (OLS) were undertaken by using E-Views 8 econometric software package for investigating expected and/or unexpected relationship existed or not amongst determinant variables and CBs' liquidity in Ethiopia.

3.10. Regression Model Specification

This study was employed balanced and structured panel data for acquiring combined observations advantages over cross sectional and time series data methodology. Using balanced panel data is helpful for

discoursing and tackling more complex problems and for scrutinizing how variables and their relationships changes vigorously through over time more than time series data. It is also useful for maximizing degree of freedom and empower testing with large CBs' dynamic behavioral information to manage multicollinarity problems which may arise from individual variables modeling by time series periods. It enables the researcher to remove biasness effect in regression results from certain variables omission. It also encompasses both cross-sectional and time-series components: cross-sectional components are sampled CBs in Ethiopia and time-series component is the time period from 2000-2016 (Brooks, 2008).

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

$$L_{it} = \alpha + \beta X_{it} + \delta i + \varepsilon_{it}$$

Where $\mathbf{L_{it}}$ represents one of the two dependent variable ratios (CBs' liquidity ratio **i** at time **t**), X_{it} was explanatory variable vector of CB **i** at time **t,** α was intercept/constant term, β was coefficient which represents explanatory variables slope, δ_i represents fixed effects in CB ***i*** and ε_{it} was the random error term. Subscript ***i*** represented cross-section and ***t*** represented time-series dimensions.

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

$\mathbf{L_1i,t} = \alpha i + \beta_1(CAPi,t) + \beta_2(BSIZEi,t) + \beta_3(NPLAi,t) + \beta_4(ROAi,t) + \beta_5(IRMt) + \beta_6(IRLAt) + \beta_7(MMIRt) + \beta_8(NBBP,Dt) + \beta_9(GDPt) + \beta_{10}(INFt) + \beta_{11}(UERt) + \delta i + \varepsilon i,t$……**(Model 1)**

$\mathbf{L_2i,t} = \alpha i + \beta_1(CAPi,t) + \beta_2(BSIZEi,t) + \beta_3(NPLAi,t) + \beta_4(ROAi,t) + \beta_5(IRMt) + \beta_6(IRLAt) + \beta_7(MMIRt) + \beta_8(NBBP,Dt) + \beta_9(GDPt) + \beta_{10}(INFt) + \beta_{11}(UERt) + \delta i + \varepsilon i,t$……**(Model 2)**

Wherever:

L_{1it}: denoted CBs' liquidity measured by Liquid Asset to Deposit plus Short Term Borrowing ratio of **i^{th}** CB in year **"t"**

L_{2it}: denoted CBs' liquidity measured by Liquid Asset to Total Assets ratio of **i^{th}** CB in year **"t"**

$CAP_{i,t}$: Capital Adequacy ratio of **i^{th}** CB in year **"t"**

$BSIZE_{i,t}$: Bank Size of **i^{th}** CB in year **"t"**

$NPLA_{i,t}$: Non-Performing Loan and Advances of **i^{th}** CB in year **"t"**

$ROA_{i,t}$: Return on Assets of **i^{th}** CB in year **"t"**

IRM_t: Interest Rate Margin of in year "t**"**

$IRLA_t$: Interest Rate on Loans and Advances of in year **"t"**

$MMIR_t$: Money Market Interest Rate of in year "t**"**

$NBBP_{Dt}$: National Bank Bill Purchase of **i^{th}** dummy variable in year **"t"**

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

INF_t: General Inflation Rate of Ethiopia in year **"t"**

UER_t: Unemployment rate of Ethiopia in year "t"

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

δ_i*:* Fixed effects in CB ***i***

ε_{it}*:* the random error term

The bank specific variables were both cross-sectional and time variant whereas industry specific and macroeconomic variables were only time variant converted into panel data type for each cross-sectional unit. Model L_1 and L_2 liquidity ratios were employed as supported and benchmarked by favor of NBE liquidity requirement directive.

CHAPTER FOUR

DATA PRESENTATION AND ANANLYSIS

This chapter presents collected data analysis by employing descriptive statistics, correlations and regression analysis results. It has six essential sub sections. First, Fixed Effect Model (FEM) versus Random Effect Model (REM) test are made to distinguish the most applicable data model for this study; second, Classical Liner Regression Model (CLRM) diagnostic test are accomplished; third, Correlation analysis among dependent and independent variables are undergone; fourth, descriptive statistics analysis of dependent variable and independent variables are presented; fifth, fixed effect panel data multiple regression model result are described and lastly, comprehensive regressions analysis results discussions are followed based on reviewed empirical literatures and this study findings.

4.1. Testing Fixed Effect Model (FEM) vs. Random Effect Model (REM)

In financial studies, fixed effect model (FEM) and random effect model (REM) are the two most commonly applicable panel data estimator models. Hence, fixed effect model (FEM) estimator is more convenient when the number of observations in the sample frame constitutes the whole population whereas random effect model (REM) estimator is more convenient when the number of observations in the sample frame only chosen randomly from the population (Brooks, 2008). On the other hand, when there are large number of time series data and small number of cross-sectional units in the study, so there may be slight difference in parameters estimator value in both fixed effect model (FEM) and random effect model (REM) (Gujarati, 2004).

In this study, number of cross-sectional units are seven and number of time series data are seventeen years (two fold more than cross-sectional units). CBs in sample frame are chosen on the basis of longest establishment years, financial data availability, ample experience, strong capital and assets shares, robust customer bases, large branch network and entire population representative power criteria to increase number of observations. Fixed effect model (FEM) is more appropriate than random effect model (REM). Thus, it employed fixed effect multiple regression model to attain the broader objective.

4.2. Testing Classical Liner Regression Model (CLRM) Assumptions

After choosing the most best applicable model for this study, fixed effect model (FEM), successive phase is CLRM assumptions diagnostic test. It is very essential to ascertain whether data utilized and chosen model are apt or not with classical linear regression model assumptions. So, five basic

assumptions are tested to confirm forecasted approaches, Ordinary Least Squares (OLS), necessary proper numbers and coefficient projected about hypothesis tests. Hence, this study assume average value of error terms are zero, error variance is constant (homoscedastic), covariance amongst error terms are zero (non-autocorrelation), error terms are normally distributed (normality) and explanatory variables are non-correlated (non-multicollinearity) as discoursed as ensued.

4.2.1. Normality Assumption Test

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

In this regard, as depicted in Appendix E, this study employed BJ normality test for null hypothesis (error term) testing in normally distribution assumptions. The kurtosis value of model L_1 and L_2 3.336773 and 3.213141 are almost all nearer to three respectively. The BJ test p-values 0.767476 and 0.111577 of model L_1 and L_2 are insignificant respectively rejecting null hypothesis attributable to error terms that follows normal dispersion. Thus far, this study test results indicating that all data employed are consistent with normal distribution assumptions.

4.2.2. Non-Multicollinearity Assumption Test

This test is CLRM assumptions test which focuses on testing relationship amid independent variables. Perfect collinearity exists when independent variables thoroughly has linear mix with another independent variables and can't be forecasted via OLS (Brooks, 2008). Multicollinearity may happens when correlation among independent variables is imperfectly high while infulence on depdendent variable decreases. All independent variables may not perfectly correlated with depedent varaibles while they correlate each other without perfection. Different authors were arguing how much correlation among independent variables causes multicollinearity. For instance, Hair et al (2006) argued that critical multicollinearity problem may not be caused by correlation coefficient above 0.7 in absolute value. As stated by Malhotra (2000) when correlation coefficient amid independent variables exceeds 0.75

multicollinearity problem exists. Kennedy (2008) stated correlation coefficient greater than 0.7 may causes critical multicollinearity problem which lead into inefficient estimation and less reliable outcome. Thus, all authors did not have same arguments about correlation coefficient for multicollinearity existance. Therefore, estimated correlation matrix results of eleven independent varaiables, Table 4.1 below, shows that highest correlation matrix value 0.6564 are registred amid IRLA and NBBP followed by 0.5717 amid BSIZE and IRLA. In line with Kennedy (2008), Hair et al (2006) and Malhotra (2000) there is no correlation if value exceeds 0.7, 0.7 and 0.75 respectively. So, this study is concluded non-multicollinearity problem obseerved between independent variables.

Table 4.1 Correlation Matrix between Independent Variables

	BSIZE	*CAP*	*GDP*	*INF*	*IRLA*	*IRM*	*MMIR*	*NBBP*	*NPLA*	*ROA*	*UER*
BSIZE	**1**										
CAP	(0.3600)	**1**									
GDP	0.3708	0.0169	**1**								
INF	0.3229	0.0595	0.3241	**1**							
IRLA	0.5717	0.1887	0.1906	0.1707	**1**						
IRM	(0.0395)	0.2802	0.1390	0.1211	0.4545	**1**					
MMIR	(0.1890)	0.2236	(0.5743)	(0.2671)	0.2780	0.0704	**1**				
NBBP	0.3584	0.3297	0.1751	0.1955	0.6564	0.3604	0.1934	**1**			
NPLA	0.1752	(0.4715)	(0.1047)	(0.0853)	(0.3341)	(0.4186)	(0.1588)	(0.2943)	**1**		
ROA	0.2767	0.3847	0.5065	0.3878	0.3167	0.0279	(0.2066)	0.2356	(0.3382)	**1**	
UER	0.2094	0.0536	0.0685	(0.1176)	0.3563	0.1540	0.0836	0.2874	(0.1481)	(0.0170)	1

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

4.2.3. Heteroskedasticity Assumption Test

Third CLRM assumptions test by stating errors variance is constant. Heteroskedasticity sign exsit when regression residual value changes over sample frame by revealing errors don't have constant variance. Heteroskedasticity null hypothesis presence is tested by employing white test with p-value above 0.05.

Table 4.2 Heteroskedasticity Test: White Test

Liquidity (L_1)		**Liquidity (L_2)**	
F-statistic	1.590148	F-statistic	1.833102
Prob. F(9,109)	0.1270	Prob. F(11,107)	0.0571
Obs.* R-squared	13.81096	Obs.* R-squared	18.86956
Prob. Chi-Square (9)	0.1292	Prob. Chi-Square (11)	0.0635
Scaled explained SS	13.09735	Scaled explained SS	14.79905

Liquidity (L_1)		Liquidity (L_2)	
Prob. Chi-Square (9)	0.1583	Prob. Chi-Square (11)	0.1919

Source: E-view computed results

Thus far, as portrayed in Table 4.2 above and Appendix D, white test, F-statistic, Obs.* R-squared and Scaled explained SS are provided identical conclusion by assuring no heteroscedasticity problem in both model L_1 and L_2 liquidity because both models' p-values exceeded 0.05. The regression models showed error term variance are constant (not vary) or homoscedastic and there are enough objective assurances for heteroscedasticity null hypothesis test rejection in the period under investigation.

4.2.4. Autocorrelation Assumption Test

This test is fourth CLRM assumptions test which states distribution term and covariance among time series and cross-sectional data errors term is zero. It also assumes error terms are uncorrelated among each other. So, error terms are autocorrelated or consecutively correlated if and only if they are uncorrelated among one another (Brooks, 2008) and also as tested by Durbin and Watson test. Thus, Durbin-Watson (DW) test is the first order autocorrelation test that examine relationship midst error and its instant previous value. DW test is nearly equal to $2(1-\hat{\rho})$, where $\hat{\rho}$ is the forecasted correlation coefficient between error term and its first order lag (Brooks, 2008). Hence, this study fixed effect regression anaysis result, Appendix B, DW stat values of model L_1 and L_2 are 1.969785 and 1.121818 repectively revealing this study independent variables have no critical autocorrelation evidence because DW test outcomes are nearer to two (2).

So, in this study to check nonappearance of autocorrelation problem, Breusch-Godfrey (BG) normality test is perfromed for ten (10) lag value because DW tests is the only first order autocorrelation or one lag value test. Hence, BG-test results are as dipicted in table 4.3 and 4.4 below and Appendix C of model L_1 and L_2. Thus far, Table 4.3 and 4.4 below, the F-stat p-values of model L_1 and L_2 are 0.4222 and 0.2857 repectively, as a result of which in both models p-values exceeded 5% which reveal there are no autocorrelation problems and therefore, failed to reject the null hypotheses.

Table 4.3 Breusch-Godfrey (BG) Test for the absence of Serial Autocorrelation for Model L_1

F-statistic	0.999230	Prob. F(5,102)	0.4222
Obs.*R-squared	5.509969	Prob. Chi-Square(5)	0.3569

Table 4.4 Breusch-Godfrey (BG) Test for the absence of Serial Autocorrelation for Model L_2

F-statistic	1.263524	Prob. F(5,100)	0.2857
Obs.*R-squared	7.011813	Prob. Chi-Square(5)	0.2198

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

4.3. Descriptive Statistic Analysis of Dependent and Independent Variables

This study part offer descriptive statistics analysis of dependent and independent variables in the underneath Table 4.5. It shows mean, median, maximum, minimum, standard deviations and number of observations of all study variables in tabulation. The study is employed dependent variable, CBs' liquidity, measured by stoch approach for sampled seven CBs in Ethiopia and eleven independent variables. So, CBs' liquidity is measured by Liquid Assets to Deposit plus Short Term Borrowing (L_1) and Liquid Assets to Total Assets (L_2) ratios. Independent variables which influence CBs' liquidity in Ethiopia, are identified and examined by categorizing into bank specific factors (CAP, BSIZE, NPLA and ROA), industry specific (IRM, IRLA, MMIR and NBBP) and macroeconomic factors (GDP, INF and UER). Hence, all these variables are depicted, Table 4.5 below, in summarized ways for the period covering from 2000-2016 annually.

Table 4.5 Descriptive Statistics of Dependent and Independent Variables Summary

	Mean	Median	Maximum	Minimum	Std. Dev.	No of Obs.
L1	0.3916	0.3816	0.7373	0.0827	0.1382	119
L2	0.3243	0.3127	0.5941	0.0782	0.1159	119
BSIZE	8.6638	8.7676	12.8600	5.0626	1.5689	119
CAP	0.1335	0.1239	0.2595	0.0162	0.0441	119
GDP	0.0874	0.1035	0.1264	-0.0210	0.0396	119
INF	0.1182	0.0969	0.3640	-0.1057	0.1143	119
IRLA	0.1011	0.0990	0.1560	0.0508	0.0230	119
IRM	0.0491	0.0452	0.1317	0.0095	0.0217	119
MMIR	0.0130	0.0134	0.0330	0.0004	0.0087	119
NBBP	0.3025	0.0000	1.0000	0.0000	0.4613	119
NPLA	0.0456	0.0322	0.2897	0.0000	0.0479	119
ROA	0.0327	0.0341	0.0568	-0.0229	0.0128	119
UER	0.0837	0.0540	0.5222	0.0500	0.1103	119

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

As Table 4.5 above shows, the mean is the average value whereas maximum and minimum values are maximum and minimum statistics values respectively, but standard deviations is a statistics value which indicates deviations from mean value of all dependent and independent variables for seven sampled CBs in Ethiopia during examination periods of this study.

4.3.1. Descriptive Statistic Analysis of Dependent Variable (Table 4.5 and Appendix F, G and H)

The mean value of financing loopholes is 39.16% as measured by models L_1 implies on average CBs' liquidity is 39.16% during study period in Ethiopia. It is above 15% minimum regulatory liquidity requirement as per NBE directive No. SBB/57/2014. The maximum liquidity was 73.73% in NIB during the year 2000 while the minimum liquidity was 8.27% in CBE during the year 2015 measured by models L_1. The standard deviations value is 13.82% shows liquidity dispersion from mean value ranging between 25.34% and 52.98% for all sampled CBs in Ethiopia. The positive sign of model L_1 financing gap reveals the existence of excess liquid assets over and above deposit and short term borrowing.

Similarly, the mean value of financing loophole is 32.42% measured by model L_2 implies on average CBs' liquidity is 32.42% during study period. The maximum liquidity was 59.41% in CBE during the year 2004 while minimum liquidity was 7.82 % in CBE during the year 2015 measured by model L_2. The standard deviations value 11.59% indicates liquidity dispersion from mean value ranging between 20.84% and 44.02% for all sampled CBs in Ethiopia. The positive sign of model L_2 financing gap reveals existences of excess liquid assets above total assets amount. The Liquid Assets to Total Assets ratio (models L_2) mean value 32.42% is also more than 15% NBE minimum requirement. When this ratio is too high, it indicates CBs may have adequate liquidity to cover any unforeseen fund requirement whereas when it is too low, it indicates they can't earn required liquidity. Relatively model L_1 mean value is more than model L_2 impling on average there are higher deposit amount volatile and short term borrowings are tied up in liquid assets as compared with model L_2 of CBs in Ethiopia.

4.3.2. Descriptive Statistic Analysis of Independent Variables (Table 4.5 and Appendix F, G and H)

4.3.2.1. Descriptive Statistics Analysis of Bank Specific Variables (Table 4.5 and Appendix F, G and H)

The CBs' size (BSIZE) is proxy measured by natural logarithm of total assets (LnTOA). Natural logarithm is employed to minimize deviations between maximum and minimum values. The mean value of BSIZE is 866.38% which implies average total assets size of sampled CBs in Ethiopia during this study period. The maximum total asset size value 1,286.00% was recorded by CBE during the year 2016 whereas the minimum total asset size value 506.26% was recorded by NIB during the year 2000 midst

sampled CBs in Ethiopia. The standard deviations value 156.89% shows somehow fewer BSIZE dispersion from mean value ranging between 709.49% and 1023.27% for all sampled CBs in Ethiopia.

Capital adequacy (CAP) is proxy total capital to total assets ratio. Its mean value 13.35% shows on average only 13.35% of total assets amount is covered by CAP while the remaining 86.65% financed from external sources which implies all sampled CBs are highly dependent on external sources arisen from deposit mobilization and other sources. However, the mean value is exceeded 8% international standards. The maximum CAP 25.95% was registered by NIB during the year 2000 while the minimum CAP 1.62% was registered by CBE in the year 2002. The standard deviations value 4.41% indicates minimal CAP dispersion from mean value ranging between 8.94% and 17.76% for all sampled CBs in Ethiopia. Minimum 1.62% CAP existence may exposes them for liquidity shortage even if their average CAP 13.25% is good by exceeding NBE and international requirements standard.

Non-performing loans and advances (NPLA) is proxy measured by provision for loan losses to total outstanding loans and advances ratio. NPLA is the actual deteriorate assets quality amount. Provision for loan losses is the forecasted amount based on outstanding loans and advances quality deterioration. The mean value 4.56% of provision for loan losses shows on average 4.56% provision for loans losses held for each outstanding loans and advances or for each 1 birr outstanding loans and advances provided to customers 0.0456 cents provision is held by sampled CBs in Ethiopia during this study periods. It is forecasted amount kept by sampled CBs to minimize loan and advances quality losses. The maximum provision 28.97% was held by CBE during the year 2003 while the minimum provision 0.48% was held by UB in the year 2001. The standard deviations value 4.79% indicates provision dispersion from mean value ranging between -0.23% and 9.35% for all sampled CBs in Ethiopia in this study periods. The maximum value 28.97% depicts higher amount of provision required to minimize unforeseen credit risk exposure as per NBE Assets Classification and Loan Provisioning directive no SBB43/2008 by all sampled CBs in Ethiopia in the periods.

Profitability (ROA) is proxy measured by return on assets expressed as net income before tax and provision to total assets ratio. The average ROA mean value 3.27% indicates for each one birr investment made by sampled CBs in Ethiopia, they are generating 0.0327 cents return during the period under examination. It is much more dependent on loans and advances created or provided to borrowers. The maximum profit 5.68% was earned by WB during the year 2011 while profit loss of 2.29% was incurred by CBE in the year 2002 by revealing it had been suffered 0.0229 cents loss per one birr

investment. Standard deviations value 1.28% implies smaller amount of ROA depression from mean value ranges between 1.99% and 4.55% for all sampled CBs in Ethiopia during this study periods.

4.3.2.2. Descriptive Statistic Analysis of Industry Specific Variables (Table 4.5 and Appendix F, G and H)

Interest rate margin (IRM) is proxy measured by net interest income from loans and advances to total outstanding loans and advances ratio. Its mean value 4.91% reveals on average for each 1 birr loans and advances lending to customers, sampled CBs are earning 0.0491 cents during this study period. The maximum IRM 13.17% was earned by UB in the year 2016 whereas minimum IRM 0.95% was earned by CBE in the year 2002. The standard deviations value 2.17% shows slight IRM variation from mean value ranging between 2.74% and 7.08 earned by all sampled CBs in Ethiopia.

Interest rate on loans and advances (IRLA) is proxy measured by interest rate on loans and advances to total outstanding loans and advances ratio. Its mean value 10.11% indicates on average lending cost charged from customer by sampled CBs. The maximum lending cost 15.6% was charged by CBE in the year 2016 whereas minimum lending cost 5.08% was charged by NIB in the year 2000. The standard deviations value 2.3% shows minimal cost of borrowing depression from mean value ranging between 7.81% and 12.41% charged from customers by all sampled CBs in Ethiopia during this study periods.

Money market interest rate (MMIR) mean value 1.3% indicates per one birr investment made on Treasury Bills (TB). Hence, NBE is charging on average 1.3% interest rate sampled CBs during study period. The maximum TB MMIR 3.3% was charged by NBE during the year 2000 while the minimum TB MMIR 0.04% was charged in the year 2006. The standard deviations value 0.87% indicates below one percent minimal borrowing cost depression from mean value ranging between 0.43% and 2.17% TB MMIR for all sampled CBs in Ethiopia.

National bank bill purchase (NBBP) policy is dummy variable applicable only to private CBs at the rate of 27% on loans and advances provided to their customers. Its mean value 30.25% indicates for each 1 birr loans and advances provided to customers they are purchasing 0.3025 cents amount of bill. The maximum NBBP policy value with no doughty is 100% whereas its minimum value is 0% for all private CBs. Standard deviation values 46.13% indicates high NBBP variation from mean value ranges between 0% and 76.38% for only sampled six private CBs in Ethiopia during this study period.

4.3.2.3. Descriptive Statistic Analysis of Macroeconomic Variables (Table 4.5 and Appendix F, G and H)

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

Real GDP growth rate (GDP) is proxy annual real GDP rate. It measures economic performance of the country. Its mean value is 8.74% which reveals on average market values of all final goods and services produced in Ethiopian economy is 8.74% for the last 17 years from 2000-2016. The maximum GDP value 12.64% was recorded during the year 2005 while the minimum failed production value -2.1% was recorded during the year 2003. The standards deviation is 3.96% shows insignificant difference from mean GDP in economic growth ranges between 4.78% and 12.7% in each year under this study.

General inflation rate (INF) is proxy measured by annual percentage general Consumer Price Index (CPI) change. The mean value is 11.82% shows mean CPI% changes on average INF in the country. It is increasing by 11.82% during each year under considerations more than average 8.74% GDP of Ethiopia. The maximum INF 36.4% was registered during the year 2009 while minimum INF -10.57% was occurred during the year 2002. The standard deviation value is 11.43% which shows presence of moderate INF variation from mean ranges amid 0.39% and 23.25% in each year from 2000-2016.

Unemployment rate (UER) is proxy annual percentage of unemployed workforce. Its mean value is 8.37% which reveals on average unemployed workforce during this study period. Maximum UER 52.22% was occurred during year 2015 whereas minimum UER 5% was occurred during the year 2013. The standard deviation is 11.03% reveals fewer unemployed workforce dispersion from average UER ranges amid -2.66% and 19.4% during each year under investigations.

4.4. Correlation Analysis among Dependent and Independent Variables

Correlation is association amid two or more variables. It measures strength or degree of linear association amid two variables (Gujarati, 2004). Correlation coefficent of two varaiables fluctuates amid +ve 1(perfect positive relationship) and -ve 1(perfect negative relationship). If it expressed interms of y and x axis, correlations shows y and x are correlated if y and x can be handled by symmetrical method. However, it doesn't imply change in x influence changes in y and vice versa. Instead it indictates presence of linear relationship between two varaiables and their movement. Hence, their average mean assocaites with correlation coefficient (Brooks, 2008). Table 4.6 below shows correlation matrix between depedent and independent variables of this study as ensued.

Table 4.6. Correlation Matrix between Dependent and Independent Variables

	L_1	L_2	BSIZE	CAP	GDP	INF	IRLA	IRM	MMIR	NBBP	NPLA	ROA	UER
L_1	1	0.9097	(0.3344)	0.0713	(0.0248)	0.1126	(0.4077)	(0.1991)	(0.1879)	(0.3077)	0.3386	(0.1139)	(0.2778)
L_2	0.9097	1	(0.2188)	(0.0582)	(0.0172)	0.1154	(0.4129)	(0.4280)	(0.2142)	(0.3211)	0.4991	(0.0558)	(0.2718)

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

4.4.1. Dependent Variable Measurement Models Correlation

This study dependent variable, CBs' liquidity, measured by model L_1 and L_2 are, Table 4.6 above, perfectly and strongly correlated at 0.9097 implies these two liquidity measurement models have strong and same average mean relationship because they are both liquidity position indicators tools for sampled CBs in Ethiopia during the period from 2000-2016.

4.4.2. Independent Variables Correlation with Dependent Variable

Independent variables, Table 4.6 above, correlation with dependent variable are presented by classifying into bank specific, industry specific and macroeconomic variables as ensued.

4.4.2.1. Bank specific independent variables correlation with dependent available (Table 4.6)

Amongst bank specific variables, BSIZE and ROA are negatively correlated with CBs' liquidity measured by model L_1 and L_2. The CBs' size measured by LnTOA is negatively correlated with correlation coefficient value of -0.3344 and -0.2188 with their liquidity in Ethiopia measured by model L_1 and L_2 respectively. This indicates perfect negative relationship between them and suggests that when BSIZE increases CBs' liquidity level will deceases.

The profitability measured by return on assets ratio is negatively correlated with correlation coefficient value of -0.1139 and -0.0558 with CBs' liquidity measured by model L_1 and L_2 respectively. This indicates there are perfect negative relationship between them. This suggests a decrease in ROA will lead into a decrease in CBs' liquidity in same direction which means they have direct relationship when ROA increases then their liquidity will deceases.

The capital adequacy (CAP) has positive and negative correlation with correlation coefficient value of 0.0713 and -0.0582 with CBs' liquidity measured by model L_1 and L_2 respectively. The positive correlation by model L_1 implies when capital strength increases then CBs' liquidity will deceases implying that capital has weak correlations with liquidity in opposite direction and however, the

negative correlation by model L_2 indicates when capital strength decreases liquidity increases showing strong negative correlation between them in same direction.

The non-performing loans and advances (NPLA) is correlate positively with correlation coefficient value of 0.3386 and 0.4991 to CBs' liquidity measured by model L_1 and L_2 respectively. This suggests strong inverse relationship amid them implies when NPLA increases liquidity position decreases.

4.4.2.2. Industry Specific Independent Variables Correlation with Dependent Variable (Table 4.6)

This study part discourses IRM, IRLA, MMIR and NBBP as industry specific independent variables correlation with CBs' liquidity in Ethiopia. So, IRM, IRLA, MMIR and NBBP are negatively correlate with correlation coefficient values of -0.1991 and -0.4280, -0.4077 and -0.4129, -0.1879 and -0.2142 and -0.3077 and -0.3211 with CBs' liquidity in Ethiopia measured by model L_1 and L_2 respectively. These results indicates when all industry specific variables deceases CBs' liquidity increases by implying there are direct negative relationship between them.

4.4.2.3. Macroeconomic Variables Correlation with Dependent Variable

This part discourses GDP, INF and UER as macroeconomic variables that independently correlate with CBs' liquidity in Ethiopia. Thus far, GDP and UER with correlation coefficient value of -0.0248 and -0.0172 and -0.2778 and -0.2718 are negatively correlate with CBs' liquidity measured by model L_1 and L_2 respectively. These results reveals that when GDP and UER decrease liquidity will increases by implying there are direct negative relationship between them. Whereas INF with correlation coefficient value of 0.1126 and 0.1154 is positively correlate with CBs' liquidity in Ethiopia by implying inverse relationship among them towards same direction meaning when INF raises up liquidity also raise up.

4.5. Regression Analysis Results Presentation, Discussion and Summary

In this part, results, discussions and summary of fixed effect multiple regression analysis model results are presented by relating this study findings with theoretical literature and empirical study results under three sub headings hereunder.

4.5.1. Regression Analysis Models and Results of Variables Presentation, Discussions and Summary

Regression analysis is the study of dependent variable reliance on one or more explanatory variables to estimate population mean or average value of the former in terms of known or fixed (repeated sampling) values of the latter. It helps to estimate sample regression function (SRF) and draw inferences about population regression function (PRF) (Gujarati, 2004).

Determinants of CBs' Liquidity measured by Model L_1

The empirical model L_1 is used for identifying and examining statistically significant determinants of CBs' liquidity measured by Liquid Assets to Deposit plus Short Tem Borrowing ratio (L_1) as:

$$L_{1i,t} = \alpha_i + \beta_1(BCAP_{i,t}) + \beta_2(BSIZEi,t) + \beta_3(NPLA_{i,t}) + \beta_4(ROA_{i,t}) + \beta_5(IRM_t) + \beta_6(IRLA_t) + \beta_7(MMIR_t) + \beta_8(NBBP,_{Dt}) + \beta_9(GDP_t) + \beta_{10}(INF_t) + \beta_{11}(UER_t) + \delta_i + \varepsilon_{i,t} \ldots\ldots (Model\ L_1)$$

Where, Beta **(β)** reveals each independent variables influential level on dependent variable with coefficient value either positive or negative. Model L_1 regression results is presented as ensued.

Table 4.5.1. CBs' Liquidity Regression Results Measured by Model L_1

Dependent Variable: L_1

Total panel (balanced) observations: 119 (118 after adjustments)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.285884	0.102859	2.779384	0.0065
CAP	0.655642	0.305357	2.147131	0.0341**
BSIZE	-0.030931	0.011724	-2.638166	0.0096***
GDP	0.302620	0.319981	0.945743	0.3465
ROA	-2.560181	1.044718	-2.450595	0.0159**
INF	0.255169	0.088950	2.868684	0.0050***
IRLA	1.623801	0.823105	1.972775	0.0512*
IRM	-0.985092	0.542584	-1.815557	0.0723*
MMIR	-0.995579	1.520583	-0.654735	0.5141
NBBP	-0.076984	0.027210	-2.829186	0.0056***
UER	-0.028863	0.086868	-0.332262	0.7404
NPLA	0.809242	0.245992	3.289705	0.0014 ***
R-squared ($\mathbf{R^2}$)	0.605489			
Adjusted R-squared ($\mathbf{R^2}$)	0.560402			
F-statistic	13.42934	Durbin-Watson stat		1.969785
Prob. (F-statistic)	0.000000			

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

Sources: Sampled CBs Financial Statements and E-views 8 computation

Table 4.5.1 above reveals that regression analysis results of determinants of CBs' liquidity (L_1) measured by Liquid Assets to Deposit plus Short Tem Borrowing ratio and explanatory variables which includes bank specific, industry specific and macroeconomic factors for seven sampled CBs in Ethiopia for the period covering from 2000-2016.

In this regression result, **P-**value shows the percentage of significance or insignificance level of each variables, $\mathbf{R^2}$ values shows explanatory power of the model and **adjusted** $\mathbf{R^2}$ value shows that loss of degree of freedom related with addition of extra variables included to observe explanatory power of the model. So, model L_1 regression analysis results between dependent variable (CBs' liquidity) and independent variables (CAP, BSIZE, NPLA, ROA, IRM, IRLA, MMIR, NBBP, GDP, INF and UER) relationships are discoursed by regression estimation equation as ensued:

$$L_1 = 0.285884 + 0.655642*CAP_{it} - 0.030931*BSIZE_{it} - 0.809242*NPLA_{it} - 2.560181*ROA_{it} - 0.985092*IRM_t + 1.623801*IRLA_t - 0.995579*MMIR_t - 0.076984*NBBP_{Dt} + 0.302620*GDP_t + 0.255169*INF_t - 0.028863*UER_t$$

Model L_1 R-squared (R^2) Interpretation

R-squared ($\mathbf{R^2}$) in regression result indicates how much explanatory variables entirely included in model are truly explained variations in dependent variables (Brooks, 2008). Thus, its determination coefficient value 0.605489, Tables 4.5.1 above, reveals that 60.55% of CBs' liquidity (L_1) is influenced by CAP, BSIZE, NPLA, ROA, IRM, IRLA, MMIR, NBBP, GDP, INF and UER disparity. Whereas remaining 39.45% of CBs' liquidity (L_1) is influenced by other determinants which are not incorporated in this model. R-squared ($\mathbf{R^2}$) outcome is valid because only eleven bank specific, industry and macroeconomic variables are included in this study.

Model L_1 Adjusted R-squared (R^2) Interpretation

Adjusted R^2 is modification of R-squared which shows loss of freedom degree association because of extra variable additions in model's explanatory power observations (Brooks, 2008). It helps to conclude how much dependent variable explained by independent variables in this study. Accordingly, outcome value 0.560402 shows 56.04% loss of freedom degree is associated with satisfactory level meaning that approximately 56.04% of CBs' liquidity volatility is explained by independent variables volatilities while remaining 43.96% is not explained by model L_1. Model L_1 explanatory power is high because F-

statistics value is 13.42934 with overall significance measurement of p-value 0.000000. The p-value of F-statistics is zero at six digits so model L_1 is significant at 1% confidence level.

Table 4.5.1 above reveals amidst independent variables BSIZE and NBBP negatively and INF and NPLA positively and statistically significant at 1% confidence level, CAP positively and ROA negatively and statistically significant at 5% confidence level, IRLA positively and IRM negatively and statistically significant at 10% confidence level are influencing CBs' liquidity (L_1) in Ethiopia. Independent variables like GDP, MMIR and UER have statistically insignificant influence on CBs' liquidity (L_1). Yet, BSIZE, NPLA, IRLA, MMIR, GDP and INF coefficient signs are opposite whereas CAP, ROA, IRM, NBBP and UER coefficient signs are synonymous with expectations.

Determinants of CBs' Liquidity Measured by Model L_2

This study empirical model L_2 is used to identify and examine statistically significant determinants of CBs' liquidity in Ethiopia measured by Liquid Assets to Total Assets ratio (L_2) as:

$$L_{2i,t} = \alpha_i + \beta_1(BCAP_{i,t}) + \beta_2(BSIZEi,t) + \beta_3(NPLA_{i,t}) + \beta_4(ROA_{i,t}) + \beta_5(IRM_t) + \beta_6(IRLA_t) + \beta_7(MMIR_t) + \beta_8(NBBP,_{Dt}) + \beta_9(GDP_t) + \beta_{10}(INF_t) + \beta_{11}(UER_t) + \delta_i + \varepsilon_{i,t} \ldots\ldots (Model\ L_2)$$

Table 4.5.2. CBs' Liquidity Regression Result Measured by Model L_2

Dependent Variable: L_2

Total panel (balanced) observations: 119

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.559339	0.081545	6.859246	0.0000
CAP	0.169521	0.268037	0.632455	0.5284
BSIZE	-0.047725	0.010040	-4.753512	0.0000***
GDP	0.192873	0.283200	0.681050	0.4973
ROA	0.171274	0.909506	0.188315	0.8510
INF	0.278694	0.078040	3.571191	0.0005***
IRLA	1.827444	0.719193	2.540965	0.0125**
IRM	-2.116794	0.479515	-4.414444	0.0000***
MMIR	-2.684155	1.314321	-2.042237	0.0436**

NBBP	-0.012110	0.023415	-0.517169	0.6061
UER	-0.066853	0.076116	-0.878306	0.3817
NPLA	1.400663	0.208706	6.711192	0.0000***
R-squared (R^2)	0.551911			
Adjusted R-squared	0.505846			
F-statistic	11.98110	Durbin-Watson stat		1.121818
Prob(F-statistic)	0.000000			

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

Sources: Sampled CBs Financial Statements and E-views 8 computation

The above table 4.5.2 reveals the regression analysis results of determinants of CBs' liquidity (model L_2) in Ethiopia measured by Liquid Assets to Total Assets ratio and explanatory variables which includes bank specific, industry specific and macroeconomic factors for seven sampled CBs in Ethiopia for the period covering from 2000-2016. So, model L_2 regression analysis results between dependent variable (CBs' liquidity) and independent variables (CAP, BSIZE, NPLA, ROA, IRM, IRLA, MMIR, NBBP, GDP, INF and UER) relationships are discoursed regression estimation equation as ensued:

$$L_2 = 0.559339 + 0.169521*CAPit - 0.047725*BSIZEit + 1.400663*NPLAit + 0.171274*ROAit - 2.116794*IRMt + 1.827444*IRLAt - 2.684155*MMIRt - 0.012110*NBBP_{Dt} + 0.192873*GDPt + 0.278694*INFt - 0.066853*UERt$$

Generally, Table 4.5.1 and 4.5.2 above, liquidity measurement models L_1 and L_2 are comparable and similar in providing same result by measuring liquidity level and its risk exposure of CBs. Whereas, they are different in their denominator. Model L_1, Liquid Asset to Deposit plus Short Term Borrowing ratio, reveals level of liquid assets to meet short term obligations and commitments on demand. On the other hand, model L_2, Liquid Asset to Total Assets ratio, reveals amount of liquid assets in total assets of sampled CBs in Ethiopia for time span from 2000-2016.

Model L_2 R-squared (R^2) Interpretation

The R-squared (**R^2**) determination coefficient value 0.551911, Tables 4.5.2 above, shows 55.19% CBs' liquidity (L_2) is influenced by CAP, BSIZE, NPLA, ROA, IRM, IRLA, MMIR, NBBP, GDP, INF and UER variations. Whereas remaining 44.81% of CBs' liquidity (L_2) is influenced by other determinants

that are not incorporated in this model. R-squared (R^2) outcome is valid because only eleven bank specific, industry and macroeconomic variables are included this study.

Model L_2 Adjusted R-squared (R^2) Interpretation

Adjusted R-squared regression result value 0.505846 indicates 50.58% loss of freedom degree is associated with satisfactory level implying that approximately 50.58% CBs' liquidity volatility is explained by independent variables volatilities and remaining 49.42% is not explained by model L_2. So, 50.58% of sampled CBs' liquidity (L_2) is influenced by CAP, BSIZE, NPLA, ROA, IRM, IRLA, MMIR, NBBP, GDP, INF and UER disparity. Whereas remaining 49.42% liquidity (L_2) is influenced by other determinants not yet incorporated in model L_2. This model explanatory power is high because F-statistics value is 11.98110 with overall significance measurement p-value of 0.000000. P-value of F-statistics is zero at six digits. So, model L_2 is significant at 1% confidence level.

Therefore, Table 4.5.2 above, amidst independent variables BSIZE and IRM negatively and INF and NPLA positively and statistically significant at 1% confidence level are influencing CBs' liquidity (L_2) in Ethiopia. Whereas IRLA positively and MMIR negatively and statistically significant at 5% confidence level are influencing CBs' liquidity (L_2) in Ethiopia. Nonetheless, independent variables like CAP, ROA, GDP, NBBP and UER have statistically insignificant influence on CBs' liquidity (L_2) in Ethiopia. But, the coefficient sign of BSIZE, ROA, NPLA, IRLA, MMIR, GDP and INF are opposite while CAP, IRM, NBBP and UER coefficient signs are identical with this study expectations as measured by Model L_2.

4.5.2. Regression Analysis Result of Independent Variables Presentation, Discussions and Summary

Under this part, the relationship amid dependent variable and independent variables are discourse based on this study findings. CBs' liquidity, dependent variable, is measured by Liquid Assets to Deposit and Short Term Borrowing (L_1) and Liquid Assets to Total Assets (L_2) ratios. Hence, a relationship among CBs' liquidity and independent variables regression analysis results are conferred briefly by categorizing into bank specific, industry specific and macroeconomic variables as ensued.

4.5.2.1. Bank Specific Variables Regression Analysis Results Presentation, Discussions and Summary

Capital adequacy (CAP) and CBs' Liquidity (Table 4.5.1 and 4.5.2)

In this study, sampled CBs' capital is measured by equity capital to total assets ratio. It was hypothesized that capital adequacy influence positively and significantly CBs' liquidity in Ethiopia. Thus, as fixed effect multiple regression analysis model result reveals, CAP is positive and statistically

significant influence at 5% confidence level on CBs' liquidity in Ethiopia measured by model L_1. The positive coefficient sign value 0.655642 indicates existence of positive relationship among CAP and CBs' liquidity, Table 4.5.1 above, which implies when CAP increases by 1 birr CBs' liquidity increases by 0.66 cents by keeping all other variables constant.

Therefore, positive relationship amid CAP and CBs' liquidity is consistent with assumption of CBs having reliable CAP will have reliable liquidity as per risk absorption theory. It is also in light of this study hypothesis (H_1) and Singhn and Sharma (2016), Raeis et al (2016), Fekadu (2016), Fola (2015), Moussa (2015), Mugenyah (2015) and Vodova (2013) on Czech and Slovak and Hungarian CBs finding results. On the other hand, capital adequacy has positive and statistically insignificant influence on CBs' liquidity in Ethiopia with coefficient value 0.169521 with p-value 0.5284, Table 4.5.2 above, measured by model L_2. Positive coefficient sign indicates existence of positive relationship among CAP and CBs' liquidity measured by model L_2 implying that when CAP power increases by 1 birr liquidity increases by 0.17 cents insignificantly by keeping, all other variables constant. Insignificance relationship between CAP and liquidity may be when the former increase by 1 birr the later increase nearer to zero minimally due to presence of smaller liquid assets in total asset components, much more illiquidity or more long term investments existence in each sampled CBs. CAP statistically and insignificantly influence CBs' liquidity result is contrary to this study hypothesis (H_1) but has identical positive coefficient sign with expectation under model L_2. So, hypothesis that stated capital adequacy has positive and statistically significant influence on CBs' liquidity in Ethiopia is rejected as per model L_2.

Thus, CAP has positive and statistically significant influence on CBs' liquidity measured by model L_1, Tables 4.5.1 above, is consistent with this study hypothesis (H_1) is not rejected whereas CAP has positive and statistically insignificant influence on CBs' liquidity measured by model L_2 , Table 4.5.2 above, is contrary to this study hypothesis (H_1) is rejected.

Bank Size (BSIZE) and CBs' Liquidity (Table 4.5.1 and 4.5.2)

Bank size is proxy natural logarithm of total assets (LnTOA) and hypthesized(H_2) it has positive and statistically significant influence on CBs' liquidity in Ethiopia. But, the result reveals BSIZE has negative and statistically significant at 1% confidence level influence on CBs' liquidity in Ethiopia with coefficient value -0.030931and -0.047725 with p-value 0.0096 and 0.0000 measured by model L_1 and L_2 respectively. The negative coefficient sign in both models shows existence of opposite association

among BSIZE and liquidity. These results shows one birr increase in BSIZE lead into 0.03 and 0.05 cents decrease in liquidity measured by model L_1 and L_2 respectively, all other variables constant.

So, this study findings are consistent with "too big to fail" hypothesis which assumes if big CBs consider themselves as big they may fail holding enough liquid assets. According to Iannotta et al (2007) arguments with "too big to fail" big CBs can access inherent guarantee advantage like easy deposit mobilization, money market financing and reduce funding cost by investing in risky assets. Thus, CBs status at "too big to fail" may push them to moral hazard behavior, take unnecessary risk exposures and depend on Lender of the Last Resort for liquidity support during liquidity shortage (Vodova, 2011). Then, this study regression result of model L_1 and L_2 are in line with Singhn and Sharma (2016), Yimer (2016), Melese and Laximikantham (2015), Berihun (2015),Vodová (2013) on Czech and Slovak CBs, Vodova(2013) on CBs in Poland, Vodova (2013) on CBs in Hungary, Choon et al (2013), Karlee et al (2013), Vodová (2011) on CBs in Czech and others studies.

By and large, regression results of model L_1 and L_2 indicates CBs' liquidity in Ethiopia decreases when BSIZE increases. Thus, the hypothesis (H_2) that states bank size has positive and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Non-Performing Loans and Advances (NPLA) and CBs' Liquidity (Table 4.5.1 and 4.5.2)

Non-performing loans and advances is proxy provision for loan losses to total outstanding loans and adavnces ratio and hypothsized (H_3) that percentage share of non-performing loans and advances in total loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia. Regression analysis result reveals NPLA has positive and statistically significant at 1% confidence level influencing CBs' liquidity with coefficient value 0.809242 and 1.400663 with p-value 0.0014 and 0.0000 measured by model L_1 and L_2 respectively. The positive coefficient signs indicates existence of positive relationship between NPLA and CBs' liquidity in Ethiopia measured by model L_1 and L_2 respectively. The NPLA positive and statistically significantly influence on CBs' liquidity is contrary to this study hypothesis (H_3) in terms of sign.

Therefore, these results indicates that 1% change in NPLA will has 80.9% and 140.1% change in CBs' liquidity measured by model L_1 and L_2 respectively, by keeping all other variables constant. These findings of positive relationship between NPLA and liquidity reveals that when CBs have massive NPLA, they may refrain from extending loans and advances to borrowers. Their holding more liquidity

have opportunities costs and low return. Increase in NPLA measures assets quality may significantly influence the whole banking industry. When NPLA is enormous, it shows illiquidity and banking industry efficiency problem in turn lead banking system to failure by reducing liquidity through loss of depositors and financiers confidence. NPLA has positive and statistically significant influence on CBs' liquidity in Ethiopia is consistent with Yimer (2016), Rafique and Malik (2013), Choon et al (2013), Hailu (2013), Tesfaye (2012), Vodová (2011) and others studies whereas contrary to this study expectation (H_3). This hypothesis (H_3) that stated percentage share of NPLA in total loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Profitability (ROA) and CBs' liquidity (Table 4.5.1 and 4.5.2)

Profitability of CBs is proxy measured by return on assets and hypothesized (H_4) that profitability has negative and statistically significant influence on CBs' liquidity in Ethiopia. Yet, the regression analysis result reveals that ROA has negatively and statistically significant at 5% confidence level infulence on CBs' liquidity in Ethiopia with coefficinet value -2.560181 with p-value 0.0159 measured by model L_1, Table 4.5.1 above. The negative coefficinet sign reveals existance of negative relationship amongst profitability and CBs liquidity measured by model L_1. It implies that 1% change in ROA result in 256% deacrses liquidity, keeping all other variables constant. This result is consistent with this study expecation (H_4), finance theory assumptions,Vodova (2011) and Berger and Bouwman (2009). In accordance with finance theory, ROA is neagtively associate with CBs' liquidity in agreement with Goddard et al (2004) arguments that state liquid assets holding enforces CBs for opportunity costs to arises because they earn low return from its holding by showing inverse association among ROA and CBs' liquidity. So, this study regression result indicates ROA negative and statistical signifiacntly infulence on CBs' liquidity is supported by previous researchers' empirical findings and theroretical arguments and so failed to reject this study hypothesis (H_4) with respect to model L_1.

On the other hand, the regression analysis result reveals that ROA has positive and statistically insignificant infulence on CBs' liquidity in Ethiopia with coefficinet value 0.171274 with p-value 0.8510 measured by L_2 model, Table 4.5.2 above, is contrary to this study expectation and finance theory assumptions. This shows 1% change in ROA lead into 17.13% change in CBs' liquidity in Ethiopia in same direction, by keeping all other varaible constant. Hence, positive relationship between ROA and CBs' liquidity indicates that an increase in the former will increase the later. Loans and advances are main sources of CBs' profitability which encourage for high volume lending to earn high

profit. And thus, they increase loans and advances provission (long term illiquid assets), however, will deceases their liquid assest exposure in opposite direction. The contrasting infulence of CBs' liquidity assets increases was stated that "although more liquid assets increase the ability to raise cash on short-notices, they also reduce the ability of management to commit credibly an investment startegy that protects investors" which ultimatly reduce CBs capacity to raise external finance. More generally, the regression anlysis result of model L_1 is consistent with this study expectations (H_4), Fola (2015), Vodova (2013) CBs in Poland and Vodova (2012) CBs in Slovakia. So, this study hypothesis (H_4) that states profitability has negative and statistically significant influence on CBs' liquidity is not rejected.

Model L_2 regression anlysis result is inconsistent with expectation (H_4) but in agreement with Elahi (2017), Fekadu (2016), Yimer (2016), Melese and Laximikantham (2015), Choon et al (2013), Karlee et al (2013), Vodova (2013) and Vodová (2012) findings. So, this study hypothesis (H_4) that states profitability has negative and statistically significant influence on CBs' liquidity is not rejected.

4.5.2.2. Industry Specific Variables Regression Analysis Results Presentation, Discussions and Summary

Interest Rate Margin (IRM) and CBs' liquidity (Table 4.5.1 and 4.5.2)

Interest rate margin is proxy difference between interest income from loan and advances as percentage of the total loan and advances and the interest paid out on deposit as a percentage of total deposits or net interest income to total outstanding loans and advances ratio and hypothesized that interest rate margin has negative and statistically significant influence on CBs' liquidity in Ethiopia. The regression analysis results indicates IRM has negative and statistically significant at 10% and 1% confidence level influence on CBs' liquidity in Ethiopia with coefficient value -0.985092 and -2.116794 and p-value 0.0723 and 0.0000 measured by model L_1 and L_2 respectively, consistent with expectations (H_7). The negative coefficient sign values shows 1% change in IRM may lead into 98.5% and 211.7% change in CBs' liquidity measured by model L_1 and L_2 respectively in opposite direction, all other variables constant. The negative IRM impact on CBs' liquidity reveals low IRM discourage CBs involvement in loaning, paying more interest expenses for money savers and hence, vulnerability for holding low return more liquid assets. It is opposite to liquidity prefrence theory which stated money lenders requiure high IRM.

Generally, this study finding result is in agreement with Elahi (2017), Vodova (2013) on CBs in Hungary, Vodova (2013) on CBs in Poland, Tesfaye (2012) and Vodová (2012) on CBs in Poland

findings. And hence, the hypothesis (H_5) that states interest rate margin has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Interest Rate on Loans and Advances (IRLA) and CBs' liquidity (Table 4.5.1 and 4.5.2)

Interest rate on loans and advances is proxy percentage of interest rate on loans and advances to total outstanding loans and advances. It was hypothesized (H_6) that interest rate on loans and advances has negative and statistically significant influence on CBs' liquidity in Ethiopia. Regression analysis result reveals that IRLA has positive and statistically significant at 10% and 5% confidence level influence on CBs' liquidity in Ethiopia with coefficient value 1.623801 and 1.827444 with p-value 0.0512 and 0.0125 measured by model L_1 and L_2 respectively and yet, not in agreement with this study expectation in terms of sign whereas consistent in terms significance. These positive coefficient signs in both models implies that 1% increase in IRLA may significantly increase 162.38 % and 182.74% of CBs' liquidity in Ethiopia measured by model L_1 and L_2 respectively. This direct positive relationship happen when CBs increase IRLA then their borrowers may not offer loans and advances from them as a result of which large amount of loans and advances (illiquid assets) delivery may decreases and hence, they holding large volume liquidity. However, the positive relationship between IRLA and CBs' liquidity is contrary to finance theory which states increase in IRLA motivate CBs to involve more in lending activities as a result they reduce liquid assets holding quota. So, this study findings are consistent with expectation (H_6), Berihun (2015), Malik and Rafique (2013), Vodova (2013) on CBs in Hungary, Vodova (2013) on CBs in Poland, Munteanu (2012) and Vodová (2011) findings. Yet, hypothesis that states IRLA has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Money Market Interest Rate (MMIR) and CBs' liquidity (Table 4.5.1 and 4.5.2)

Money market interest rate is proxy annual weighted average interest rate on Treasury Bills (TB) and hypothesized that MMRI has positive and statistically significant influence on CBs' liquidity in Ethiopia. Though, this study regression analysis results reveals that MMRI has negative and statistically insignificant and significant at 5% confidence level influence on CBs' liquidity with coefficient value -0.995579 and -2.684155 with p-value 0.5141 and 0.0436 measured by model L_1 and L_2 respectively. The result is contrary with expectation (H_7) measured by model L_1 whereas consistent as measured by model L_2. Negative coefficient sign reveals 1% increase in MMIR may lead to 99.6% and 268.4% decrease in CBs' liquidity measured by model L1 and L2 respectively. When MMIR increase CBs may encourage investing more on money market TBs which push them for depressing liquidity and vulnerability for

liquidity risk. So, the negative coefficient sign in both model L_1 and L_2 indicates that MMIR on TBs has opposite relationship with CBs' liquidity and also opposite to theory that states high MMIR encourage CBs to invest more on money market instruments for enhancing liquidity. So, this study results are in agreement with expectations (H_7), Subedi and Neupane (2013), Vodova (2013) on CBs in Hungary, Tesfaye (2012) and Lucchetta (2007) findings. Thus, hypothesis that states money market interest rate has positive and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

National Bank Bill purchase (NBBP) and CBs' liquidity (Table 4.5.1 and 4.5.2)

National bank bill purchase policy is proxy as dummy variable (1 for bill purchase enforcement time periods 0 otherwise) by reason of non-existence periods before policy introduction and unequally applicability amidst private and public CBs like CBE not enforced by the policy. It was hypothesized that NBBP has negative and statistically significant influence on CBs' liquidity in Ethiopia. So, the regression analysis results reveals NBBP has negative and statistically significant at 1% confidence level influence on CBs' liquidity with coefficient value -0.076984 and p-value 0.0056 measured by model L_1, Table 4.5.1 above, and consistent with expectation (H_8). But, NBBP has negative and statistically insignificant influence on CBs' liquidity as measured by model L_2 with coefficient value -0.012110 and p-value of 0.6061, Table 4.5.2 above, which is inconsistent with expectation (H_8) of this study.

Therefore, in accordance with model L_1 regression analysis result, one birr investment in NBBP has 7.69 % decrease in CBs' liquidity exposure. But, with regard to model L_2 regression result for one birr investment in NBBP has 1.2% insignificant decease on CBs' liquidity. This may be due to presence of minimal or small amount of loans and advances delivery to borrowers and fewer level of liquid assets and higher total assets amount. Hence, NBBP, except CBE, is enforcing all private CBs to invest on Government bond 27% of their total loans and advances at the rate of 3% interest rate for five years. When need arises, for instance, liquidity problem, they can't access easily and utilize for discharging payment and settlement transactions. They are indebted for 1 birr loans and advances provided to borrowers' 27 cents investment on NBBP government bond. Likewise, this study model L_1 regression analysis results is consistent with Fekadu (2016), Fufa (2016), Sebsebie (2014) and Wolde (2013) findings and hypothesis that stated NBBP has negative and statistically significant influence on CBs' liquidity is not rejected. However, model L_2 result shows that NBBP has negative and statistically insignificant influence on CBs' liquidity is inconsistent.

4.5.2.3. Macroeconomic Variables Regression Analysis Results Presentation, Discussions and Summary

Real gross domestic product growth rate, general inflation rate and unemployment rate are macroeconomic variables that influence CBs' liquidity in Ethiopia as discoursed as ensued.

Real GDP growth rate (GDP) and CBs' liquidity (Table 4.5.1 and 4.5.2)

The GDP is proxy annual real growth rate and hypothesized that real GDP growth rate has negative and statistically significant influence on CBs' liquidity in Ethiopia. Thus, the regression analysis results reveals that GDP has positive and statistically insignificant influence on CBs' liquidity with coefficient value 0.302620 and 0.192873 and with p-value 0.3465 and 0.4973 measured by model L_1 and L_2 respectively. The positive coefficient value implies that a single unit increase in GDP push towards 30.26% and 19.29% units increase in CBs' liquidity measured by model L_1 and L_2 respectively, by keeping all other variables constant. This relationship impact may be due to an increase in nationals' income and economic growth of the country. It may increases the bankability of society through deposit financing to CBs as a result of which their liquidity may increase too. The statistically insignificance association existence may be indicator of increase in nations' economic income has no that much influence surpassing survival income by saving money to CBs. When excess income is utilized for consumption CBs deposit gathering sachems may decreases liquidity creation and holding.

However, the finding results are inconsistent with this study expectation (H_9) but in agreement with Fekadu (2016), Yimer (2016), Fola (2015), Chagwiza (2014), Vodová (2013) on CBs in Hungary, Vodova (2012) on CBs in Slovakia, Munteanu (2012), Tesfaye (2012) and Vodová (2011) on CBs in Czech findings. Therefore, this study hypothesis (H_9) that states GDP has negative and statistically significant influence on CBs' liquidity in Ethiopia is rejected.

General Inflation rate (INF) and CBs' liquidity (Table 4.5.1 and 4.5.2)

The general inflation rate of the country is proxy annual general Consumer Price Index (CPI) and hypothesized that general inflation rate has negative and statistically significant influence on CBs' liquidity in Ethiopia. Thus, the regression analysis result reveals that general INF has positive and statistically significant at 1% confidence level influence on CBs' liquidity with coefficient value 0.255169 and 0.278694 with p-value 0.0050 and 0.0005 measured by model L_1 and L_2 respectively contrary in terms of sign but consistent in terms of significance with this study expectation (H_{10}). These positive coefficient sign implies existence of positive relationship between general INF and CBs' liquidity in Ethiopia. Yet, 1% change in general INF have 25.52 % and 27.87 % change in CBs'

liquidity as measured by model L_1 and L_2 respectively, by keeping all other variables constant, in same direction. When prices of goods and services increase then CBs interest rate may increase substantially while purchasing power of money decreases as well. They may be pressurized to mobilize more deposit from the public as a result they may encourage for more liquidity creation but fear investing more for long term. When general INF increase CBs' liquidity increases. The positive relationship amid general INF and CBs' liquidity is in accordance with the theory that states during inflationary economy period CBs refrain from long term investment and prefer holding risk free liquid asset, providing small amount of loans and advances and investing on most profitable short term money market instruments through an economic agents to increase their liquidity instantaneously.

However, findings are consistent with this study expectation (H_{10}) in terms of significance with Yimer (2016), Singhn and Sharma (2016), Raeis et al (2016), Fola (2015), Vodova (2013) on CBs in Poland and Tesfaye (2012) findings. So, this study hypothesis (H_{10}) that states general INF influence has negative and statistically significant influence on CBs' liquidity in Ethiopia is not rejected.

Unemployment (UER) and CBs' liquidity (Table 4.5.1 and 4.5.2)

An unemployment rate (UER) is proxy annual workforce unemployment rate percentage of the country and hypothesized as UER has negative and statistically significant infulence on CBs' liquidity in Ethiopia. Thus, regression analysis result portrays that UER has negative and statistically insignificant infulence on CBs' liquidity contrary to this study expectation (H_{11}). The negative coeficinet sign -0.028863 and -0.066853 with p-value 0.7404 and 0.3817 measured by model L_1 and L_2 repectively implies that existance of negative relationship between UER and CBs' liquidity with minimal impact. Hence, 1% increase in UER will have 2.89% and 6.69% decreases in CBs' liquidity. This may be because when unemployed workforce of the country increase from time to time and failed creating new job opportinities, no one depositor save money in the CBs. So, they can't easily create liquidity through deposit mobilzation schem and can't distribute liquidity adeqautely. Perhaps, high UER may decreases capital and liquidity ceation activities of CBs during distressed economic situations as well.

Thus, this study findings are consistent with negative coefficient sign whereas inconsistent interms of insignificance level with expectation (H_{11}). On the other hand, findings are consistent with Singhn and Sharma (2016), Bhati et al (2015), Vodova (2013) on CBs in Hungary, Munteanu (2012) and Vodova (2012) on CBs in Slovak findings. So, hypothesis (H_{11}) that states UER has negative and statistically significant infulence on CBs' liquidity in Ethiopia is rejected.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter provides summary of major findings, conclusion and recommendations of the findings discussed in the preceding chapters. It also highlights gaps for future research works.

5.1. Major Findings' Summary

This study was regressed dependent variable, CBs' liquidity and independent variables: Bank specific (capital adequacy (CAP), bank size (BSIZE), non-performing loans and advances (NPLA) and return on assets (ROA)), Industry specific (interest rate margin (IRM), interest rate on loans and advances (IRLA), money market interest rate (MMIR) and national bill purchase policy (NBBP)) and Macroeconomic variables (real Gross Domestic Product growth rate (GDP), general inflation rate (INF) and unemployment rate (UER)) of sampled seven CBs for time span 2000-2016 by employing E-view 8 econometric software. Balanced panel data descriptive statistics, correlation analysis and fixed effect model (FEM) multiple regression analysis were employed on sampled CBs using model L_1 and L_2. Hence, the findings revealed that CAP, BSIZE, NPLA, ROA, IRM, IRLA, MMIR, NBBP and INF are found to be statistically significant. This reveals that all these variables are key determinants of CBs' liquidity in Ethiopia. Whereas GDP and UER are found to be statistically insignificant influence.

5.2. Conclusions

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

- Capital Adequacy (CAP) has positive and statistically significant influence at 5% confidence level on CBs' liquidity in Ethiopia. This positive relationship reveals when capital increases the liquidity may also increase, all other factors constant. It is consistent with the assumption that states CBs' having reliable capital will have reliable liquidity. So, it can be concluded that when CBs' have adequate capital they can create, distribute and hold enough liquidity by considering capital as buffer and financing means.
- Bank size (BSIZE) has negative and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. This reveals existence of opposite association among BSIZE and CBs' liquidity in Ethiopia subject to "too big to fail" hypothesis. Big CBs consider themselves as big and

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

- Non-performing loans and advances (NPLA) has positive and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. NPLA and liquidity have direct positive relationship by revealing that when CBs have massive NPLA amount, they may refrain from spreading loans and advances to borrowers and hold more low return liquidity with high opportunities costs. When NPLA is enormous, it shows illiquidity, efficiency problems and liquidity position reduction of CBs which in turn lead to bank run and banking industry and financial system failure. It can be conclude that increase in NPLA will significantly influence CBs, banking industry and financial system.
- Profitability (ROA) has negative and statistically significant influence at 5% confidence level on CBs' liquidity in Ethiopia. This reveals ROA and liquidity have negative relationship implying significant increase in ROA lead into significant decrease in CBs' liquidity in Ethiopia, all other variables constant. Holding liquid assets enforces CBs for high opportunity costs and earn low return. Therefore, it can be conclude that ROA influence negatively CBs' liquid assets holding.
- Interest rate margin (IRM) has negative and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. This reveals IRM and CBs' liquidity have negative relationship. This implies low IRM may discourage CBs from spreading loans and advances and make them paying more interest expenses to money savers. There is also vulnerability for holding low return more liquid assets opposite to liquidity preference theory that states lenders require high IRM. So, it can be concluded that low IRM influence negatively CBs lending and increase liquidity holding costs.
- Interest rate on loans and advances (IRLA) has positive and statistically significant influence at 10% and 1% confidence level on CBs' liquidity in Ethiopia. This shows interest rate on loans and advances (IRLA) and CBs' liquidity have positive relationship by implying that an increase of the former significantly increase the later. When CBs increase IRLA, borrowers may not be welling to borrow loans and advances from them. As a result loans and advances deliver will decreases and hence, they will hold high opportunity cost and low return assets more liquidity. Hence, it can be concluded that increase in IRLA significantly increase CBs' liquidity holding.

- Money market interest rate (MMIR) has negative and statistically significant influence at 10% and 5% confidence level on CBs' liquidity in Ethiopia. This shows MMIR and CBs liquidity have negative relationship by implying that increase of the former will decrease the later. In this case when MMIR increases, CBs may encouraged investing more on money market TBs which push them depresses their liquidity position and vulnerability to liquidity risk. So, it can be concluded that increase in MMIR may weaken CBs' liquidity position and vulnerability for liquidity risk.
- National bank bill purchase (NBBP) policy has negative and statistically significant influence at 1% confidence level on CBs' liquidity in Ethiopia. This reveals NBBP and CBs' liquidity have negative relationship by implying investment increase in the former lead into decrease in the later. NBBP, except CBE, is enforcing all private CBs to invest on Government bond 27% of total loans and advances at the rate of 3% interest rate for five years. And also when need arises, for instance, liquidity problem, they can't access easily and utilize for discharging payment and transaction settlement purposes. Thus, it can be concluded that NBBP may deceases CBs' liquidity position.
- General inflation rate (INF) has positive and statistically significant influence at 1% confidence level on CBs' liquidity. This revels that when goods and services prices increases then interest rate increase and at the same time purchasing power of money decreases. CBs may be pressurized to mobilize more deposit from the public and they also motivate to create more liquidity but may fear investing for long term periods. Similarly, during inflationary economy period they refrain from long term investment, prefer holding risk free liquid asset, provide small amount of loans and advances and invest in short term money market instruments through an economic agents and then CBs increase liquidity. It can be concluded that an increase in general INF will increases CBs' liquidity.
- Real GDP growth rate has positive and statistically insignificant influences on CBs' liquidity in Ethiopia. This positive relationship may arises when countrywide income increase together with economic growth bankable citizen will increases depositing to CBs through which liquidity may increase largely. The presence of statistically insignificance relationship may be an indicator of nations' economic income increase which may not adequately surpasses survival incomes to save money to CBs. So, it can be concluded that if excess income is utilized for consumption without made savings then CBs' liquidity creation and holding may not be increased adequately.
- Unemployment rate (UER) has negative and statistically insignificant influence on CBs' liquidity. When unemployed workforce increase from time to time and the country failed creation of new job

opportunities, no one will deposit money in CBs. Therefore, they can't easily access and create liquidity through deposit mobilization and distribute liquidity adequately at required level. Similarly, high UER also decease capital and liquidity creation and distribution activities of CBs during distressed economic situations as well. Thus, it can be conclude that increase in UER will have insignificant impact on CBs' liquidity in Ethiopia.

5.3. Recommendations

Based on major findings of identified and examined determinants of CBs' liquidity in Ethiopia, the ensued possible recommendations can be advisable to CBs' management, NBE, MoFEC, PFEA and further researchers as ensued.

CBs' Management can be advisable to:

- Manage assets and liability by drawing orthodox liquidity management strategy, policy and procedure/guideline to alleviate significant influential factors and maintain reputation, remain competitive and profitable in banking industry.
- Set limit and develop controlling strategy for all liquidity determinants by scanning internal and external environmental under their domain.
- Develop appropriate liquidity measurement tools that can avoid ratios' drawback which enable them to capture shortfalls, respective control and proactive liquidity administration.
- Work in collaboration with NBE to minimize macroeconomic factors that impact liquidity creation, distribution and holding positions.
- Give due attention, particularly private CBs, on NBBP impact on liquidity through monitoring, controlling and making open discussion with NBE, MoFEC and PFEA for increasing bills bond interest rate at least equivalent to deposit rate.
- Provide accurate audited Financial Statements timely that enables to assess liquidity creation, distribution and holding for academicians and consult those as required may be.
- Insist NBE, MoFEC and PFEA establishment of secondary money market that enable to participate and easy liquidity access.
- Manage proactively liquidity risks thoroughly to safeguard themselves and banking industry from unforeseen bankruptcy and run-off.
- Utilize this study output as an input for policy, strategy and procedures development.

NBE can be advisable to:

- Provide guidance on adequate liquidity creation, distribution, positions and its risk management so that CBs can stabilize, enhance and safeguard banking industry from bankruptcy and run-off by managing liquidity determinants.
- Maintain database of all CBs' data/information and avail for researchers to commence study on liquidity determinants.
- Provide equally applicable directives for both public and private CBs to alleviate liquidity problems.
- Build public confidence on banking functions so that they trust CBs operations and work together through depositing, borrowing, smoothen intermediation and transformation of liquidity.
- Establish secondary money market for easy liquidity access from financial market system.
- Set interest rate on TB, loans and advances and deposit to minimize liquidity problems through proper regulations.
- Utilize this study output as an input for policy development and directives issues.

MoFEC and PFEA can be advisable to:

- Establish appropriate strategic policy that facilitate CBs' liquidity creation, distribution and holding position, minimize failure risks and bring prompt banking industry development and growth.
- Draw equally applicable policy for all private and public CBs can increases financial soundness, strength, competiveness, development and growth of liquidity and its risk management.
- Create sustainable economic development and growth that minimize inflation and unemployment rate which enables CBs to create, distribute and hold adequate liquidity.
- Draw policy and give direction to NBE for secondary money market establishment and monitor its implementation.
- Utilize this study output as an input for policy development and provide directives issues.

Further researchers can be advisable to:

- Conduct more study on bank specific, industry specific and macroeconomic determinants of CBs' liquidity by incorporating this study and other banks including Development Bank of Ethiopia, Micro Financial Institutions and Insurance companies in Ethiopia.
- Provide study output to CBs, NBE, MoFEC and PFEA and consult them as require about liquidity.

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APPENDIXIES

APPENDIX A: Raw Input Data

S. No.	Bank Name	Year	Independent Variables											Dependent Variable	
			1	2	3	4	5	6	7	8	9	10	11		
			CAP	NPLA	BSIZE	ROA	GDP	INF	IRLA	IRM	NBBP	MMIR	UER	L1	L2
1	AIB	2000	0.1344	0.0313	6.6320	0.0303	0.0340	0.0536	0.1119	0.0467	0.0000	0.0330	0.0750	0.4135	0.3623
2	AIB	2001	0.1367	0.0339	6.8101	0.0198	0.0742	-0.0035	0.1016	0.0376	0.0000	0.0280	0.0680	0.3854	0.3374
3	AIB	2002	0.1178	0.0377	7.0139	0.0171	0.0163	-0.1057	0.0958	0.0380	0.0000	0.0200	0.0630	0.4108	0.3624
4	AIB	2003	0.1042	0.0550	7.2449	0.0128	-0.0210	0.1092	0.0725	0.0263	0.0000	0.0134	0.0580	0.4391	0.3961
5	AIB	2004	0.1011	0.0772	7.4787	0.0198	0.1173	0.0735	0.0719	0.0271	0.0000	0.0050	0.0540	0.4717	0.4288
6	AIB	2005	0.1042	0.0620	7.7080	0.0247	0.1264	0.0613	0.0729	0.0334	0.0000	0.0010	0.0540	0.4334	0.3890
7	AIB	2006	0.1073	0.0491	7.9909	0.0376	0.1154	0.1058	0.0732	0.0365	0.0000	0.0004	0.0530	0.3506	0.3145
8	AIB	2007	0.1227	0.0434	8.2506	0.0533	0.1179	0.1582	0.0854	0.0519	0.0000	0.0053	0.0530	0.3322	0.2945
9	AIB	2008	0.1293	0.0464	8.4806	0.0423	0.1119	0.2530	0.0917	0.0426	0.0000	0.0068	0.0520	0.4367	0.3826
10	AIB	2009	0.1171	0.0550	8.7676	0.0315	0.1004	0.3640	0.1019	0.0440	0.0000	0.0074	0.0510	0.5663	0.4962
11	AIB	2010	0.1297	0.0471	8.9803	0.0442	0.1057	0.0280	0.0964	0.0291	0.0000	0.0079	0.0520	0.5874	0.5088
12	AIB	2011	0.1411	0.0364	9.2219	0.0499	0.1140	0.1810	0.0990	0.0273	1.0000	0.0113	0.0520	0.4688	0.4002
13	AIB	2012	0.1466	0.0270	9.3874	0.0445	0.0870	0.3410	0.1215	0.0401	1.0000	0.0187	0.0560	0.3114	0.2648
14	AIB	2013	0.1511	0.0230	9.6063	0.0439	0.0990	0.1350	0.1155	0.0437	1.0000	0.0189	0.0500	0.2575	0.2404
15	AIB	2014	0.1374	0.0227	9.9049	0.0414	0.1035	0.0810	0.1187	0.0402	1.0000	0.0160	0.0520	0.2939	0.2527
16	AIB	2015	0.1402	0.0174	10.0804	0.0361	0.1040	0.0770	0.1171	0.0432	1.0000	0.0143	0.5222	0.1897	0.1626
17	AIB	2016	0.1392	0.0153	10.2959	0.0333	0.0800	0.0969	0.1244	0.0505	1.0000	0.0144	0.0574	0.2277	0.1956
18	BOA	2000	0.1713	0.0153	6.5765	0.0292	0.0340	0.0536	0.0766	0.0393	0.0000	0.0330	0.0750	0.2747	0.2242
19	BOA	2001	0.1853	0.0262	6.7979	0.0391	0.0742	-0.0035	0.1048	0.0580	0.0000	0.0280	0.0680	0.2428	0.1987
20	BOA	2002	0.1217	0.0568	7.0405	0.0070	0.0163	-0.1057	0.0972	0.0408	0.0000	0.0200	0.0630	0.4385	0.3809
21	BOA	2003	0.1163	0.0766	7.1952	0.0060	-0.0210	0.1092	0.0766	0.0366	0.0000	0.0134	0.0580	0.4289	0.3803
22	BOA	2004	0.1457	0.0759	7.3683	0.0341	0.1173	0.0735	0.1008	0.0538	0.0000	0.0050	0.0540	0.4564	0.3962
23	BOA	2005	0.1531	0.0494	7.6290	0.0399	0.1264	0.0613	0.0851	0.0505	0.0000	0.0010	0.0540	0.4259	0.3690
24	BOA	2006	0.1718	0.0311	7.9494	0.0430	0.1154	0.1058	0.0841	0.0572	0.0000	0.0004	0.0530	0.3261	0.2756
25	BOA	2007	0.1384	0.0469	8.1304	0.0280	0.1179	0.1582	0.0876	0.0514	0.0000	0.0053	0.0530	0.3447	0.3009
26	BOA	2008	0.1017	0.0889	8.3594	0.0051	0.1119	0.2530	0.0896	0.0511	0.0000	0.0068	0.0520	0.3754	0.3379
27	BOA	2009	0.1132	0.0983	8.6082	0.0266	0.1004	0.3640	0.1018	0.0531	0.0000	0.0074	0.0510	0.5489	0.4923
28	BOA	2010	0.1156	0.0741	8.7451	0.0313	0.1057	0.0280	0.0830	0.0355	0.0000	0.0079	0.0520	0.5253	0.4717
29	BOA	2011	0.1156	0.0333	8.8926	0.0355	0.1140	0.1810	0.1122	0.0441	1.0000	0.0113	0.0520	0.4428	0.3979
30	BOA	2012	0.1363	0.0257	9.0167	0.0350	0.0870	0.3410	0.1276	0.0468	1.0000	0.0187	0.0560	0.3476	0.3062
31	BOA	2013	0.1307	0.0598	9.2232	0.0285	0.0990	0.1350	0.1058	0.0384	1.0000	0.0189	0.0500	0.2199	0.1946
32	BOA	2014	0.1753	0.0551	9.3305	0.0464	0.1035	0.0810	0.1451	0.0495	1.0000	0.0160	0.0520	0.2844	0.2435
33	BOA	2015	0.1538	0.0152	9.5228	0.0274	0.1040	0.0770	0.1445	0.0495	1.0000	0.0143	0.5222	0.5460	0.4590
34	BOA	2016	0.1477	0.0137	9.7308	0.0278	0.0800	0.0969	0.1370	0.0534	1.0000	0.0144	0.0574	0.2130	0.1844
35	CBE	2000	0.0858	0.1390	9.8949	0.0313	0.0340	0.0536	0.0966	0.0415	0.0000	0.0330	0.0750	0.3801	0.3457
36	CBE	2001	0.0614	0.1838	9.9753	0.0099	0.0742	-0.0035	0.0926	0.0290	0.0000	0.0280	0.0680	0.3053	0.2839
37	CBE	2002	0.0162	0.2455	10.0054	-0.0229	0.0163	-0.1057	0.0601	0.0095	0.0000	0.0200	0.0630	0.3725	0.3581
38	CBE	2003	0.0753	0.2897	10.0941	0.0296	-0.0210	0.1092	0.0783	0.0201	0.0000	0.0134	0.0580	0.6001	0.5642
39	CBE	2004	0.0654	0.2437	10.2391	0.0174	0.1173	0.0735	0.0817	0.0176	0.0000	0.0050	0.0540	0.6313	0.5941
40	CBE	2005	0.0603	0.2117	10.4094	0.0238	0.1264	0.0613	0.0676	0.0173	0.0000	0.0010	0.0540	0.5542	0.5267
41	CBE	2006	0.0644	0.1767	10.4871	0.0312	0.1154	0.1058	0.0918	0.0188	0.0000	0.0004	0.0530	0.6233	0.5916
42	CBE	2007	0.1170	0.1423	10.6795	0.0269	0.1179	0.1582	0.1062	0.0208	0.0000	0.0053	0.0530	0.6602	0.5905
43	CBE	2008	0.1175	0.0613	10.8281	0.0371	0.1119	0.2530	0.0889	0.0255	0.0000	0.0068	0.0520	0.3894	0.3538
44	CBE	2009	0.1172	0.0311	10.9922	0.0457	0.1004	0.3640	0.1128	0.0366	0.0000	0.0074	0.0510	0.3026	0.2629
45	CBE	2010	0.1014	0.0185	11.2143	0.0378	0.1057	0.0280	0.1142	0.0332	0.0000	0.0079	0.0520	0.2352	0.2103
46	CBE	2011	0.0799	0.0245	11.6463	0.0371	0.1140	0.1810	0.1134	0.0317	0.0000	0.0113	0.0520	0.2895	0.2648
47	CBE	2012	0.0829	0.0221	11.9755	0.0499	0.0870	0.3410	0.1076	0.0368	0.0000	0.0187	0.0560	0.1737	0.1580
48	CBE	2013	0.0769	0.0261	12.1915	0.0447	0.0990	0.1350	0.1333	0.0413	0.0000	0.0189	0.0500	0.1961	0.1801

S. No.	Bank Name	Year	Independent Variables											Dependent Variable	
			1	2	3	4	5	6	7	8	9	10	11		
			CAP	NPLA	BSIZE	ROA	GDP	INF	IRLA	IRM	NBBP	MMIR	UER	L1	L2
49	CBE	2014	0.0724	0.0275	12.3901	0.0403	0.1035	0.0810	0.1375	0.0395	0.0000	0.0160	0.0520	0.1418	0.1296
50	CBE	2015	0.0640	0.0264	12.6236	0.0417	0.1040	0.0770	0.1505	0.0441	0.0000	0.0143	0.5222	0.0827	0.0781
51	CBE	2016	0.0606	0.0272	12.8600	0.0361	0.0800	0.0969	0.1560	0.0451	0.0000	0.0144	0.0574	0.0868	0.0822
52	DB	2000	0.1017	0.0338	6.7627	0.0208	0.0340	0.0536	0.0901	0.0405	0.0000	0.0330	0.0750	0.4174	0.3769
53	DB	2001	0.1036	0.0322	7.0031	0.0327	0.0742	-0.0035	0.0980	0.0426	0.0000	0.0280	0.0680	0.3505	0.3209
54	DB	2002	0.0983	0.0310	7.3038	0.0262	0.0163	-0.1057	0.0883	0.0335	0.0000	0.0200	0.0630	0.3816	0.3425
55	DB	2003	0.0784	0.0387	7.5964	0.0186	-0.0210	0.1092	0.0647	0.0313	0.0000	0.0134	0.0580	0.3543	0.3260
56	DB	2004	0.0852	0.0373	7.8925	0.0291	0.1173	0.0735	0.0692	0.0345	0.0000	0.0050	0.0540	0.3566	0.3257
57	DB	2005	0.0918	0.0323	8.1374	0.0284	0.1264	0.0613	0.0726	0.0407	0.0000	0.0010	0.0540	0.3240	0.2985
58	DB	2006	0.1142	0.0265	8.4220	0.0407	0.1154	0.1058	0.0765	0.0468	0.0000	0.0004	0.0530	0.2797	0.2527
59	DB	2007	0.1211	0.0248	8.7063	0.0427	0.1179	0.1582	0.0802	0.0487	0.0000	0.0053	0.0530	0.3080	0.2766
60	DB	2008	0.1239	0.0232	8.9655	0.0425	0.1119	0.2530	0.0959	0.0492	0.0000	0.0068	0.0520	0.4162	0.3724
61	DB	2009	0.1190	0.0230	9.1832	0.0362	0.1004	0.3640	0.0977	0.0458	0.0000	0.0074	0.0510	0.5392	0.4832
62	DB	2010	0.1172	0.0218	9.4217	0.0371	0.1057	0.0280	0.0956	0.0268	0.0000	0.0079	0.0520	0.4736	0.4254
63	DB	2011	0.1260	0.0199	9.5929	0.0430	0.1140	0.1810	0.0971	0.0275	1.0000	0.0113	0.0520	0.4758	0.4247
64	DB	2012	0.1415	0.0215	9.7711	0.0510	0.0870	0.3410	0.1105	0.0369	1.0000	0.0187	0.0560	0.3737	0.3296
65	DB	2013	0.1343	0.0225	9.8908	0.0412	0.0990	0.1350	0.1152	0.0351	1.0000	0.0189	0.0500	0.3464	0.3069
66	DB	2014	0.1507	0.0178	9.9971	0.0436	0.1035	0.0810	0.1210	0.0358	1.0000	0.0160	0.0520	0.3422	0.2979
67	DB	2015	0.1475	0.0168	10.1171	0.0389	0.1040	0.0770	0.1227	0.0395	1.0000	0.0143	0.5222	0.2560	0.2233
68	DB	2016	0.1429	0.0171	10.2603	0.0333	0.0800	0.0969	0.1199	0.0372	1.0000	0.0144	0.0574	0.2749	0.2404
69	NIB	2000	0.2595	0.0000	5.0626	0.0063	0.0340	0.0536	0.0508	0.0177	0.0000	0.0330	0.0750	0.7373	0.5506
70	NIB	2001	0.1994	0.0048	5.8171	0.0536	0.0742	-0.0035	0.0905	0.0530	0.0000	0.0280	0.0680	0.3358	0.2738
71	NIB	2002	0.1948	0.0123	6.2804	0.0412	0.0163	-0.1057	0.0895	0.0452	0.0000	0.0200	0.0630	0.3920	0.3127
72	NIB	2003	0.1458	0.0400	6.7856	0.0215	-0.0210	0.1092	0.0673	0.0384	0.0000	0.0134	0.0580	0.3236	0.2757
73	NIB	2004	0.1468	0.0382	7.1285	0.0393	0.1173	0.0735	0.0712	0.0428	0.0000	0.0050	0.0540	0.3123	0.2654
74	NIB	2005	0.1368	0.0415	7.4570	0.0381	0.1264	0.0613	0.0733	0.0443	0.0000	0.0010	0.0540	0.3118	0.2679
75	NIB	2006	0.1495	0.0386	7.6143	0.0400	0.1154	0.1058	0.0725	0.0440	0.0000	0.0004	0.0530	0.2531	0.2146
76	NIB	2007	0.1715	0.0341	7.8660	0.0407	0.1179	0.1582	0.0809	0.0508	0.0000	0.0053	0.0530	0.3234	0.2670
77	NIB	2008	0.1728	0.0379	8.2025	0.0435	0.1119	0.2530	0.0993	0.0645	0.0000	0.0068	0.0520	0.4433	0.3651
78	NIB	2009	0.1608	0.0460	8.4777	0.0456	0.1004	0.3640	0.1142	0.0733	0.0000	0.0074	0.0510	0.5819	0.4857
79	NIB	2010	0.1632	0.0390	8.6946	0.0478	0.1057	0.0280	0.1046	0.0479	0.0000	0.0079	0.0520	0.6174	0.5139
80	NIB	2011	0.1734	0.0412	8.8695	0.0484	0.1140	0.1810	0.1203	0.0557	1.0000	0.0113	0.0520	0.6236	0.5124
81	NIB	2012	0.1934	0.0271	9.0211	0.0471	0.0870	0.3410	0.1169	0.0580	1.0000	0.0187	0.0560	0.4486	0.3602
82	NIB	2013	0.1915	0.0250	9.1209	0.0428	0.0990	0.1350	0.1256	0.0763	1.0000	0.0189	0.0500	0.3053	0.2466
83	NIB	2014	0.1886	0.0215	9.2824	0.0364	0.1035	0.0810	0.1055	0.0702	1.0000	0.0160	0.0520	0.2207	0.1783
84	NIB	2015	0.1707	0.0152	9.4922	0.0333	0.1040	0.0770	0.1288	0.0835	1.0000	0.0143	0.5222	0.1638	0.1356
85	NIB	2016	0.1669	0.0180	9.6697	0.0311	0.0800	0.0969	0.1519	0.0894	1.0000	0.0144	0.0574	0.2254	0.1881
86	UB	2000	0.2416	0.0114	5.1818	0.0281	0.0340	0.0536	0.0909	0.0748	0.0000	0.0330	0.0750	0.3398	0.1966
87	UB	2001	0.2403	0.0075	5.6454	0.0283	0.0742	-0.0035	0.0970	0.0818	0.0000	0.0280	0.0680	0.4570	0.2438
88	UB	2002	0.2018	0.0123	6.1225	0.0154	0.0163	-0.1057	0.1043	0.0752	0.0000	0.0200	0.0630	0.6368	0.3114
89	UB	2003	0.1495	0.0241	6.4646	0.0109	-0.0210	0.1092	0.0655	0.0528	0.0000	0.0134	0.0580	0.4601	0.2695
90	UB	2004	0.1068	0.0391	6.8711	0.0104	0.1173	0.0735	0.0703	0.0466	0.0000	0.0050	0.0540	0.5043	0.3008
91	UB	2005	0.1002	0.0388	7.3505	0.0276	0.1264	0.0613	0.0776	0.0521	0.0000	0.0010	0.0540	0.5171	0.3109
92	UB	2006	0.1072	0.0289	7.6926	0.0274	0.1154	0.1058	0.0707	0.0606	0.0000	0.0004	0.0530	0.4260	0.2705
93	UB	2007	0.1442	0.0301	7.9863	0.0296	0.1179	0.1582	0.0865	0.0650	0.0000	0.0053	0.0530	0.4211	0.2578
94	UB	2008	0.1205	0.0268	8.4415	0.0271	0.1119	0.2530	0.0920	0.0755	0.0000	0.0068	0.0520	0.5043	0.2989
95	UB	2009	0.0860	0.0309	8.8731	0.0187	0.1004	0.3640	0.0976	0.0759	0.0000	0.0074	0.0510	0.6074	0.3483
96	UB	2010	0.0885	0.0365	9.1238	0.0270	0.1057	0.0280	0.0960	0.0766	0.0000	0.0079	0.0520	0.6315	0.3571
97	UB	2011	0.1004	0.0277	9.3312	0.0286	0.1140	0.1810	0.1034	0.0823	1.0000	0.0113	0.0520	0.5286	0.3154
98	UB	2012	0.1201	0.0233	9.3630	0.0349	0.0870	0.3410	0.1270	0.1078	1.0000	0.0187	0.0560	0.3778	0.2457
99	UB	2013	0.1175	0.0186	9.3960	0.0254	0.0990	0.1350	0.1277	0.1195	1.0000	0.0189	0.0500	0.2374	0.1713
100	UB	2014	0.1162	0.0144	9.6330	0.0184	0.1035	0.0810	0.1413	0.1215	1.0000	0.0160	0.0520	0.3482	0.2218
101	UB	2015	0.1152	0.0122	9.7459	0.0210	0.1040	0.0770	0.1382	0.1280	1.0000	0.0143	0.5222	0.2162	0.1594
102	UB	2016	0.1194	0.0130	9.9129	0.0212	0.0800	0.0969	0.1437	0.1317	1.0000	0.0144	0.0574	0.1932	0.1446

S. No.	Bank Name	Year	Independent Variables											Dependent Variable	
			1	2	3	4	5	6	7	8	9	10	11		
			CAP	NPLA	BSIZE	ROA	GDP	INF	IRLA	IRM	NBBP	MMIR	UER	L1	L2
103	WB	2000	0.0973	0.0267	6.2422	0.0136	0.0340	0.0536	0.0992	0.0322	0.0000	0.0330	0.0750	0.5152	0.4611
104	WB	2001	0.0995	0.0436	6.3682	0.0240	0.0742	-0.0035	0.1105	0.0505	0.0000	0.0280	0.0680	0.4458	0.3877
105	WB	2002	0.0991	0.0493	6.4708	0.0186	0.0163	-0.1057	0.1034	0.0468	0.0000	0.0200	0.0630	0.3958	0.3529
106	WB	2003	0.1046	0.0508	6.7901	0.0169	-0.0210	0.1092	0.0736	0.0352	0.0000	0.0134	0.0580	0.3965	0.3532
107	WB	2004	0.1132	0.0583	7.0388	0.0395	0.1173	0.0735	0.0894	0.0520	0.0000	0.0050	0.0540	0.4098	0.3588
108	WB	2005	0.1114	0.0509	7.3877	0.0390	0.1264	0.0613	0.0798	0.0429	0.0000	0.0010	0.0540	0.4366	0.3837
109	WB	2006	0.1129	0.0483	7.7227	0.0416	0.1154	0.1058	0.0753	0.0462	0.0000	0.0004	0.0530	0.3337	0.2926
110	WB	2007	0.1480	0.0441	8.1548	0.0440	0.1179	0.1582	0.0858	0.0455	0.0000	0.0053	0.0530	0.4349	0.3793
111	WB	2008	0.1804	0.0592	8.3248	0.0461	0.1119	0.2530	0.1015	0.0500	0.0000	0.0068	0.0520	0.5200	0.4372
112	WB	2009	0.1987	0.0609	8.5406	0.0500	0.1004	0.3640	0.1106	0.0590	0.0000	0.0074	0.0510	0.6931	0.5696
113	WB	2010	0.2221	0.0397	8.6556	0.0553	0.1057	0.0280	0.0999	0.0454	0.0000	0.0079	0.0520	0.6605	0.5287
114	WB	2011	0.2060	0.0463	8.9948	0.0568	0.1140	0.1810	0.1082	0.0441	1.0000	0.0113	0.0520	0.6285	0.5137
115	WB	2012	0.2325	0.0342	9.0297	0.0549	0.0870	0.3410	0.1239	0.0481	1.0000	0.0187	0.0560	0.4216	0.3343
116	WB	2013	0.2091	0.0234	9.2490	0.0436	0.0990	0.1350	0.1248	0.0509	1.0000	0.0189	0.0500	0.3283	0.2670
117	WB	2014	0.2178	0.0207	9.3275	0.0356	0.1035	0.0810	0.1433	0.0805	1.0000	0.0160	0.0520	0.1926	0.1592
118	WB	2015	0.2018	0.0165	9.5260	0.0330	0.1040	0.0770	0.1406	0.0526	1.0000	0.0143	0.5222	0.2185	0.1784
119	WB	2016	0.1965	0.0137	9.6921	0.0296	0.0800	0.0969	0.1364	0.0542	1.0000	0.0144	0.0574	0.2332	0.1913

Source: CB's FS, NBE, MoFEC and CSA and own computation

APPENDIX B: Regression Result of Model L_1 and L_2

Model L_1

Dependent Variable: L_1

Method: Least Squares
Date: 10/06/17 Time: 09:06
Sample (adjusted): 2 119
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.285884	0.102859	2.779384	0.0065
CAP	0.655642	0.305357	2.147131	0.0341
BSIZE	-0.030931	0.011724	-2.638166	0.0096
GDP	0.302620	0.319981	0.945743	0.3465
ROA	-2.560181	1.044718	-2.450595	0.0159
INF	0.255169	0.088950	2.868684	0.0050
IRLA	1.623801	0.823105	1.972775	0.0512
IRM	-0.985092	0.542584	-1.815557	0.0723
MMIR	-0.995579	1.520583	-0.654735	0.5141
NBBP	-0.076984	0.027210	-2.829186	0.0056
UER	-0.028863	0.086868	-0.332262	0.7404
NPLA	0.809242	0.245992	3.289705	0.0014

R-squared	0.605489	Mean dependent var	0.391439
Adjusted R-squared	0.560402	S.D. dependent var	0.138808
S.E. of regression	0.092033	Akaike info criterion	-1.829730
Sum squared resid	0.889353	Schwarz criterion	-1.524485
Log likelihood	120.9541	Hannan-Quinn criter.	-1.705791

F-statistic	13.42934	Durbin-Watson stat	1.969785
Prob(F-statistic)	0.000000		

Source: E view 8 output and own computation

Model L_2

Dependent Variable: L_2
Method: Least Squares
Date: 10/06/17 Time: 08:50
Sample: 1 119
Included observations: 119

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.559339	0.081545	6.859246	0.0000
CAP	0.169521	0.268037	0.632455	0.5284
BSIZE	-0.047725	0.010040	-4.753512	0.0000
GDP	0.192873	0.283200	0.681050	0.4973
ROA	0.171274	0.909506	0.188315	0.8510
INF	0.278694	0.078040	3.571191	0.0005
IRLA	1.827444	0.719193	2.540965	0.0125
IRM	-2.116794	0.479515	-4.414444	0.0000
MMIR	-2.684155	1.314321	-2.042237	0.0436
NBBP	-0.012110	0.023415	-0.517169	0.6061
UER	-0.066853	0.076116	-0.878306	0.3817
NPLA	1.400663	0.208706	6.711192	0.0000

R-squared	0.551911	Mean dependent var	0.324261
Adjusted R-squared	0.505846	S.D. dependent var	0.115892
S.E. of regression	0.081467	Akaike info criterion	-2.081845
Sum squared resid	0.710150	Schwarz criterion	-1.801597
Log likelihood	135.8698	Hannan-Quinn criter.	-1.968045
F-statistic	11.98110	Durbin-Watson stat	1.121818
Prob(F-statistic)	0.000000		

Dependent Variable: L_2
Method: Least Squares
Date: 10/06/17 Time: 08:51
Sample (adjusted): 2 119
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.332248	0.082116	4.046090	0.0001
CAP	0.198398	0.238068	0.833364	0.4065
BSIZE	-0.033873	0.009295	-3.644306	0.0004
GDP	0.127718	0.249689	0.511508	0.6101
ROA	-1.016631	0.829130	-1.226142	0.2229
INF	0.224853	0.069447	3.237779	0.0016

IRLA	1.689536	0.640375	2.638353	0.0096
IRM	-1.437401	0.439012	-3.274171	0.0014
MMIR	-1.334850	1.191506	-1.120305	0.2651
NBBP	-0.041852	0.021332	-1.961965	0.0524
UER	-0.009586	0.067784	-0.141416	0.8878
NPLA	0.927477	0.201542	4.601902	0.0000

R-squared	0.658634	Mean dependent var	0.323939
Adjusted R-squared	0.619621	S.D. dependent var	0.116332
S.E. of regression	0.071748	Akaike info criterion	-2.327706
Sum squared resid	0.540512	Schwarz criterion	-2.022462
Log likelihood	150.3347	Hannan-Quinn criter.	-2.203768
F-statistic	16.88234	Durbin-Watson stat	1.890229
Prob(F-statistic)	0.000000		

Source: E view 8 output and own computation

APPENDIX C: Breusch-Godfrey Serial Correlation LM Test Result of Model L_1 and L_2

Model L_1

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.999230	Prob. F(5,102)	0.4222
Obs*R-squared	5.509969	Prob. Chi-Square(5)	0.3569

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/06/17 Time: 08:46
Sample: 2 119
Included observations: 118
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.097649	0.120526	0.810186	0.4197
CAP	0.235448	0.333943	0.705055	0.4824
BSIZE	-0.004295	0.012216	-0.351600	0.7259
ROA	-0.564826	1.010999	-0.558681	0.5776
INF	-0.023247	0.090661	-0.256417	0.7981
IRLA	0.384221	0.874062	0.439581	0.6612
IRM	-0.152849	0.567727	-0.269230	0.7883
MMIR	-2.309628	1.924144	-1.200340	0.2328
NBBP	-0.009178	0.031305	-0.293168	0.7700
NPLA	0.194508	0.289397	0.672117	0.5030
RESID(-1)	0.234357	0.197125	1.188874	0.2372
RESID(-2)	0.255410	0.149852	1.704415	0.0913
RESID(-3)	0.108098	0.116515	0.927760	0.3557
RESID(-4)	-0.116745	0.108019	-1.080786	0.2823
RESID(-5)	-0.102958	0.111741	-0.921391	0.3590

R-squared	0.046695	Mean dependent var	-1.46E-16
Adjusted R-squared	-0.093497	S.D. dependent var	0.087591
S.E. of regression	0.091594	Akaike info criterion	-1.817429
Sum squared resid	0.855723	Schwarz criterion	-1.441743
Log likelihood	123.2283	Hannan-Quinn criter.	-1.664890
F-statistic	0.333077	Durbin-Watson stat	1.996902
Prob(F-statistic)	0.990459		

Source: E view 8 output and own computation

Model L_2

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.263524	Prob. F(5,100)	0.2857
Obs*R-squared	7.011813	Prob. Chi-Square(5)	0.2198

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/06/17 Time: 08:52
Sample: 2 119
Included observations: 118
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.090550	0.094255	0.960695	0.3390
CAP	0.206175	0.257156	0.801748	0.4246
BSIZE	-0.003480	0.009469	-0.367577	0.7140
GDP	0.036876	0.259210	0.142265	0.8872
ROA	-0.294734	0.854288	-0.345005	0.7308
INF	-0.015825	0.070855	-0.223340	0.8237
IRLA	0.281077	0.670297	0.419333	0.6759
IRM	-0.412696	0.484085	-0.852529	0.3960
MMIR	-1.767929	1.547166	-1.142688	0.2559
NBBP	-0.002034	0.024110	-0.084350	0.9329
UER	0.012458	0.073799	0.168815	0.8663
NPLA	0.229622	0.243457	0.943172	0.3479
RESID(-1)	0.291798	0.187748	1.554197	0.1233
RESID(-2)	0.245480	0.137249	1.788569	0.0767
RESID(-3)	0.039323	0.118476	0.331905	0.7407
RESID(-4)	-0.146142	0.108333	-1.349006	0.1804
RESID(-5)	-0.090546	0.112880	-0.802141	0.4244

R-squared	0.059422	Mean dependent var	-1.19E-17
Adjusted R-squared	-0.100476	S.D. dependent var	0.067969
S.E. of regression	0.071302	Akaike info criterion	-2.304222
Sum squared resid	0.508394	Schwarz criterion	-1.881575
Log likelihood	153.9491	Hannan-Quinn criter.	-2.132614

F-statistic	0.371625	Durbin-Watson stat	1.955418
Prob(F-statistic)	0.988399		

Source: E view 8 output and own computation

APPENDIX D: Hetroskedasticity Test: White Test of Model L_1 and L_2

Model L_1

Heteroskedasticity Test: White Test

F-statistic	1.590148	Prob. F(9,109)	0.1270
Obs*R-squared	13.81096	Prob. Chi-Square(9)	0.1292
Scaled explained SS	13.09735	Prob. Chi-Square(9)	0.1583

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/06/17 Time: 08:47
Sample: 1 119
Included observations: 119

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003413	0.006910	0.493984	0.6223
CAP^2	0.511063	0.165172	3.094125	0.0025
BSIZE^2	0.000124	0.000103	1.202602	0.2317
ROA^2	-1.834747	2.701199	-0.679234	0.4984
INF^2	-0.061951	0.041399	-1.496428	0.1374
IRLA^2	-0.539932	0.632108	-0.854176	0.3949
IRM^2	0.320199	0.628145	0.509752	0.6113
MMIR^2	-8.392842	6.149413	-1.364820	0.1751
NBBP^2	-0.002498	0.004505	-0.554433	0.5804
NPLA^2	-0.103594	0.151113	-0.685538	0.4945

R-squared	0.116059	Mean dependent var	0.011062
Adjusted R-squared	0.043073	S.D. dependent var	0.016702
S.E. of regression	0.016339	Akaike info criterion	-5.310273
Sum squared resid	0.029098	Schwarz criterion	-5.076733
Log likelihood	325.9612	Hannan-Quinn criter.	-5.215440
F-statistic	1.590148	Durbin-Watson stat	1.335902
Prob(F-statistic)	0.127005		

Source: E view 8 output and own computation

Model L_2

Heteroskedasticity Test: White Test

F-statistic	1.833102	Prob. F(11,107)	0.0571
Obs*R-squared	18.86956	Prob. Chi-Square(11)	0.0635
Scaled explained SS	14.79905	Prob. Chi-Square(11)	0.1919

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/06/17 Time: 08:53
Sample: 1 119
Included observations: 119

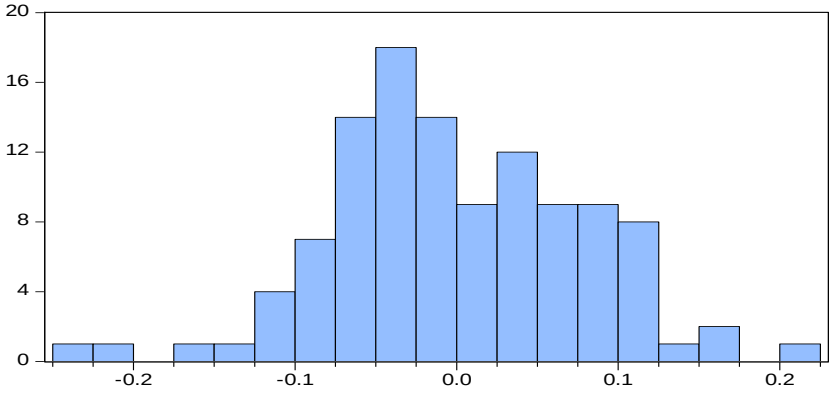
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.003020	0.004097	-0.737045	0.4627
CAP^2	0.280202	0.081542	3.436285	0.0008
BSIZE^2	3.78E-05	5.15E-05	0.733309	0.4650
GDP^2	0.224832	0.237725	0.945766	0.3464
ROA^2	-0.549652	1.422367	-0.386434	0.6999
INF^2	-0.023840	0.021079	-1.130961	0.2606
IRLA^2	0.115498	0.322567	0.358058	0.7210
IRM^2	-0.306673	0.314428	-0.975335	0.3316
MMIR^2	0.089892	3.790708	0.023714	0.9811
NBBP^2	-0.002437	0.002227	-1.094413	0.2762
UER^2	0.005812	0.013124	0.442874	0.6588
NPLA^2	0.006282	0.075275	0.083455	0.9336

R-squared	0.158568	Mean dependent var	0.005968
Adjusted R-squared	0.072065	S.D. dependent var	0.008347
S.E. of regression	0.008041	Akaike info criterion	-6.713147
Sum squared resid	0.006918	Schwarz criterion	-6.432900
Log likelihood	411.4323	Hannan-Quinn criter.	-6.599348
F-statistic	1.833102	Durbin-Watson stat	1.400313
Prob(F-statistic)	0.057059		

Source: E view 8 output and own computation

APPENDIX E: Normality Test of Model L_1 and L_2

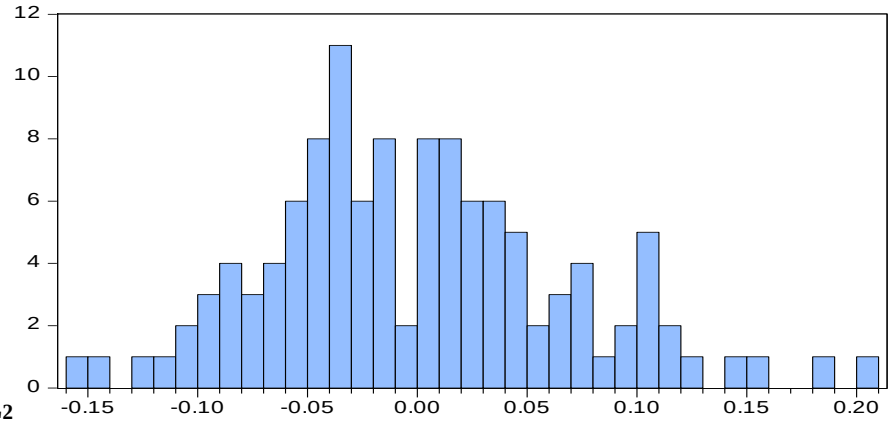
Model L_1



Series: Standardized Residuals
Sample 2001 2016
Observations 112

Mean	-4.65e-17
Median	-0.009288
Maximum	0.221669
Minimum	-0.240479
Std. Dev.	0.077658
Skewness	-0.001084
Kurtosis	3.336773
Jarque-Bera	0.529297
Probability	0.767476

Source: E view 8 output and own computation



Model L_2

Source: E view 8 output and own computation

APPENDIX F: Descriptive Statistics of Dependent and Independent Variables

	L1	L2	BSIZE	CAP	GDP	INF	IRLA	IRM	MMIR	NBBP	NPLA	ROA	UER
Mean	0.3916	0.3243	8.6638	0.1335	0.0874	0.1182	0.1011	0.0491	0.0130	0.3025	0.0456	0.0327	0.0837
Median	0.3816	0.3127	8.7676	0.1239	0.1035	0.0969	0.0990	0.0452	0.0134	0.0000	0.0322	0.0341	0.0540
Maximum	0.7373	0.5941	12.8600	0.2595	0.1264	0.3640	0.1560	0.1317	0.0330	1.0000	0.2897	0.0568	0.5222
Minimum	0.0827	0.0782	5.0626	0.0162	-0.0210	-0.1057	0.0508	0.0095	0.0004	0.0000	0.0000	-0.0229	0.0500
Std. Dev.	0.1382	0.1159	1.5689	0.0441	0.0396	0.1143	0.0230	0.0217	0.0087	0.4613	0.0479	0.0128	0.1103
Skewness	0.2325	0.3711	0.1801	0.4666	-1.5295	0.5678	0.3188	1.6418	0.6044	0.8598	3.1506	-0.8846	3.7283
Kurtosis	2.5856	2.7069	2.9894	3.1876	4.3003	3.2567	2.4535	6.6338	2.8165	1.7393	13.4768	4.8530	14.9594
Jarque-Bera	1.9234	3.1573	0.6439	4.4924	54.7784	6.7216	3.4969	118.9289	7.4126	22.5433	741.1150	32.5462	984.8645
Probability	0.3823	0.2063	0.7247	0.1058	0.0000	0.0347	0.1740	0.0000	0.0246	0.0000	0.0000	0.0000	0.0000
Sum	46.6034	38.5871	1030.9940	15.8809	10.4023	14.0645	12.0344	5.8466	1.5512	36.0000	5.4219	3.8942	9.9582
Sum Sq. Dev.	2.2548	1.5848	290.4383	0.2291	0.1854	1.5423	0.0624	0.0553	0.0090	25.1092	0.2712	0.0194	1.4352
Observations	119	119	119	119	119	119	119	119	119	119	119	119	119

Source: E view 8 output and own computation

APPENDIX G: Variables Maximum and Minimum Values

A. Dependent Variable					
S. NO	**MODEL**	**DESCRIPTION**	**VALUE**	**YEAR**	**BANK**
1	**L1**	**Maximum**	0.7373	2000	NIB
		Minimum	0.0827	2015	CBE
2	**L2**	**Maximum**	0.5941	2004	CBE
		Minimum	0.0782	2015	CBE
B. Independent Variables					
S. NO	**VARIABLES**	**DESCRIPTION**	**VALUE**	**YEAR**	**BANK**
1	**BSIZE**	**Maximum**	12.8600	2016	CBE
		Minimum	5.0626	2000	NIB
2	**CAP**	**Maximum**	0.2595	2000	NIB
		Minimum	0.0162	2002	CBE
3	**NPLA**	**Maximum**	0.2897	2003	CBE
		Minimum	0.0048	2001	UB
4	**ROA**	**Maximum**	0.0568	2011	WB
		Minimum	(0.0229)	2002	CBE
5	**IRLA**	**Maximum**	0.1560	2016	CBE

		Minimum	0.0508	2000	NIB
6	**IRM**	**Maximum**	0.1317	2016	UB
		Minimum	0.0095	2002	CBE
7	**MMIR**	**Maximum**	0.0330	2000	Common for All CBs
		Minimum	0.0004	2006	
8	**NBBP**	Dummy Variable			
9	**GDP**	**Maximum**	0.1264	2005	Common for All CBs
		Minimum	(0.0210)	2003	
10	**INF**	**Maximum**	0.3640	2009	
		Minimum	(0.1057)	2002	
11	**UER**	**Maximum**	0.5222	2015	
		Minimum	0.0500	2013	

Source: E view 8 output and own computation

APPENDIX H: Variables Standard Deviation Values and Ranges

S. No	Variables	Mean Value	Standard Deviations	
			Value	Range
1	**L1**	0.3916	0.1382	0.2534 to 0.5298
2	**L2**	0.3243	0.1159	0.2084 to 0.4402
3	**BSIZE**	8.6638	1.5689	7.0949 to 10.2327
4	**CAP**	0.1335	0.0441	0.0894 to 0.1776
5	**GDP**	0.0874	0.0396	0.0478 to 0.1270
6	**INF**	0.1182	0.1143	0.0039 to 0.2325
7	**IRLA**	0.1011	0.0230	0.0781 to 0.1241
8	**IRM**	0.0491	0.0217	0.0274 to 0.0708
9	**MMIR**	0.0130	0.0087	0.0043 to 0.0217
10	**NBBP**	0.3025	0.4613	(0.1588) to 0.7638
11	**NPLA**	0.0456	0.0479	(0.0023) to 0.0935
12	**ROA**	0.0327	0.0128	0.0199 to 0.0455
13	**UER**	0.0837	0.1103	(0.0266) to 0.1940

Source: E view 8 output and own computation

APPENDIX I: Correlation Matrix between Dependent and Independent Variables

	L₁	***L₂***	***BSIZE***	***CAP***	***GDP***	***INF***	***IRLA***	***IRM***	***MMIR***	***NBBP***	***NPLA***	***ROA***	***UER***
L₁	**1**	0.9097	(0.3344)	0.0713	(0.0248)	0.1126	(0.4077)	(0.1991)	(0.1879)	(0.3077)	0.3386	(0.1139)	(0.2778)
L₂	0.9097	**1**	(0.2188)	(0.0582)	(0.0172)	0.1154	(0.4129)	(0.4280)	(0.2142)	(0.3211)	0.4991	(0.0558)	(0.2718)
BSIZE	(0.3344)	(0.2188)	**1**	(0.3600)	0.3708	0.3229	0.5717	(0.0395)	(0.1890)	0.3584	0.1752	0.2767	0.2094
CAP	0.0713	(0.0582)	(0.3600)	**1**	0.0169	0.0595	0.1887	0.2802	0.2236	0.3297	(0.4715)	0.3847	0.0536
GDP	(0.0248)	(0.0172)	0.3708	0.0169	**1**	0.3241	0.1906	0.1390	(0.5743)	0.1751	(0.1047)	0.5065	0.0685
INF	0.1126	0.1154	0.3229	0.0595	0.3241	**1**	0.1707	0.1211	(0.2671)	0.1955	(0.0853)	0.3878	(0.1176)
IRLA	(0.4077)	(0.4129)	0.5717	0.1887	0.1906	0.1707	**1**	0.4545	0.2780	0.6564	(0.3341)	0.3167	0.3563
IRM	(0.1991)	(0.4280)	(0.0395)	0.2802	0.1390	0.1211	0.4545	**1**	0.0704	0.3604	(0.4186)	0.0279	0.1540
MMIR	(0.1879)	(0.2142)	(0.1890)	0.2236	(0.5743)	(0.2671)	0.2780	0.0704	**1**	0.1934	(0.1588)	(0.2066)	0.0836
NBBP	(0.3077)	(0.3211)	0.3584	0.3297	0.1751	0.1955	0.6564	0.3604	0.1934	**1**	(0.2943)	0.2356	0.2874
NPLA	0.3386	0.4991	0.1752	(0.4715)	(0.1047)	(0.0853)	(0.3341)	(0.4186)	(0.1588)	(0.2943)	**1**	(0.3382)	(0.1481)
ROA	(0.1139)	(0.0558)	0.2767	0.3847	0.5065	0.3878	0.3167	0.0279	(0.2066)	0.2356	(0.3382)	**1**	(0.0170)
UER	(0.2778)	(0.2718)	0.2094	0.0536	0.0685	(0.1176)	0.3563	0.1540	0.0836	0.2874	(0.1481)	(0.0170)	**1**

Source: E view 8 output and own computation

APPENDIX J: Banks in Ethiopia

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

Source: NBE June 30, 2016 annual report and CBs' Audited Financial Statements