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ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE
FACTORS AFFECTING LIQUIDITY OF COMMERCIAL BANKS: (CASE
STUDY ON SELECTED BANKS IN ETHIOPIA)

BY:
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A THESIS SUBMITTED TO THE DEPARTMENT OF ACCOUNTING
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OF MASTERS OF ACCOUNTING AND FINANCE

ADVISOR:

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DECLARATION

I, Desibelew Erkihune declare that this thesis is my original work, prepared under the guidance of Dr, Abebe Yitayew. I prepared, collected, analyzed and finished this thesis in accordance with all the scholarly ethical standards. All academic information used in this thesis has been acknowledged through citations. Additionally, I affirm that I have followed all rules governing academic honesty and integrity and that I have not created or manipulated any ideas or data in my work. This thesis is being submitted in partial fulfilment of Addis Ababa University's Master of accounting and finance requirement. I further confirm that this thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

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Statement of Certification

This is to certify that this study, “Factors affecting liquidity of commercial Banks, (case study on selected banks in Ethiopia)”, undertaken by Desibelew Erkihune for the partial fulfillment of Masters of accounting and finance at Addis Ababa University, is an original work and not submitted earlier for any degree either at this University or any other University, and has been supervised in accordance with university policies, and the student has my permission to submit it for evaluation.

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Factors Affecting Liquidity of Commercial Banks: (Case Study on Selected Banks in Ethiopia)

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Approval Sheet

As members of the Board of Examining for the Final master of accounting and finance thesis Defiance, we certify that we have read and assessed the study prepared by Desibelew Erkihune entitled Factors affecting liquidity of commercial Banks, (case study on selected banks in Ethiopia)”, and we recommend that the thesis be accepted as satisfying the requirement for the Degree of Master of Art in Accounting and Finance.

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Acronym

AB: Awash Bank S.C.

AS: Asset Management

BIS: Bank of International settlement

BOA: Bank of Abyssinia S.C.

BS: Bank size

CAP: Capital Adequacy

CBO: cooperative bank of oromia

CLRM: Classical Linear Regression Model

DB: Dashen Bank S.C.

DG: Deposit Growth

DW: Durbin-Watson

FEM: Fixed Effect Model

GDP: Gross Domestic Product

GFC: Global Financial Crisis

LC: Liquidity creation

LIQ: Liquidity

LIB: Lion international Bank S.C.

OIB: Oromia International Bank S.C.

OPEF: Operational efficiency

OLS: Ordinary Least Square

NBE: National Bank of Ethiopia

NBE –bills purchase: national bank bills purchase

NIB: Nib International Bank S.C.

NPL: Non-performing loans

REM: Random Effect Model

RR: Reserve Requirement

ROA: Return on Assets

RR: Reserve Requirement

HB: Hibret Bank S.C.

WB: Wegagen Bank S.C.

ZB: Zemen Bank S.C.

Abstract

The main objective of the study is to investigate the factors that affect Ethiopian commercial bank's liquidity. The data covered the period from 2018-2022 G.C for the sample of selected ten commercial banks. Quantitative research approach and explanatory Research design were adopted in carrying out this research. Secondary data were collected from the selected ten commercial banks using purposive sampling technique. Macro- economic data are collected from NBE and World Bank report while internal factor data were collected from audited financial statements. The study used both descriptive and inferential statistics. Mean and standard deviation were used as descriptive statistics, whereas correlation and panel regressions were used from inferential statistics using stata. The findings of the study shows that bank size, gross domestic product, and national bank bill purchase have negative and statistically significant impact on liquidity and profitability has positive significant effect on commercial banks liquidity. Deposit growth, reserve requirement and asset management have positive and statistically insignificant impact on liquidity. In addition, Capital adequacy and operational efficiency have negative insignificant effect on bank liquidity. The study suggests that focusing and reengineering the banks alongside the key internal factors could enhance the liquidity position of the commercial banks in Ethiopia. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider the macroeconomic environment together in developing strategies to improve the liquidity position of the banks. On the other side the policy maker, NBE has to consider the existing economic conditions and promote favorable environment to the development of the financial sector.

Keywords: Ethiopian banks; liquidity ratio; internal factors; external factors; OLS model; linear regression.

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CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

A bank is a type of financial organization that is authorized to accept deposits and offer loans. In addition, banks might provide financial services like asset management, currency exchange, and safe deposit lockers (Adam Barone et, at, 2023). The different sorts of banks include retail banks, commercial or corporate banks, and investment banks, to name a few. In the vast majority of countries, banks are governed by the national government or central bank (Barone, 2023). A "commercial bank" is a type of financial organization that accepts deposits, offers checking account services, makes various loans, and offers basic financial products including certificates of deposit (CDs) and savings accounts to individuals and small businesses (Julia Kagan, et al 2023). Banks are essential to economic development because they serve as a bridge to encourage investment and growth (Thomas Lambert et, al 2020). The mid-2007 to early-2009 era of high stress in the world's banking institutions and financial markets is referred to as the global financial crisis (GFC). During the Global Financial Crisis (GFC), a decline in the US housing market served as the motivation for a financial crisis that expanded from the US to the rest of the globe via connections in the global financial system (Cernohorský et al 2010). Many banks suffered significant losses and needed assistance from the government to stay afloat. As the main industrialized economies endured their biggest recessions since the Great Depression in the 1930s, millions of people lost their employment. In comparison to previous recessions without a financial crisis, the recovery from this one happened far more slowly. Why are commercial banks concerned about liquidity? The operations of commercial banks depend greatly on liquidity. A bank with high liquidity has greater access to capital, which opens up a variety of lending and investing opportunities.

During the global financial crisis, many banks found it difficult to keep enough liquidity. Unprecedented levels of liquidity support from central banks were needed to maintain the financial system (Cernohorský, J, Teplý P and Vrabel, 2010). Despite receiving such a lot of

assistance, a number of banks failed, were forced into mergers, or needed resolution (Teplý, 2011). The crisis highlighted the significance of accurate measurement and management of liquidity risk. The speed at which you can access your money is referred to as liquidity. Liquidity is the ability to access your money whenever you need it. It is the effectiveness or simplicity with which an asset or security can be turned into immediate cash without impacting its market price (Adam Hayes 2023). It is an indicator of the amount of cash and other resources banks have at their disposal to promptly settle accounts and take care of pressing commercial and financial commitments. Cash alone is the most liquid asset. For a bank, liquidity is the capacity to pay its debts as they become due without suffering intolerable losses (BIS., 2008). Liquidity risk consequently results from banks' basic involvement in the maturity transformation of short-term deposits into long-term loans. It comprises two different kinds of risk: market and funding liquidity risks. Funding liquidity risk is the possibility that a business won't be able to pay its short-term debts when they're due. The danger that a business won't be able to pay its present outstanding debts is known as funding liquidity risk. Market liquidity risk is the loss a market player faces when they wish to execute a trade or liquidate a position right away but don't get the best deal. Liquidity position of banks can be affected by bank specific factors (bank size, non-performing loans, asset management, Deposit Growth profitability and operational efficiency) and macroeconomic factors (Reserve Requirement), Inflation rate, NBE Treasury bill purchase, and real Gross Domestic Growth (GDP)).

In other words, liquidity is the capacity of a financial institution to meet all lawful requests for funds. According to Aspachs et. al, (2005) banks must maintain the ideal amount of liquidity to maximize their profit and allow them to fulfill their obligations. However, as was noted by (Diamond an (Diamond and Dybvig,, 1983), one of the main reasons why banks are fragile is their role in altering maturity and providing insurance with regard to depositors' possible liquidity needs. Generally speaking, banks work to balance profitability and liquidity (Niresh, 2012). A crucial aspect of banking is ensuring that consumers always have access to enough liquidity. In order to meet withdrawal requirements and new loan demand from clients in need of liquidity, banks make sure that there is a sufficient supply of cash and other near-cash securities accessible.

In Ethiopia context to the knowledge of the researcher, there are more than three works on the title factors affecting liquidity in commercial banks in Ethiopia. Of these researches one is conducted by, (Belete, 2015). According to Belet, Liquidity for a bank means the ability to meet its financial obligations as they come due, without incurring unacceptable losses. The study conducted by him examined, factors affecting liquidity in selected private commercial banks in Ethiopia, by adopting mixed approach, a quantitative approach and qualitative approach. The researcher overlooked some important variables that can significantly affect Ethiopian commercial banks' liquidity.

However, factors such as operational efficiency of the bank, bank service quality, and the level of asset management that are crucial to bank liquidity were left out of the study. One more is a study conducted by (Teshome, 2017). According to Teshome , liquidity as the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The study, which focused primarily on a few key variables like GDP, Government policy, bank size, etc. that can significantly affect Ethiopian banks' liquidity, was undertaken by him and studied the determinants affecting liquidity in a few selected private commercial banks in Ethiopia. Additionally, a study by (Rahel, 2019), stated that Liquidity creation is the main concerns of commercial banks because banks are mainly involved in deposit mobilizing and lending which have direct impact on their liquidity. The study focuses on factors affecting liquidity in a sample of private commercial banks in Ethiopia using data gathered between 2000 and 2017 G.C. The purpose of this study is to look at the effect of factors affecting liquidity in selected commercial banks of Ethiopia by capturing bank specific factors (bank size, capital adequacy, non-performing loans, asset management profitability, deposit growth and operational efficiency) and macroeconomic factors (Reserve Requirement, Inflation rate, National Bank bill purchase, and real Gross Domestic Growth (GDP)).

1.2. Statement of the Problem

The primary function of a bank is to move money from surplus to deficit economic units. Furthermore, they give policy makers a way to implement monetary policies that maintain price and foreign exchange stability. However, the bank's operations are not without problem because they play a crucial role in the maturity transformation of short-term deposits into long-term loans, which are naturally subject to liquidity risk (shumet, 2016). Under such conditions, banks will be exposed to liquidity issues, which could irritate their clients and have an impact on the entire financial industry. Alternatively, when banks maintain excessive amounts of liquid assets that don't pay interest, including cash and non-interest bearing deposits, Profitability at the bank will be affected. Every bank must therefore ensure that it operates to meet both its profitability aim and the financial needs of its clientele by maintaining an ideal level of liquidity (Mesfin AberaYednke, 2022).

A liquidity problem starts with widespread maturity mismatches across banks and other firms, which leaves them short on cash and other liquid assets when they're needed. Large, detrimental economic shocks or typical economic cyclical shifts can both lead to liquidity problems. The amount of cash and other assets that banks have on hand to promptly settle accounts and take care of urgent business and financial commitments is known as liquidity. Cash and other assets that may be quickly turned into cash are known as liquid assets and are used to satisfy financial obligations. Central bank reserves and government bonds are also typical examples of liquid assets (Chen, 2022). A financial institution must have sufficient liquid assets to cover depositor withdrawals and other short-term obligations in order to continue operating. Banks exposed the danger of not having enough liquid assets to meet random requests from depositors (Gatev, 2007), Since, bank liabilities often have shorter maturities than bank assets; as a result, banks must continuously manage funding of their balance sheet structure based on maturity transformation. For the reason banks are inevitably exposed to liquidity risk when they engage in a cycle of continuously re-financing (Bonfim & Kim, 2012)

Banks operational risk is influenced by liquidity since it has a significant impact on the operational activities that banks carry out (Fielding, D and Shortland, , 2005). A lack of cash or assets that can be quickly converted into cash across numerous businesses or financial institutions at once is a sign of a liquidity risk. A severe rise in demand and a sharp decline in

availability of cash occur during a liquidity crisis, and the resulting lack of accessible liquidity can result in widespread defaults and even bankruptcy. In order to improve their business operations, borrowers are currently concerned about the liquidity problem in Ethiopia, in addition to banks and regulatory bodies. Customers' deposits are used to fund the loans made by banks. To meet the demand of the investors, however, Ethiopian banks hardly ever find those cash. Few studies on the factors influencing bank liquidity in Ethiopia have recently been conducted in an effort to pinpoint the variables that influence the liquidity of commercial banks in Ethiopia. Among the researchers involved in the field were:

Tseganesh (2012), analyzed both bank specific and macroeconomic variables from year 2000 to 2011 for the sampled commercial banks and the result was, capital adequacy and loan growth have positive and insignificant relationship with liquidity and on the contrary NPL, GDP and INF have negative and insignificant relationship and finally bank size IRM, STIR have negative and significant relationship to banks liquidity. However, the study didn't include the effect of bank specific factor like operation efficiency and Asset management.

Belete (2015), Uses balanced fixed effect panel regression to investigate the bank-specific and macroeconomic determinants affecting bank liquidity for eight commercial banks in Ethiopia over the period of 2002–2013. In order to achieve this, the study used a mixed-methods approach that combines documentary analysis and in-depth interviews. The study's conclusions demonstrate a statistically significant and favorable association between capital adequacy, interest rate margin, and inflation and banks' liquidity. On the other hand, the association between loan growth and bank liquidity was negative and statistically significant. However, it was discovered that the correlation between profitability, non-performing loans, bank size, and the GDP was statistically negligible. According to the study, strengthening the focus and reengineering of the banks as well as the important internal drivers could improve the liquidity position of Ethiopia's commercial banks. The impact of bank-specific characteristics, such as asset management and operational efficiency, was left out of the study.

Rahel (2019), investigates the macroeconomic, industry-specific, and bank-specific variables that influence the liquidity of Ethiopian commercial banks. For the sample of six private commercial banks that were carefully chosen, the data covers the years 2000 to 2017. This study was conducted using a quantitative research methodology and an explanatory design. Purposive

sampling was used to gather secondary data from the six private commercial banks that had been chosen. The study's conclusions indicate that factors such as bank size, capital adequacy ratio, reserve requirement, interest rate spread, loan growth, and NBE bill purchasing have a negative and statistically significant impact on liquidity. The impact of bank-specific factors, like asset management and operational efficiency, was left out of the study.

The trend in the liquidity ratio of Ethiopian commercial banks also decreased from time to time so far (Belete et al 2015). Therefore, to identify what make banks illiquidity is important to bankers and regulators to protect banks from liquidity shocks. This liquidity problem can be aggravated by different factors which are internal and external or bank specific and macroeconomic factors. Under such basic factors there are different specific factors affecting bank liquidity in the context of Ethiopia. Even though different researchers mentioned different specific factors that affect commercial banks liquidity, there are also other factors that are not included in their study like operation efficiency of the bank, Service quality of the bank asset quality of the bank and Asset management that plays great role in determination of commercial banks liquidity. Generally neither of the aforementioned researcher nor the others in Ethiopia used the above bank specific factors (Operational efficiency and Asset management) in Ethiopia. Lack of uniform literature and detail explanation about the effect of GDP, Inflation rate and bank size that includes the above mentioned factors in the area leads to the researcher to conduct this research and knowing about such factors are crucial for better understanding of liquidity issues for both regulatory bodies and financial institutions. The existence of such knowledge gap in the area initiated to do this study. Therefore, this study seeks to fill the gap by providing additional internal factors that affects Ethiopian commercial banks liquidity.

1.3. Research Questions

Based on the problem stated in this study, the researcher develops the following research questions.

1. What are the internal/Bank specific/ factors that affect bank liquidity in commercial banks of Ethiopia?
2. What are the macroeconomic/external/ factors that affect bank liquidity in commercial banks of Ethiopia?

1.4. Objectives of the Study

Banks liquidity problem can be affected by two major factors in which the study focuses, i.e., bank specific or industry specific and macroeconomic factors on Ethiopian selected commercial banks. In the problems highlighted above, the study has the following general and specific objectives.

1.4.1. General Objective

The general objective of the study is,

- ❖ To investigate the factors that affects bank liquidity in selected commercial banks of Ethiopian.

1.4.2. Specific Objectives,

- ❖ To identify the external factors that affects banks liquidity in selected Ethiopian commercial banks.
- ❖ To describe the internal factors that influences banks liquidity in selected Ethiopian commercial banks.

1.5. Hypothesis

In order to attain the above general and specific objectives the following hypothesis are formulated,

H1: bank size has negative and significant effect on bank's liquidity problem.

H2: Capital adequacy has positive and significant effect on bank liquidity

H3: profitability has positive and significant impact on bank's liquidity.

H4: Asset management has a positive insignificance impact on banks liquidity.

H5: There is a Negative and insignificant relationship between operation efficiency of the bank and banks liquidity.

H6: Deposit growth has positive and significant relation with bank liquidity.

H7: Gross domestic product has positive/negative significant impact on banks liquidity.

H8: Reserve requirement has negative significant impact on bank's liquidity.

H9: There is a negatively significant relationship between the NBE-Bill purchase and banks liquidity.

1.6. Significance of the Study

V.I.J. Kumar (2008) Due to inadequate liquidity management, banks all around the world are currently experiencing liquidity problems. Managing liquidity risks is crucial since every commitment or transaction has an influence on a bank's liquidity.

One of the most significant components of the framework for enterprise-wide risk management is liquidity risk. A bank's liquidity system should retain enough liquidity to survive all potential stress scenarios. The correct operation of the bank will be ensured by a thorough examination of the bank's liquidity risk management system and liquidity situation. Although some studies conducted in the area of factors affecting bank liquidity in Ethiopia this study would also have a great contribution to the existing knowledge in the areas of factors affecting commercial banks liquidity in Ethiopia.

- ❖ The outcomes and results of this thesis will have potential value to financial institutions, particularly banks to understand banks liquidity.
- ❖ It will serve as a reference material for both academicians and practitioners
- ❖ It will initiate the concerned organization to assess the existing practice of liquidity and liquidity risk management.
- ❖ It will initiate other interested researchers to carry out more studies extensively in the area of bank liquidity problem.

1.7. Scope of the Study

The scope of the study focused on factors affecting liquidity in selected Commercial Banks of Ethiopia. Considering time and financial constraints the study chooses a sample of ten commercial banks functioning in Ethiopia that have a data to the minimum five years. These banks are AB, DB, BOA, CBO, ZB, OIB, NIB, WB, LIB and HB.

1.8. Limitation of the Study

This study was designed to examine the factors affecting liquidity of commercial banks in Ethiopia by using quantitative approach with secondary data due to time, resources as well as availability of data constraint. Since the study only focused on a sample of ten selected commercial banks due to the lack of availability of data and governmental intervention, it was very difficult to include all commercial banks that are found in Ethiopia. The study would be

better generalized; if one could include all commercial banks to explain the factors affecting liquidity of Ethiopian commercial banks.

1.9. Organization of the Paper

This research paper has five chapters. Chapter one presents the introduction part, which contains background of the study, statement of the problem, research questions, objectives of the study, hypothesis, scope of the study, limitations of the study, Significance of the research paper and Organization of the paper. Chapter two was presents literature reviews both theoretical and empirical view regarding factors affecting banks liquidity in commercial bank of Ethiopia. Chapter three was presents research methodology which would be adopted in the research. The research results and discussion were presented in the fourth chapter. The summary of findings, conclusion and recommendations were presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1. INTRODUCTION

In chapter two the answer of all the questions which are raised in the study about factors affecting liquidity in commercial banks of Ethiopia discussed. Commercial banks comprise public sector banks, foreign banks private sector banks that are financial institutions which perform the function of accepting deposits from the general public and giving loans for investment for the aim of generating profit. In related to these function commercial banks may face a problem called liquidity. Liquidity refers to the efficiency or ease with which an asset or security can be converted in to ready cash without affecting its market value. Liquidity can be affected by internal as well as external factors. In the first section of chapter two, the paper discusses a theoretical review of the variables affecting the liquidity of Ethiopian commercial banks. Different theories regarding what influences bank liquidity are offered in more detail than various empirical studies carried out by researchers are described in a condensed manner. Additionally, the study's conceptual framework and reason for the research effort were discussed. Finally, conclusions about the review of the literature and knowledge gaps are presented.

2.2. Theoretical Review

2.2.1. Definition and Function of Commercial Banks

A financial institution with permission to accept deposits and issue loans is referred to as a bank. In addition to lending money, banks may also offer other financial services including safe deposit boxes and wealth management. Retail banks, corporate or commercial banks, and investment banks are just a few examples of the numerous types of banks. Most nations have a national government or central bank that controls the banking industry (Barone, 2023) Commercial bank refers to a financial institution that accepts deposits, offers checking account services, makes various loans, and offers basic financial products like certificates of deposit (CDs) and savings accounts to individuals and small businesses. A commercial bank is where most people do their banking (Julia, 2016). The functions of commercial banks are classified into two main divisions. Accepts deposit, Provides loan and advances, Credit

cash, Discounting bills of exchange, Overdraft facility: Purchasing and selling of the securities, Locker facilities, Paying and gathering the credit

However, the activity of the bank is not without problems, since banks have fundamental role in the maturity transformation of short-term deposits into long-term loans that inherently exposed for liquidity risk. Liquidity risk is the risk that a company or individual will not have enough cash to meet its financial obligation or pay its debit. Liquidity refers to the efficiency or ease with which an asset or security can be converted in to ready cash without affecting its market value; the risk arises when a company cannot buy or sell an investment in exchange for cash fast enough to pay its debit, (Kenton, 2021). In such circumstance, banks will be exposed to liquidity problem and may frustrate their costumers and may affect the financial sector as a whole. On the other hand, when banks hold excess liquid asset which are non-earning assets such as cash and non-interest bearing deposits, the bank's profitability will be affected.

Hence, every bank has to ensure that it operates to satisfy its profitability target and at the same time to meet the financial demands of its customers by maintaining optimum level of liquidity.

2.2.2. Bank Liquidity Creation -Theory

According to Yeager et al, (1989) liquidity is a financial institution's ability to meet all financial demands. The Basel Committee on Banking Supervision (BCBS) defines bank liquidity as the bank's capability to fund increases in assets and satisfy obligations at short notice with little acceptable losses. To compute bank liquidity, many empirical studies employ ratios calculated from accounting data such as a ratio of liquid assets to total assets (Bunda, I &Desquilbet,, 2008). Nevertheless, using such liquidity ratios could be imprecise under certain circumstances such as the Southeast Bank of Miami case. Despite having liquid assets to total assets above 30%, that bank went bankrupt due to its inability to repay some liabilities claimed on-demand with its liquid assets (Distinguin et al., 2013).Drawing on the use of liquidity transformation to measure liquidity creation, (Allen N. Berger and Christa H.S. Bouwman, 2007), develop a comprehensive set of indicators. To construct their liquidity creation measures, they classify all bank assets, liabilities, equity, and off-balance sheet activities as liquid, semiliquid, or illiquid. After assigning weights to the activities classified earlier, they construct four liquidity creation measures by combining the activities as classified and weighted previously in different ways. The measures classify all activities other than loans by product category (i.e. 'cat') and maturity

(i.e. 'mat'). To assess how much liquidity banks create on the balance sheet versus off the balance sheet, they alternatively include off-balance-sheet activities (i.e. 'fat') or exclude them (i.e. 'nonfat'). The measures developed by (Berger, A, Bouwman,, 2009), have been the most widely accepted and employed in bank liquidity research so far.

The researchers like (Hackethal, A., Rauch, C., Steffen, S., and Tyrell, M. , 2010), identified that there is a strong and persistent positive influence of general economic strength with liquidity creation; the stronger the economy, the larger is the amount of liquidity creation. Liquidity creation strongly depends on the given interest rate environment; the larger the yield curve spread and, consequently, the lower the ECB main refinancing rate, the higher the created liquidity.

Liquidity creation (LC) is one of the most important roles that banks play in the economy. Bank liquidity creation – which incorporates loans, deposits, off-balance sheet guarantees, derivatives, and all other balance sheet and off-balance sheet financial activities – is theoretically linked to the economy. Bank loans, particularly those to bank-dependent customers without capital market opportunities, are often thought to be primary engines of economic growth (Barclay, M & Smith,, 1995). These loans also play an important role in affecting output through the bank lending channel of monetary policy (e.g., Bernanke and Blinder, 1998), particularly for small banks that tend to cater to small, bank-dependent firms (Kashyap, AK, Rajan, RG and Stein, JK , 2002). Transactions deposits, another key component of LC, provide liquidity and payments services which are essential to a well-functioning economy (Kashyap, AK, Rajan, RG and Stein, JK , 2002). Off-balance sheet guarantees like loan commitments and standby letters of credit allow customers to expand their economic activities because they are able to plan their investments and other expenditures knowing that the funds to finance these expenditures will be forthcoming in the future when needed (e.g., Boot, Greenbaum, and Thakor 1993). Moreover, these guarantees are often used as backups for other capital market financing, such as commercial paper and municipal revenue bonds, and in this way assist the capital markets in financing economic growth. Similarly, derivatives, the other main type of bank off-balance sheet activity, aid real economic activity by allowing firms to hedge risks related to future changes in interest rates, foreign exchange rates, and other market prices (e.g. Stulz, 2003). These connections between the components of LC and real economic activity may be seen as part of the

more general literature on the effects of finance on the real economy (Barclay, M & Smith,, 1995). Despite the theoretical links between LC and the economy, the empirical literature until now is missing any test of whether LC affects real economic output, measurement of how large such an effect may be, and whether this effect is stronger than that of more traditional measures of bank output, such as total assets.

2.2.3. Keynes Motives of Money Theory

The literature in economics and finance examines potential justifications for businesses holding liquid assets.

Keynes, (1936) Distinguished three reasons why people like and want liquidity. The transaction motive in this case is that businesses hold cash to meet their demands for cash inflows and outflows. Cash is kept on hand to conduct transactions, and the need for liquidity serves this purpose. The amount of income, the intervals between receiving it, and the ways in which it is spent all have an impact on the need for cash. Holding cash for precautionary purposes acts as a company's emergency fund. If anticipated cash inflows do not received as anticipated, cash on hand could be utilized to pay short-term obligations for which it may have been benchmarked. Holding cash for speculative purposes enables a company to seize unique chances that, if taken advantage of immediately, will benefit the company.

2.2.4. Bank Liquidity Creation and Financial Fragility-Theory

According to the theory of financial intermediation, one significant function of banks in the economy is to supply liquidity by funding long-term, illiquid assets with short-term, liquid liabilities. Banks perform the role of liquidity providers by holding illiquid assets, providing cash and demand deposits to the rest of the economy, and creating liquidity. In order to support the existence of banks, (Diamond and Dybvig,, 1983), emphasize the "desire for liquidity" under the uncertainty of economic agents. Banks exist because they offer better liquidity insurance than financial markets. Banks, however, confront transformation risk and are vulnerable to the risk of a run on deposits because they are liquidity insurers. In general, the risk for banks to incur losses from selling illiquid assets to satisfy client liquidity requests increases with the amount of liquidity created for the external public. Initially, a natural explanation for why deposit-taking institutions exist was modeled, providing an explanation for the crucial function that banks play in the economy by supplying liquidity. (Diamond and Dybvig,, 1983)

An analysis similar to this was done by (Kashyap, 2002), to support the need for banks to create liquidity. They contend that since banks do deposit taking and lending under one roof, there must be synergies between these two activities. By maintaining liquid assets as collateral against withdrawals, deposits and loan commitments are secured in a way that creates synergy. These liquid assets are seen by them as expensive overhead. The two distinct functions can share these overheads, which is why there is synergy.

The relationship between a lack of liquidity and systemic financial crises is well examined by (Diamond, DW., and Rajan, RG., 2005). It is suggested that the failure of one bank can reduce the amount of liquidity that is available to the point where other banks may also be impacted. As a result, there is a contagion effect. It is challenging to pinpoint the cause of a crisis, though, because solvency and liquidity impacts interact. Liquidity risk typically results from banks' essential role in converting short-term deposits into long-term loans at maturity.

2.3. Internal Factors Affecting Bank Liquidity

Theoretically factors affecting bank liquidity are mainly divided into two categories, these are internal and external factors. The internal (bank-specific factors) are factors that are related to internal efficiencies and managerial decisions. Such factors include determinants such as bank non-performing loan, bank capital adequacy, bank size, asset management operational efficiency and the like. The external or macro determinants are variables that are not related to bank management but reflect the economic and legal environment that affects the operation and liquidity positions of institutions. The macroeconomic factors that can affect bank liquidity include factors such as GDP, FDI, NBE-bill purchase, interest rate and inflation rate are among others (Syed Quaid Ali Shaha, Imran Khana et al. 2018).

2.3.1. Bank Size and Bank Liquidity

According to the “too big to fail” argument, large banks would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannotta, G, Nocera, G, and Sironi, A, 2007.). Therefore, “too big to fail” status of large banks could lead to moral hazard behavior and excessive risk exposure. If big banks are seeing themselves as “too big to fail”, their motivation to hold liquid assets is limited. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort. Thus, large banks are likely to perform higher levels of liquidity creation that exposes them to losses associated

with having to sale illiquid assets to satisfy the liquidity demands of customers. Hence, there can be positive relationship between bank size and illiquidity. However, since small banks are likely to be focused on traditional intermediation activities and transformation activities (Rauch et al. 2008; Berger and Bouwman 2009) they do have small amount of liquidity. Hence, there can be negative relationship between bank size and illiquidity.

2.3.2. Capital Adequacy and Bank Liquidity

The main reason banks hold capital is to absorb risk. This includes liquidity crisis risk, bank run protection and various other risks, especially credit risk. The reason banks hold capital is motivated by their role in risk transformation, but recent theory suggests that bank capital can also influence a bank's ability to generate liquidity. Suggesting, these theories produce conflicting predictions about the relationship between capital creation and liquidity creation. Financial fragility replacement theory predicts that as capital increases, liquidity generation decreases. (Diamond, DW and Rajan, RG , 2000,2001), focus on financial fragility. They model themselves as relationship banks that raise money from investors to fund entrepreneurs. Entrepreneurs can forego their efforts, thereby reducing the amount of bank loans they get. More importantly, banks may be holding back, limiting their ability to raise funds. Deposit contracts alleviate bank holdup problems, because if the bank threatens to withhold the deposit, the depositor can run to the bank. Thus liquidity generation is maximized. Investors are unable to rush to banks, limiting their willingness to fund and reducing liquidity formation. The higher a bank's capital adequacy ratio, the less liquidity it creates.

Moreover, the negative impact of capital on liquidity generation proposed by (Diamond, DW and Rajan, RG , 2000,2001), relies heavily on imperfect deposit insurance. With deposit insurance in place, depositors have no incentive to stay with the bank, and deposit contracts do not alleviate the bank's holdup problem. Moreover, (Gorton, G and Winton, 2000), show that high capital ratios can reduce liquidity generation through another effect, transfer of deposits. They believe that deposits are a more effective liquidity hedge for agents than investing in bank stocks. In fact, deposits are fully or partially guaranteed and can be withdrawn at face value. Bank capital, by contrast, is ineligible and has a stochastic value that depends on the health of the bank and the liquidity of the stock market. As a result, higher capital ratios shift investors' fund from relatively

liquid deposit to relatively less liquid bank asset .Therefore, the higher the bank's capital adequacy ratio, the lower the liquidity generation

2.3.3. Profitability and Bank Liquidity

The relationship between profitability and liquidity varies among different literatures. According to Brock, P. and Suarez (2000), banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability. On the other hand, Molyneux P. and Thornton J. (1992) and Goddard, Molyneux, and Wilson (2004) argued that holding liquid assets imposes an opportunity cost on the bank and has an inverse relationship with profitability. Further, Myers, S., and Rajan (2000) emphasized the adverse effect of increased liquidity for financial institutions, stating that "although more liquid assets increase the ability to raise cash on short notice, they also reduce management's ability to commit credibly to an investment strategy that protects investors," which, finally, can result in a reduction of the "firm's capacity to raise external finance" in some cases. Thus, this indicates a negative relationship between bank profitability and liquidity. The trade-offs that generally exist between return and liquidity risk are demonstrated by observing that a shift from short-term securities to long-term securities or loans raises a bank's return but also increases its liquidity risks. As a result of the two opposing views, the management of banks is faced with the dilemma of liquidity and profitability.

2.3.4. Asset Management

Banks can mobilize assets in a number of ways. It can get the loan back soon or on short notice, and it can sell stocks. Alternatively, banks can borrow money from a central bank and use securities representing investments or loans as collateral. Banks are in no hurry to foreclose on loans or sell marketable assets because it can interrupt sensitive debtor-creditor relationships, weaken trust, and lead to bank crackdowns. Banks can therefore either hold some cash reserves and other liquid assets or have access to lenders of last resort, such as central banks. In many countries, commercial banks are temporarily required to maintain liquidity coverage ratios. Among commercial bank assets, investments are less liquid than money market investments. However, maintaining an appropriate maturity spread (combining long-term and short-term investments) can ensure that some of the bank's investments can be repaid on a regular basis. This creates a steady stream of liquidity and forms a secondary liquidity reserve. However, banks

are forced to "borrow short-term and lend long-term" due to the need to convert large portions of their debt into cash on demand. Since most bank loans have a fixed maturity date, banks must exchange notes that can be cashed at any time for notes that mature on a specified future date. This exposes even the most solvent banks to liquidity risk—the risk of not having enough cash (base money) to meet the demand for immediate payment. Banks manage this liquidity risk in different ways. One approach, known as wealth management, focuses on adjusting a bank's asset mix (loan, securities, and cash portfolios).

This approach leaves little control over a bank's debt and overall size. Both of these depend on the number of customers who deposit their savings with the bank. In general, bankers construct a portfolio of assets that can generate the maximum interest income while keeping the risk within acceptable limits. Also, banks must keep aside enough cash reserves to cover routine needs, such as the requirement for reserves to fulfill minimum statutory standards, while focusing the remainder of their resources mostly on short-term commercial loans. Due to the abundance of short-term loans among a bank's assets, some bank loans are perpetually due, allowing a bank to satisfy unusual cash withdrawals or settlement obligations by forgoing the renewal or replacement of some maturing loans. (<https://www.britannica.com/topic/bank/Asset->)

2.3.5. Operational Efficiency

In a business context, operational efficiency is a measure of resource allocation and can be defined as the ratio of the output obtained from the business to the input into business operations. Improving operational efficiency improves the ratio of output to input. Inputs are typically money (cost), people (measured as headcount or full-time equivalents), or time or effort. Outputs are typically money (revenue, margin, and cash), new customers, customer loyalty, market differentiation, production, innovation, quality, speed and agility, complexity, or opportunity. It's common to use the terms "operational efficiency," "efficiency," and "productivity" interchangeably. "An Introduction to Efficiency and Productivity Analysis" explains how efficiency and (total factor) productivity differ from one another. [1] To further muddy the term, operational excellence—which is about continual improvement and goes beyond efficiency—is sometimes used to refer to operational efficiency. Operational efficiency and operating excellence are occasionally used interchangeably. According to (Eissa A. Al-Homaidi, 2019) operation efficiency has a direct impact on the liquidity of commercial banks. Commercial

banks' liquidity level would improve if they employed their resources wisely and managed their plans correctly.

2.3.6. Deposit Growth and Bank Liquidity

Mussa (2015) found an insignificant effect of deposits on bank liquidity. Bonner and Zymek (2013) and Kashyap (2002) argued that as demand deposits increase, liquidity asset holdings also increase. Alger and Alger (1999) provided empirical insights into liquid assets held by Mexican banks. This study summarized 10 predictions based on various theories and applied panel data estimates from January 1997 to March 1999. They assumed that at a given level of deposits, if there is more risk for borrowers, as in the case of an economic recession, liquid assets should also be increased by banks. (Pilbeam, 2005) studied emerging economies for the period of 1994 to 2004 and found that as the deposit rate increases, bank liquidity decreases. Wubayehu (2017) revealed that the level of deposit had a statistically significant and negative relationship with banks' liquidity.

2.4. Macroeconomic Factors Affecting Liquidity

2.4.1. Gross Domestic Products (GDP)

Gross Domestic Product (GDP) measures the national income and output of a given country's economy. Gross Domestic Product (GDP) is the total expenditure on all final goods and services produced within a country within a specified period of time (www.investopedia.com). It is a gauge of a nation's economic activity level. It is an index of national health. It is also employed as a business cycle indicator. According to the theory of bank liquidity and financial fragility, strong GDP growth indicates a rise in business activity, which has a negative impact on bank liquidity because banks increase lending, and vice versa. As a result, GDP and liquidity are negatively interrelated. Sheefeni and Nyambe (2016) found that GDP growth had a negative impact on liquidity in the long run. On the other hand, a study conducted by Vodová (2013) on the Visegrad countries found a positive relationship between liquidity and GDP growth. She argued that companies need time to accumulate profits and savings before reducing their share of external funding. This will improve bank liquidity. A study by Bunda, I., and Desquilbet, J. (2008) also found a positive relationship between liquidity and GDP.

2.4.2. Reserve Requirement

A bank operating in Ethiopia shall maintain in its reserve account stated under article 2.1(a) of this directive, on average in every calendar month, 7% of all birr and foreign currency deposit liabilities held in the form of demand/current deposit, saving deposit, and time deposit, NBE Directive No.SBB/84/2022. In our case, these costs will be calculated as the proportion of required reserves put in the national bank to total assets. A Positive correlation with the dependent variable is expected because a higher level of reserves (remunerated by lower interest rates) will affect the bank's behavior in setting higher loan rates to compensate for the missing profit from investing these funds.

Few studies have observed the influence of funding costs and funding sources on bank liquidity (Bunda, I., &Desquilbet, 2008). Alger & Alger, (1999) And Munteanu (2012) further explained that if refinancing costs increased, banks tended to invest more in liquid assets. This means that if liability costs increase, banks, instead of relying on the interbank market, tend to rely more on liquid assets that act as a source of liquidity.

2.4.3. NBE-bills Purchase and Bank Liquidity: The National Bank of Ethiopia's NBE- bills is long-term obligations with a maturity of five years and an interest rate of three percent annually (NBE directive number MFA/NBEBILLS/001/2011). Since 2011, commercial banks in Ethiopia, excluding the Commercial Bank of Ethiopia (CBE), have been required to purchase NBE bills, which account for 27% of new loan disbursements. In line with this directive, NBE issued an additional requirement that commercial banks maintain a portfolio of short-term loans with a composition of not less than 40%. This NBE bill has a maturity period of five years. The study by Beléte, (2015) examined the NBE-Bill purchase as having a primarily serious adverse impact on banks liquidity as it boldly changed liquid assets to illiquid long-term investments. In addition to this, Wubayehu, (2017) and Rahel, (2019) found that the NBE-bill purchase had a strongly significant, even at a significant level of 1%, negative impact on bank liquidity.

2.5. Empirical Review

In this section the researcher reviews other country and Ethiopia studies that have been previously done by various researchers and are related or are relevant to the research study.

2.5.1. Empirical Review of International Studies

Eissa A. Al-Homaidi, Mosab I. Tabash, Najib H. Farhan & Faozi A. Almaqtari, (2019) examined the determinants of liquidity (LQD) of listed commercial banks in India. The study applied both GMM and pooled fixed and random effects models to a panel of 37 commercial banks listed on India's Bombay Stock Exchange (BSE) for the period 2008-2017. LQD of banks was used as the dependent variable acting on both bank-specific and macroeconomic determinants. The findings showed that among the bank-specific factors, bank size, capital adequacy ratio, deposits ratio, operational efficiency ratio, and return on assets ratio are found to have a significant positive impact on LQD, while assets quality ratio, assets management ratio, return on equity ratio, and net interest margin ratio are found to have a significant negative impact on LQD. When we come to macroeconomic issues, interest rate and exchange rate are proven to significantly affect LQD. To achieve a smooth LQD of commercial banks in India, the Reserve Bank of India (RBI) should provide benchmarks for the above-mentioned ratios. The study made the suggestion that bankers should take into account asset quality in a manner that enhances banks' efficiency.

Using data spanning the years 2001 to 2010, Vodová, (2013) sought to determine the factors that influence commercial banks' liquidity in Hungary. According to the panel data regression analysis results, bank liquidity has a positive link with bank capital adequacy, loan interest rates, and profitability while having a negative correlation with bank size, interest margin, monetary policy interest rate, and interbank interest rates. Uncertainty exists in the relationship between the GDP growth rate and bank liquidity. According to empirical research (Valla, N, Saes-Escorbiac, B &Tiesset, , 2006), (Bunda, I &Desquilbet, J, 2008); (Lucchetta, 2007); (Fie05), there are numerous macroeconomic and bank-specific factors that affect the liquidity of commercial banks around the world (Hackethal, A., Rauch, C., Steffen, S., and Tyrell, M. , 2010). (Valla, N, Saes-Escorbiac, B &Tiesset, , 2006), examine both bank-specific and macroeconomic determinants of English banks and discovered that the likelihood of receiving

support from the lender of last resort, interest margin, and bank profitability, size of the bank, GDP growth, and short term interest rate affect the liquidity ratio as a measure of liquidity.

In a study by Bunda, I & Desquilbet, J, (2008) they looked at the factors that influence the liquidity risk of banks in emerging markets using panel data regression analysis. They discovered that the liquidity ratio, which serves as a measure of a bank's liquidity, is thought to depend on the actions of the individual banks, the macroeconomic and market environment in which those banks operate, and the regime of exchange rates that encourages risk-taking among banks with high liquidity. The liquidity ratio is influenced by factors such as bank size, the occurrence of a financial crisis, and the lending interest rate as a gauge of lending profitability. The realization of a financial crisis, which could be brought on by inadequate bank liquidity and is anticipated to have a negative impact on banks' liquidity; total assets as a measure of the size of the bank; the lending interest rate as a measure of lending profitability; and the presence of prudential regulation., which refers to the requirement that banks have adequate liquidity, the share of public spending on GDP as a measure of the supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to the nominal values of loans made to customers, and the exchange rate regime, where banks were more liquid in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) than in those with intermediate regimes are expected to have positive impact on banks liquidity.

Additionally, Hackethal, et al (2010) examined how the financial crisis affected the liquidity of commercial banks in countries throughout Latin America and the Caribbean and proposed that liquidity is negatively impacted by customer cash requirements, as measured by changes in the cash-to-deposit ratio and money market interest rate, and is positively impacted by the current macroeconomic situation, when a cyclical downturn should reduce banks' anticipated money demand from transactions and hence cause liquidity to decline. The findings of this study suggested that monetary policy interest rate, where tightening monetary policy reduces bank liquidity, level of unemployment, which is related to loan demand, size of the bank as measured by the total number of bank customers, and bank profitability all have a significant negative impact on the liquidity ratio. In contrast, savings quota and level of liquidity are found to have a positive and significant impact on the liquidity position of the bank under consideration.

The liquidity created by the German state savings bank and its determinants was analyzed by Rauch, C, et,al (2008). This study had two purposes. First, an attempt was made to measure the liquidity generated by all 457 German state savings banks in the period 1997-2006. In a second step, the impact of monetary policy on banks' liquidity generation was analyzed. In this study, the researcher measures the created liquidity according to the calculation method of (Berger,A and Bouwman,, 2007), and (Deep, A and Schaefer, G, 2004). This study created a dynamic panel regression model to evaluate the influence of monetary policy. The following variables can affect bank liquidity, according to this study: Monetary policy interest rates, where tightening monetary policy is anticipated to reduce bank liquidity, unemployment rates, which are associated with loan demand and have a negative impact on liquidity, savings rates, liquidity levels from prior periods, size of the bank as indicated by the sum of all customers, and bank profitability are anticipated to have a negative impact on bank liquidity. The researcher used bank balance sheet data as well as general macroeconomic data to conduct the tests of measuring liquidity and analyze relevant factors on bank liquidity. The control variable for the overall macroeconomic influence demonstrates that the production of bank liquidity and the general health of the economy are positively correlated. More liquidity is created as the economy gets healthier. Also, it was discovered that banks with greater interest-to-provision-income ratios generate more liquidity. Other bank-related factors, such as size or performance, did not have a statistically significant impact on the banks' ability to provide liquidity.

2.5.2. Related Ethiopian Empirical Studies on Liquidity

Rahel (2019) investigates the macroeconomic, industry-specific, and bank-specific variables influencing the liquidity of Ethiopian commercial banks. The information spanned the years 2000 to 2017 GC for the sample of six private commercial banks that were chosen. This study used an explanatory design and a quantitative research methodology. Purposive sampling was used to gather secondary data from the six private commercial banks that were chosen. The study's conclusions indicate that the following factors have a negative and statistically significant impact on liquidity: Bank size, Capital adequacy ratio, Reserve requirement, Interest rate spread, Loan growth, and NBE bill purchase. On the other hand, positive and statistically significant effects on liquidity are caused by increases in deposits, profitability, non-performing loans, foreign exchange rate fluctuation, and inflation. The study advises banks to think about both internal and external elements in order to increase operational effectiveness and maximize their

liquidity position rather than only internal policy. On the other hand, the NBE, who makes policy, must take into account the state of the economy and support a climate that would foster the growth of the financial sector.

Tseganesh (2012) studied Determinants of Banks Liquidity and their Impact on Financial Performance: Empirical study on Commercial Banks in Ethiopia aimed to identify Determinants of Banks Liquidity in Ethiopia and then to see the Impact of Banks Liquidity up on Financial Performance through the Significant Variables Explaining Liquidity. Using balanced fixed effect panel regression, eight sampled commercial banks in Ethiopia's data from 2000–2011 were examined for eight factors that affected banks' liquidity.

According to the findings of panel data regression analysis, the liquidity of banks was positively and statistically significantly impacted by capital adequacy, bank size, the percentage of non-performing loans in the total volume of loans, interest rate margin, inflation rate, and short term interest rates. Loan growth and the real GDP growth rate had no statistically significant effect on bank liquidity. Capital sufficiency and bank size were among the statistically significant factors affecting banks' liquidity; in contrast, non-performing loans and short-term interest rates had a negative impact on financial performance. The impact of interest rate margin and inflation on financial performance was negative but statistically negligible. Consequently, there was a non-linear/positive and negative effect of bank liquidity on financial performance

Wassihun (2020) Research conducted by Wassihun Tamene Commercial banks are mostly concerned with creating liquidity since they mobilize deposits and lend money, which directly affects their liquidity. So, the focus of this study is on the factors that affect Ethiopian commercial banks' liquidity. For the sample of seven commercial banks that were chosen, the data covered the years 2000 to 2018 G.C. for the sample of seven commercial banks that were chosen. This research was conducted using a quantitative technique and an explanatory research design. Purposive sampling was used to gather secondary data from the chosen seven commercial banks, and the Ministry of Finance and Economic Development (MOFED) provided macroeconomic data. The study's findings indicate that factors such as bank size, inflation, non-performing loan GDP, and loan growth have a negative and statistically significant impact on liquidity. Liquidity is positively and statistically significantly impacted by asset quality and interest rate spread. According to the study, strengthening the focus and reengineering of the banks as well as the important internal drivers could improve the liquidity position of Ethiopia's

commercial banks. When establishing strategies to strengthen their liquidity positions, Ethiopian banks must take into account both their internal environments and the macroeconomic environment in addition to internal structures and rules. On the other hand, the NBE, who makes policy, must take into account the state of the economy and support a climate that would foster the growth of the financial sector.

Nigist (2015) conducted a study titled "Determinants of Banks Liquidity: Empirical Data on Ethiopian Commercial Banks" with the purpose of determining the factors that affect the liquidity of commercial banks in Ethiopia. The researcher Used secondary data from ten commercial banks in Ethiopia that were randomly selected and collected from 2007 to 2013. By using the balanced panel fixed effect regression model, both bank internal and external factors were examined.

The study's findings revealed that while bank size has a positive and statistically significant impact on liquidity, capital adequacy, profitability, and real GDP growth rate have negative and statistically significant effects on the liquidity of Ethiopian commercial banks. Nonperforming loans, loan growth, inflation, and interest rate margin, on the other hand, were shown to be statistically insignificant or to have no effect at all on the liquidity of Ethiopian commercial banks throughout the test period.

2.6. Conclusion and Knowledge Gap

In line with the theoretical and empirical research above, liquidity is important for all businesses, especially in the bank industry. Its function is to create liquidity on both the asset and liability side of the balance sheet. Almost every financial transaction or obligation affects bank liquidity. Effective liquidity risk management helps ensure a bank's ability to meet its cash flow obligations. Cash flow obligations are uncertain because they are affected by external events and actions of other parties.

As it was discussed in the literature review part, liquidity of banks can be affected by bank specific and macroeconomic factors. It was also discussed that some factors which have significant impact on liquidity of banks in one country may not have the same impact on another country. Thus it is important to identify the factors that influence liquidity of selected Ethiopian commercial banks.

In addition, as we have seen from the empirical studies all the researchers were focused on bank specific and macro-economic factors of liquidity. Even the researcher's focuses on bank specific /industry factors as well as macroeconomic factors, like the impact of Banks asset Management Bank service Quality and Operation Efficiency are not considered. But the factors that are mentioned have direct influence on bank's liquidity position.

2.7. Conceptual Framework

The conceptual frame work which describes the relationship between bank liquidity with bank-specific and macroeconomic determinants based on the theoretical and empirical perspectives was formulated as follows.

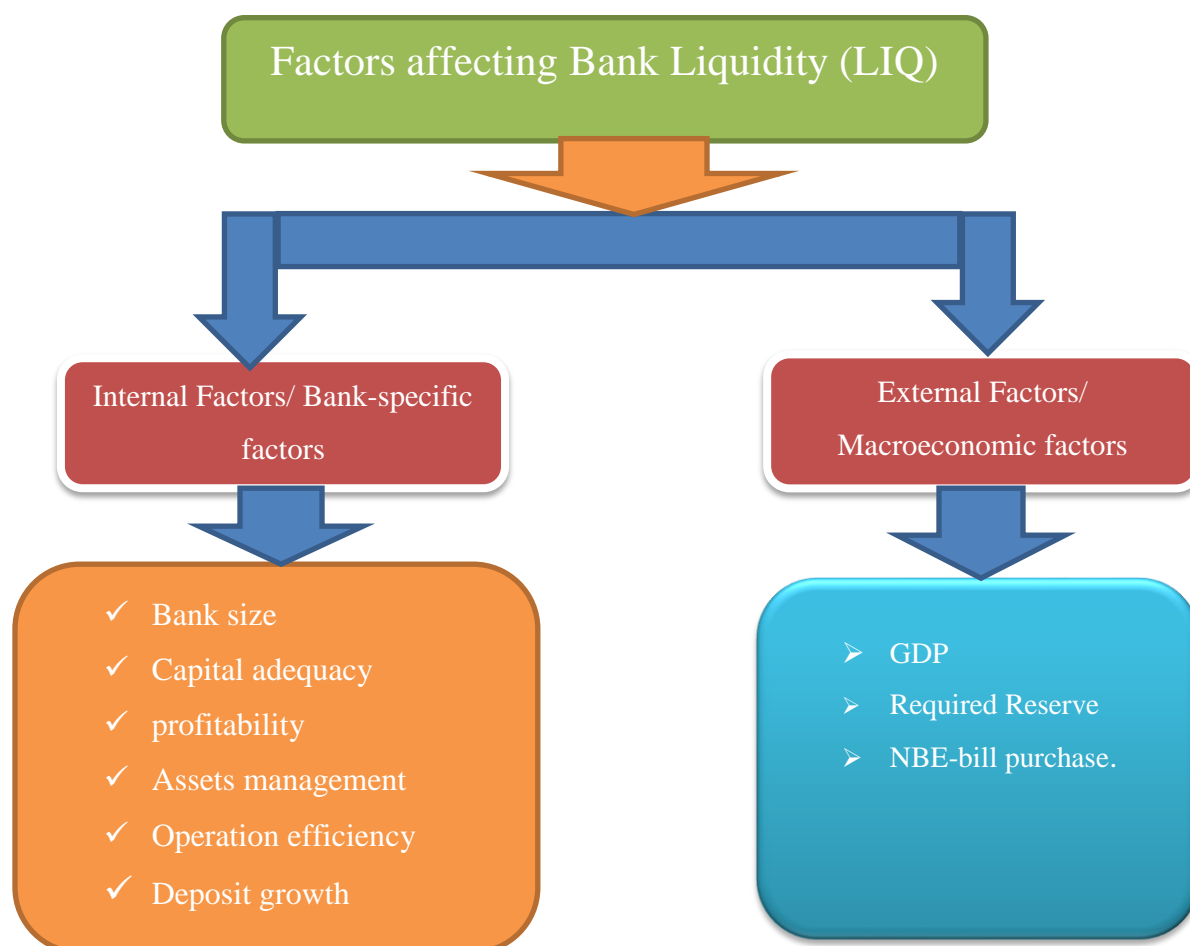


Figure1.Relationship between liquidity and its determinants (own drafting)

CHAPTER THREE

RESEARCH METHODOLOGY AND DESIGN

3.1. Introduction

Research Method: The purpose of this chapter is to go over the approaches used throughout the study to achieve the study's objectives. The exact procedures or methods used to find, select, process, and analyze information about a topic are known as research methodology. It is a means of outlining a researcher's intended method of investigation. Explanatory study methodology was used in a quantitative research strategy to investigate the cause and effect relationships between variables. Data for this study comprises only secondary data, audited financial statements particularly balance sheet and income statement or profit and loss statement, obtained from each selected commercial banks. The purpose of this chapter is to present the research approach, variables and hypotheses, and to briefly indicate what type of data used, from where data is collected, and how relevant data is collected and analyzed to achieve the study objectives.

3.2. Research Design

An overall strategy for how we will respond the research questions is referred to as the research design. Research design, as stated in Creswell, (2009) is a strategy for carrying out research. A research design is a method for employing empirical data to address your research problem. Making judgments regarding your general study objectives and approach, the type of research design you'll employ, your sample techniques or selection criteria, your methodology, the steps you'll take to gather data, and your data analysis techniques are all part of creating a research design. Written by (Shona, 2021), the researcher analyzes and critically evaluates the data and information using the facts and knowledge already at hand. Research can be categorized as descriptive, explanatory, or exploratory depending on the particular goal that it attempts to meet. In order to describe and explain what is, descriptive research focuses on people, groups, institutions, procedures, and materials. Descriptive research also compares, contrasts, categorizes, analyzes, and interprets the objects and events that make up the diverse disciplines of study. It aims to describe the situation

as it is right now. Explanatory research, on the other hand, aims to establish the cause and effect link between variables.

Exploratory research focuses on gathering background knowledge and aids in the better understanding and clarification of a topic. It is less formal and perhaps completely unstructured and is usually based on secondary data and concentrates on the development of new ideas. Since the goal of this study is to determine the cause and effect relationship between variables, explanatory research was performed.

3.3. Research Approach

There are three distinctive kinds of research methodologies: quantitative, qualitative and mixed methods, (Cresswell, 2014). As he says, a quantitative approach interprets analysis of an idea by formulating specific hypotheses and using data collection to either confirm or disprove the hypotheses. Statistical techniques and assumption testing are used to examine the data from measuring attitudes, whereas the qualitative method focuses on determining the relevance of a particular phenomenon from the participants' point of view and tracking it through time. A mixed method approach necessitates research and data collecting from both quantitative and qualitative approaches, which may involve logical and theoretical basis. The data collection is collected by observing participants' behavior while they are participating in activities (Cresswell, 2014).

In line to this, the researcher thought the quantitative research approach was appropriate. This is due to the fact that the quantitative approach is an investigation that is based on the assumption that characteristics of the social environment create an objective reality that is largely consistent across time and location (Gall, 1996). As they continued, the general methodology is to describe and explain this real-life feature by collecting numerical data on the observable behavior of the sample and subjecting this data to statistical analysis, which is required for this study. In addition, quantitative studies test theories a priori from existing knowledge by developing hypothetical relationships and proposed outcomes. And to get to that point, this research approach must use a review of the existing literature to deductively develop the theories and hypotheses to be tested, transforming the research problem into specific variables. (Yesegat, 2009). According to Yesigat's additional observations, quantitative research methodologies test the theoretically established link between variables using sample data with the aim of statistically generalizing for the population under study and Due to the quantitative character of the data

employed in this study and the researcher's desire using secondary data, a quantitative research approach was adopted.

3.4. Population and Sampling Frame

The population of the study includes all commercial banks that are operating in Ethiopia. According to NBE report, a meeting held with CEOs of the bank on August 08, 2022 the number of banks has reached a total of 30, which is around 29 commercial banks in Ethiopia since excluding development bank of Ethiopia. The target population (sample frame) of this study was ten selected Ethiopian commercial banks that are operating in Ethiopia. namely , Awash Bank S.C (AB), Dashen Bank S.C (DB), Bank of Abyssinia S.C (BOA),Wegagen Bank S.C(WB),Nib international bank(NIB),Oromia international bank S.C(OIB), Hibert Bank S.C (HB), Cooperative Bank of Oromia (CBO), Lion International Bank S.C (LIB) Zemen Bank S.C(ZB).Therefore, the matrix for the frame is 10*5 that includes 50 observations.

Table 1 Sample Banks

Name of sampled banks	Year start to operation
Awash bank	1994
Dashen bank	1995
Bank of Abyssinia	1996
Wegagen bank	1997
Hibert bank	1998
Nib international bank	1999
Cooperative bank of oromia	2005
Lion international bank	2006
Zemen bank	2008
Oromia international bank	2008

Source: Own drafting

3.5. Sampling Technique

To conduct this study the researcher used Purposive /judgmental sampling. This technique is one of the non-probabilistic sampling techniques used a non-probabilistic sampling approach. According to Saunders, M.et al ,(2012), Purposive/judgmental sampling, is a non-probability sampling technique, used when elements selected for the sample are chosen by the researcher's judgment. Purposive sampling is used when there is large population size, to select a member of a difficult to reach specialized population and to identify particular types of respondents for in depth investigation. By considering the access of full data for the selected time period, due to large population size and time resource constraints the researcher used purposive sampling technique.

3.6. Sample Size

For the purpose of this study ten commercial banks were selected. The selection criteria set by the researcher was first, the required banks are only Commercial banks operating in Ethiopia. Second, those commercial banks should have started operation before 2009 so that they can have financial statements for required years, third those commercial banks compulsory to purchase NBE-bills and forth commercial banks having at least fifteen years operating in Ethiopia. On the base of the aforementioned criteria ten commercial banks for five year data ware taken for this study. As a result, a sample of 50 observations has been used because it is viable in line with time and funds available for this study.

3.7. Data Source and Collection Instrument

To achieve the purpose of the study, the researcher depends solely on secondary data taken from audited financial statement, NBE and from World Bank Collected through structured document review. The data characterized as panel data, which capture both the cross section and time series dimensions. (Baltagi, 2005), cited in (Chen, 2022), described the advantages of panel data as a way to increase number of data points , degree of freedom, and to reduce co-linearity among explanatory variables that lead to improve the efficiency of econometric estimates. They noted additionally, it can also control for individual heterogeneity due to hidden factors that if neglected in time series or cross sectional estimation which leads to biased result. (Eric, 2019), Panel data, sometimes referred to as longitudinal data, is data that contains observations about

different cross sections across time; minimize estimation biases that may arise from aggregating groups into a single time series, by this rational the researcher chooses to use panel data type.

3.8. Study Variables Description

3.8.1. Dependent Variable

Bank Liquidity: Fool, (2016), liquidity, or the amount of cash or cash like assets on the balance sheet, is critical for any banks. Bank must meet funding needs for their operations, they must be able to repay their own debts, and they must have enough cash on hand to meet withdrawal requests, and fund new loans for customers.

Investors should usually pay very close attention to bank liquidity positions because it is the fastest way for a bank to fail. The most widely used measurement for bank liquidity is the ratio of total liquid assets to total assets (Vodova, 2012), which describes liquidity as "the ability of bank to fund increase in assets and satisfy obligations as they come due, without incurring unacceptable losses."

The relative amount of an asset that is in cash or that can be swiftly changed into cash without suffering a loss in value is referred to as liquidity and it is used to meet short-term liabilities. Liquidity ratios (stock approach) and liquidity gaps (flow approach) are the two ways that banks' liquidity can be measured, as was previously described in the literature. The liquidity gap is the difference between assets and liabilities; in contrast, liquidity ratios are several balance sheet items ratios that show trends in liquidity. The liquidity metric offers suggestions regarding the level of liquidity on which the commercial banks are working. The first approach liquidity ratio uses various balance sheet items and is simple to calculate, whereas funding gap, the second approach, is the difference between inflows and outflows, which is hard to measure because it requires more data and there is no Standard method to forecast inflows and outflows. Due to the availability of data, this study will employ liquidity ratios to estimate the liquidity of commercial banks and liquidity ratio is the preferred method in the majority of academic literature due to a more standardized method. Various authors (Aspachs et. al., 2005), (Praet, P and Herzberg,, 2008), provide various measurements of liquidity ratios. Such as, total liquid asset to total asset, total liquid asset to total deposit, loans to total asset, and loans to total deposit. For the purpose of evaluation of the liquidity positions of Ethiopian commercial banks (Wubayehu, 2017), NBE Directive No. SBB/57/2014 requires banks to compute its liquidity ratio by dividing liquid assets to

total deposits. Therefore, the ratio of liquid assets to total deposits had been used to calculate liquidity (dependent variable).

$$\text{Liquidity (LIQ)} = \frac{\text{Total Liquid asset}}{\text{Total deposit}}$$

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

3.9. Independent Variables

Bank Size (BS): bank size is measured by Natural log of total assets of private commercial banks. (Bonner and Zymek, 2013), and (Delechat .C, Henao.C, Mathoora .P and Vtyurina .S., 2012), stated that bank size negatively affects liquidity, yet its impact is significant. In contrast to small banks, which must maintain adequate liquidity, large banks can arrange for fund from external sources. It means that with an increase in bank size, liquid buffer of banks decreases. Large banks may exploit economies of scale and this enables them acquire more client and undertaking in more transactions which translate to more returns which leads more liquid.

$$\text{Bank Size (BS)} = \text{Natural logarithms of total asset}$$

Capital Adequacy of Banks (CAD): The term "capital" refers to the financial resources that companies might employ to finance their activities, such as cash, equipment, machinery, and other resources. These are the resources that enable the company to create a good or service to provide to clients. Capital is the amount of own money that a bank has on hand to support its operations and serve as a safety net in case of adversity (Athanasoglou, 2005). A bank's capital consists of its paid-in capital, undistributed profit (retained earnings), legal reserve or other reserves, and excess fund set aside for unforeseen circumstances. Deposits are the most fragile and susceptible to bank runs, therefore banks' capital helps them maintain liquidity. Financial distress is less likely with increased bank capital. The capital adequacy ratio (CAR) is used to assess the capital adequacy of a company. Capital adequacy ratio shows the internal strength of the bank to withstand losses during crisis as cited by (Dang, 2011), The proxy for capital adequacy is the ratio of total capital and reserve of the bank to total asset of the bank. This study

considered there is a positive relationship between capital adequacy & liquidity as in the above hypothesis.

$$\text{Capital Adequacy Ratio (CAD)} = \frac{\text{Total Capital of the bank} + \text{Reserve in other bank}}{\text{Total asset of the Bank}}$$

Profitability of the Bank (ROA): Liquidity needs constrain a bank from investing its entire available fund. Banks need to be both profitable and liquid which are inherently conflicts between the two and the need to balance them. As more liquid asset is investing on earning assets such as loans and advances, profitability will increase by the expense of liquidity. As a result, banks should always strike a balance between liquidity and profitability to satisfy shareholders' wealth aspirations as well as liquidity requirements. For the purpose of this study, the proxy of profitability is return on asset that measures the overall financial performance of banks and the return on asset (ROA) is measured by the ratio of net profit after tax to Average total asset.

$$\text{Profitability (ROA)} = \frac{\text{Net income after tax}}{\text{Average total asset}}$$

Assets Management (AM): Wealth management and asset management are used interchangeably. An asset manager oversees his or her clients' assets as a provider of financial services. In addition to giving clients expert advice the work also entails selecting investment choices depending on each client's investment strategy, risk tolerance, and financial position. Asset management is aimed for wealthy individual and institutional investors who place their money in liquid asset classes (equities) and other liquid and illiquid asset types (funds). This study considered there is a positive relationship between asset management & liquidity as in the above hypothesis. It can be measured as the ratio of operating income divided by total asset of the bank.

$$\text{Asset management (AM)} = \frac{\text{Operating income}}{\text{Total Asset of the Bank}}$$

Operational Efficiency: Operational efficiency refers to an organization's or bank's capacity to minimize waste in terms of time, effort, and materials while still delivering high-quality services or goods. Operational efficiency is measured in terms of the ratio between the input needed to maintain an organization's operations and the output it produces. A business's inputs include things like costs, labor costs, and time, while its outputs include things like rapid

development times, high quality, revenue, and customer acquisition and retention. It is the ratio of total operating expenses to total assets. This study considered there is a positive relationship between Operation efficiency & liquidity as in the above hypothesis

$$\text{Operation Efficiency (OPEF)} = \frac{\text{Total Operational Expense}}{\text{Total Asset}}$$

Deposit Growth (DG): Deposits are the major source of funds for banks. However, banks are required to maintain adequate liquidity to meet customer demand (Bonner and Zymek, 2013) And (Kashyap, 2002), stated that as demand deposits increase, liquidity asset holdings also increase.

$$\text{Deposit Growth (DG)} = \frac{\text{Customer deposit}}{\text{Total asset}}$$

Gross Domestic Product (GDP): It measures the monetary value of the final goods and services those purchased by the consumer produced in a nation over a specified time period (say a quarter or a year). GDP totals all the output produced inside a nation's boundaries. According to research (Painceira, 2010) on banks' liquidity preferences during various business cycles, their desire for liquidity is low at the time of economic booms. Where, banks confidently expect to profit by expanding loan able funds to sustain economic boom, whereas during economic downturn limit loanable funds in order to prioritize liquidity. To sum up, banks prefer high liquidity due to lower confidence in reaping profits during economic downturn. There is high demand for bank loan at the conditions of economic boom than that of recession time (Gabriell, 2009) and (Andireas, 2009). As they proved in their studies, there is positive relationship between banks financial performance and real GDP. As GDP of the countries increase the demand of lending from bank is also increase.

Aspachs et. al., (2005), has also inferred that banks prioritize liquidity when the economy falls, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favorable. As a result, to the best of our knowledge, banks avoid lending during economic expansion. Even (Valla, N, Saes-Escorbiac, B &Tiesset, , 2006), found a link between liquidity and declining real GDP growth. Therefore, the study expected negative relationship between banks liquidity and economic cycle.it measure the annual gross rate of Gross domestic product. For the purpose of this study, GDP is measured by the annual real growth rate of gross domestic product and it is hypothesized to affect banking liquidity positively.

Reserve Requirement: These costs in this case will be calculated as the proportion of required reserves put in the national bank to total assets. A negative correlation with the dependent variable is expected, because a higher level of reserves will affect a decrease in banks liquidity.

$$\text{Reserve Requirement (RR)} = \frac{\text{Total RR at NBE}}{\text{Total Asset}}$$

NBE Treasury Bill Purchase (NBE-Bill): Evidently, the liquidity of a bank can be significantly impacted by national bank bills. Government regulation which forced private banks exclusively to make investment on bonds that amounts 27 percent of the total loans provided by the banks to customers is currently affecting the Ethiopian private banks liquidity since huge amount of loan able funds tied up in this bond (NBE Bills). A study shows that the national bank bill has a negative influence on bank liquidity. Research in other country by (Berger A and Bouwman, 2010), found that the monetary policy effects on-balance sheet liquidity creation. Thus, NBE-bills purchase to total assets ratio was used as a proxy for measurement of NBE-bill purchase and this study considered there is a Negative relationship between NBE Treasury bill purchases with Bank liquidity.

Table 2 summary of explanatory variables and their anticipated effects

Variables	Symbol	Formulas	Expected sign
Dependent variable			
Bank liquidity	LIQ	$LIQ = \frac{\text{total liquid asset}}{\text{Total deposit}}$	NA
Independent variables			
Bank size	BS	Natural logarithm of total asset	Negative
Capital adequacy	CAD	$CAD = \frac{\text{Equity}}{\text{Total asset}}$	Positive
Profitability of the Bank	ROA	$ROA = \frac{\text{Net income after tax}}{\text{Average total asset}}$	Positive
Asset Management	AM	$AM = \frac{\text{Operating expense}}{\text{total asset}}$	Positive
Operation Efficiency	OPEF	$OPEF = \frac{\text{total operating expense}}{\text{Total asset}}$	Positive
Deposit growth	DG	$\frac{\text{Customer deposit}}{\text{Total asset}}$	Positive
Gross Domestic Product	GDP	Annual real GDP growth rate	Negative
Reserve Requirement	RR	$RR = \frac{\text{Total RR at NBE}}{\text{Total Asset}}$	Positive
NBE Treasury bill purchase	NBE-Bill	The ratio of NBE-bill to total assets	Negative

3.10. Ethical Consideration

Initially the researcher has considered ethical issues that was anticipated and described in this thesis and related to all the phases of the study. Mainly the research outcome helps the banks under the study and it were sources of information for others. Moreover, the researcher tries not falsifying or distorts data or the methods of data collection or plagiarizes the work of other. Finally, followed the best preparation for ethical behaviors like internalize sensitivity to ethical concerns and adopt a serious professional role.

3.11. Model Specification

General multivariate regression model applied to investigate the relationship that exists between Liquidity of commercial banks in Ethiopia and each of explanatory variables that includes Bank size, capital adequacy, Profitability, Asset management, operation efficiency, gross domestic product, Reserve requirement and NBE-bill purchase, another factors that are not included in the model expressed by error term in the model.

The study adopted the following general multivariate regression model, which is used to examine the internal and external factors affecting banks liquidity, (Gujarat, 2004), (Vodová, 2013) and (Raeisi, 2014)

$$Y_{it} = \alpha + \beta \cdot x_{it} + u_{it}$$

Where:

Y_{it} represents dependent variables; subscript **i** denote the cross-section and **t** representing the time-series dimension; **x_{it}** is a vector of explanatory variables for bank **i** in time **t**; **α** is constant; **β** are coefficient which represents the slope of the explanatory variables and **u_{it}** is the error term.

From the above general multivariate regression model, the following specific model (Cucinelli, 2013), was developed to test whether the commercial banks' liquidity was affected by the selected variables involved in the study.

$$LIQ = \beta_0 + \beta_1(BS_{it}) + \beta_2(CAD_{it}) + \beta_3(ROA_{it}) + \beta_4(AM_{it}) + \beta_5(OPREF_{it}) + \beta_6(DG_{it}) + \beta_7(GDP_{it}) + \beta_8(RR_{it}) + \beta_9(NBE\text{-}bill_{it}) + U_{it}$$

Where,

LIQ_{it} = is liquidity ratio measured by L1 for ith bank on year t.

BS_{it} = is Bank size for bank i at time t.

CAD_{it} = capital adequacy of bank i at time t

ROA_{it} = profitability of bank I at time t

AM_{it} = asset management for bank i at time t.

OPEF_{it}=operation efficiency for bank i at time t.

DG_{it}=deposit growth rate of bank i at time t

GDP_t=real gross domestic product/GDP growth of Ethiopia the year t.

RR_{it}=Reserve requirement of bank i at time t

NBE-bill_{it} = is national bank bill purchase for bank i at time t.

U_{it} = is a random error term

3.12. Data Analysis Methods

The study was primarily based on panel data that were collected through structured document review. The data entered into the Stata software used in this study was, analyzed by descriptive statistics and regression analysis to achieve the objective of the study. Descriptive analysis deal with variable descriptions whereas regression analysis is the most important part of the analysis helps to identifying and determining variables effect and draw relationship between dependent and independent variables. Pearson's correlation matrix test is used to identify the relationship of each variable among them and with dependent variables, and various specification tests has been done to check for assumptions of classical linear regression model: Heteroskedasticity, Autocorrelation, Multicollinearity, and normality test are held along with a test for either a fixed effect or random effect model is appropriate for the study (Malhotra, 2007). Finally, the study applied the Ordinary Least Square (OLS) regression method to test the influence of variables that influence the liquidity of selected commercial banks in Ethiopia. This method was chosen because it can minimize the error between the estimated point on the line and the actual observed points of the estimated regression line, providing the best fit. The effect of each explanatory variable on liquidity was assessed using the statistical significance of the 'βs' coefficient. Estimated coefficients were considered statistically significant using 1%, 5%, and 10% significance levels, a calculated coefficient was considered statistically significant if the p-value was less than 0.01, less than 0.05, or less than 0.1 at 1%, 5%, and 10%, respectively. While 10% and 1% are also frequently used, the typical level of significance is 5%. (Brooks, 2008), the

model's signs illustrate the anticipated link between the dependent variable and the independent variables. Last but not least, tables and graphs were used to illustrate all the data.

3.13. Data Presentation

After collecting the data relevant to the research through document review, the researcher edited the data so as to avoid errors or omissions and Coding also done in such way that enables to effectively categorize and analyses the data collected in stata software application. On the other hand regression analysis, the most important part of the analysis, helps to identify and determining variables effect and draw relationship between dependent and independent variables. The panel regression findings were shown in tabular form and assessed using individual statistical significance tests (T-tests) and overall statistical significance tests (F-test). In order to determine if the assumptions of the classical linear regression model (CLRM) have been broken or not, the researcher has also carried out diagnostic tests

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

This chapter deals with data analysis and interpretation. It has four major sections; the first section deals about a descriptive statistics result, the second section tell us the correlation analysis among the selected variables with bank liquidity. The third section is about statistical tests to assure that Classical linear regression model's assumptions are held true. Finally, the OLS regression result presented and discussed.

4.1. Summary of Descriptive Statistics.

The distribution of dependent and independent variables used in the study is explained by descriptive statistics. The main idea of descriptive statistics for a given study is measurement of location and variability. The central value of the variables denoted by location is measured mean whereas the spread of the data from the mean denoted by variability is measured by standard deviation. The dependent variable used in this study is liquidity (LIQ) (response variable).whereas, Operational efficiency(OPEF),Deposit growth rate(DG),Gross Domestic product (GDP), Reserve Requirement (RR), NBE-bills Purchase (NBE_bills), Bank size(BS), Capital Adequacy(CAD),Profitability(ROA) and Asset Management(AM), are explanatory variables.

Table 3 descriptive statistics of dependent and independent variables

	LIQ	BS	CAD	ROA	AM	OPEF	DG	GDP	RR	NBE-bills
Mean	0.207	17.596	0.122	0.024	0.088	0.041	0.809	0.061	0.0315	0.161
Stand. Deviation	0.062	0.598	0.021	0.008.	0.109	0.007	0.107	0.151	0.008	0.021
Minimum	0.132	16.336	0.079	0.003	0.056	0.026	0.703	0.038	0.018	0.107
Maximum	0.395	19.027	0.178	0.049	0.845	0.062	1.281	0.084	0.047	0.232
Observation	50	50	50	50	50	50	50	50	50	50

Source: Owen computation from sampled audited financial statements and NBE from the year 2018 to 2022 G.C via stata

Table 3 shows the results of descriptive analysis of the current study for the period from 2018 to 2022. Bank's Liquidity is taken as a dependent variable, while the independent variables are bank

specific and macroeconomic factors. The mean value of liquidity (total liquid asset to total customer deposit) of Ethiopian commercial Banks for a given period was 0.2071. The mean ratio is by far, more than above the current minimum regulatory requirement of 15% (NBE Directives No.SBB/57/2014).The maximum and minimum value of liquidity ratio is 39.5% and 13.2% respectively. There is high variation of maximum and minimum liquidity ratio. However the variation further indicated by standard deviation which is 6.2%. These mean as a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same for all banks in the sample. According to NBE Directives No.SBB/57/2014 any licensed commercial banks in Ethiopia required to maintain not less than liquid asset of 15% of its net current liabilities. All Ethiopian banks that have a liquidity ratio below the minimum requirement need attention. In general the higher this ratio signifies that the bank has the capacity to absorb liquidity shock and the lower ratio indicates the banks increased sensitivity related to deposit withdrawal. Regarding the independent variables the table above shows a descriptive summary statistic of different ratios.

Bank size, Natural logarithm of total asset is used as a measure of Bank size. The mean value of Bank size is 17.596 which is the average total asset size of sampled commercial banks in Ethiopia during the study period. Natural logarithm is employed to minimize deviations between maximum and minimum values. The maximum and minimum total asset of the sampled bank in the given period was 19.027 and 16.336 respectively. The standard deviation is 59.8 percent indicating greater deviation or variability in factors affecting Ethiopian commercial banks liquidity.

As it is seen in the above table 3the average capital adequacy ratio of the sampled banks in the study period is 12.27 % with the maximum and minimum CAD of 17.8 % and 7.9 % respectively. The standard deviation of 2.142% for CAD reveals that, there was a big dispersion towards the minimum capital adequacy ratio. The mean result of CAD implies above the minimum requirement set by the NBE which is 8% NBE directive No SBB/05/2011. The higher this ratio entails the capability of the bank to absorb losses from its own capital.

The profitability ratio which is measured by ROA is the independent variable with the mean value of 0.024. The standard deviation of profitability is 0.008 from the mean value which is the smallest standard deviation from its mean. The maximum and minimum value of

profitability ratio is 0.049 and 0.003 respectively. This indicates that there is small profitability ratio of private commercial banks in Ethiopia during the study period.

The asset management ratio is peroxides by total operating income by total asset, has an average value of 0.889. The Standard deviation of all commercial banks asset management is 0.109 in the study period as well as 0.056 and 0.845 minimum and maximum value respectively.

The mean value of Ethiopian commercial banks operational efficiency from 2018 to 2022 is 0.0414 with standard of 0.007 which is very small. Commercial banks of Ethiopia enjoyed 0.026 and 0.062 minimum and maximum value of operational efficiency in the given time period.

Deposit growth which is the independent variable with mean value of 0.809 showing standard deviation of 0.107 from the mean value. The minimum value of deposit rate was 0.703 and the maximum value of deposit rate was 1.281. This indicates that deposit growth of commercial banks is very small as compared to liquidity of commercial banks this not leads to attract customer deposit.

The other factor is external factor or macro-economic factors that affect commercial banks liquidity. Real GDP growth rate is used as a measurement of GDP. In table 4, the mean of GDP in Ethiopia during 2018-2022 of 6.14 percent, with a maximum 8.41 percent in 2022 and a minimum of 3.81 percent in 2018 and the standard deviation of 1.52 percent during the period the study period.

Reserve Requirements ratio is measured using total deposit with NBE by total assets and its value ranges from a minimum of 1.8 percent to maximum of 4.7 percent with a mean value and standard deviation of 0.0315 and 0.008 respectively. Mean is less than (7%) NBE SBB/84/2022.

The mean of NBE-bills measured by total amount of NBE-bills purchased by the bank divided to total assets was 0.1619 with the minimum and the maximum of 0.107 and 0.2321, respectively. However, its standard deviations were very small which 0.0219%.

4.2. Correlation Analysis

It is common conducting correlation analysis among variables before going to do detail regression analysis. Correlation analysis is used to identify the direction of relationship between two variables and to measure the degree of association between them. The value of correlation lies between +1 and -1. A correlation coefficient close to either -1 or +1 indicates that there was

strong inverse or direct relationship between variables respectively; whereas a correlation coefficient of zero indicates that the variables are uncorrelated (Brooks, 2008). Correlation analysis is conducted in this section in order to analyze and examine the relationship between variables

Table 4 Correlation Analysis

	LIQ	BS	CAD	ROA	AM	OPEF	DG	GDP	RR	NBE-bills
LIQ	1.0000									
BS	-0.4306	1.000								
CAD	0.3515	-0.4177	1.000							
ROA	0.4055	-0.0688	0.6095	1.000						
AM	0.0065	0.1881	0.967	0.1535	1.000					
OPEF	-0.2453	0.3294	-0.4309	-0.5100	-0.0412	1.000				
DG	0.1091	-0.2115	-0.1300	0.0216	-0.0367	-0.2872	1.000			
GDP	-0.1346	-0.4764	0.0192	0.0189	-0.0343	-0.2934	0.1898	1.000		
RR	0.1796	-0.3493	0.7126	0.3394	0.0972	-0.1560	-0.2032	0.0077	1.000	
NBE-bill	-0.5013	0.5166	-0.1452	-0.1443	0.699	0.1818	-0.1884	-0.3907	0.1800	1.0000

Source: Owen computation from sampled audited financial statements and NBE from the year 2018 to 2022 G.C via stata

As it is seen from the above Table 4 the correlation coefficient of bank size, operational efficiency, real gross domestic product and National bank bills purchase is negatively correlated with liquidity of commercial banks in the given study period. This indicates that as of bank size, operational efficiency, real gross domestic product and National bank bills purchases increase liquidity of commercial banks decrease. The correlation coefficient of capital adequacy, profitability ratio, asset management, deposit growth and reserve requirements is positively correlated with liquidity. This indicates that as capital adequacy, profitability ratio, asset management, deposit growth and reserve requirements increase there is also increasing of bank liquidity.

The correlation coefficient between profitability and liquidity is 0.4055 it means that there was strongly positive correlation between profitability and liquidity of commercial banks, whereas the correlation coefficient between asset Management and liquidity was 0.0065 which is the

weakest positive correlation among the listed variables. The correlation coefficient between NBE bills purchase and liquidity is -0.5013 this reveals that there is strong negative correlation between NBE bills purchase and bank liquidity but the correlation coefficient between gross domestic product and liquidity was -0.1346, it depicts that weakly negative relation between them.

4.3. Diagnostic tests of Classical Linear Regression Model (CLRM)

The classical linear regression model assumptions hold true, then the estimators determined by ordinary least square (OLS) will have a number of desirable properties which is known as Best Linear Unbiased Estimators (BLUE) (Brooks, 2008), Hence, the following sections discuss about the result of diagnostic test including, Multi-collinearity, Heteroskedasticity, normality, autocorrelation, unit root test, model specification test and model selection to ensure whether the data fits the basic assumptions of classical linear regression model or not.

4.3.1. Heteroskedasticity Test

Homoscedastic error term is one of the classical assumptions required for the OLS estimator to be efficient. The homoscedastic assumption fulfilled when the variance of disturbance term is constant and the same for all observation. If the disturbance terms do not have a constant variance across all observations the assumption of Homoscedastic will be violated. The violation of this assumption said to be Heteroskedasticity. If the problem Heteroskedasticity exists in the model, the least squares estimators are still unbiased(consistent) however the Gauss- Markov theorem was violated, in other words confidence interval will be unnecessary larger. As result, the t-test and f-test gives inaccurate result because of overestimation of variance, the t-test will be smaller and statistically insignificant which leads to wrong conclusion (Gujarati, D. N. & Porter, D. C., 2009). There are several tests present to detect the violation of this assumption. This study used Breusch-pagan test in order to check the presence of the problem of Heteroskedasticity for this model. The hypotheses for test of Heteroskedasticity were formulated as follows.

HO: There is homoscedasticity/constant variance/no Heteroskedasticity

H1: There is Heteroskedasticity.

Decision rule:

Reject H_0 if p-value is less than the significant level ($\alpha = 5\%$). Otherwise, do not reject H_0 .

Table 5 Heteroskedasticity Test

Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of liq	
chi2(1)	2.83
Prob > chi2	0.0925

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

As it is indicated in the above table 5 the probability value of chi2 is 0.0925 or 9.25% which is higher than normal acceptance of significant level of 5%. Therefore, the null hypothesis of homoscedasticity is failed to reject at 5 percent level of significant. In other words, there is no Heteroskedasticity in this research model, so we can run OLS to this research model.

In econometrics, an extremely common test for Heteroskedasticity is the White test, which is a statistical test that establishes whether the variance of errors in a regression model is constant, which is homoscedasticity. If no cross product terms are introduced in the white test procedure, then this is a test of pure Heteroskedasticity.

Figure 2. Test of Heteroskedasticity by White test

```
. estat imtest,white  
  
White's test for Ho: homoskedasticity  
  against Ha: unrestricted heteroskedasticity  
  
      chi2(49)      =      50.00  
      Prob > chi2   =      0.4334  
  
Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	50.00	49	0.4334
Skewness	17.76	9	0.0380
Kurtosis	0.03	1	0.8671
Total	67.79	59	0.2025

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

From the above figure under white test the probability value of chi2 is 43.34%, which is greater than 5% of significance level. This indicates that the null hypothesis fail to reject. In other words, there was no Heteroskedasticity in this research model. With respect to Skewness the probability value is 3.80% and the probability value of kurtosis is 86.71 % which is greater than 5% of significance level. This implies that there is no significance evidence for the presence of Heteroskedasticity at 5% significance.

4.3.2. Test of Normality

A normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. A distribution said to be normal when it is symmetric about its mean and also called mesokurtic, while a skewed distribution is not symmetric to its mean, it may be skewed to the left or right side of its mean. For this research to check the problem of normality test, the researcher has been conducted using the most popular test of normality, Shapiro-Wilk W test for normal data. Based on this test of Normality, if the P value is more than 0.05 ($P \geq 0.05$) there is no normality problem.

Shapiro-wilk W test for normal data

Table 6 Test of normality

Variable	Observation	W	V	Z	Prob>z
Res	50	0.97891	0.992	-0.017	0.50698

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

The hypothesis for normality test was formulated as follows

Ho: Error term is normally distributed

H1: Error term is not normally distributed

Decision rule: reject Ho if p-value of Shapiro-Wilk W is less than the significant level ($\alpha = 5\%$). Otherwise, do not reject Ho.

Therefore, the normality tests for this study as shown in table 6, above, the Shapiro-Wilk W test for normal data has a P-value of 0.50698 implies that the p-value of the Shapiro-Wilk W test for normal data for the models is greater than 0.05 which indicates that the errors are normally distributed. From the above table the probability value of normality test is 50.698% which is greater than 5% significant level that shows we fail to reject the null hypothesis.

4.3.3. Multicollinearity Test

According to Brooks (2008), Multicollinearity is the statistical term used for the problem that arises due to high correlations among the independent variables in multiple regression models. It is caused by independent variable having common information. The presences of highly correlated independent variable prevent us from obtaining insight into the true contribution to the regression from each of the independent variables. As noted by (Gujarat, 2004) a serious problem for multi co-linearity is occurred if the correlation is above 0.8 or that is pair-wise or zero-order coefficient between independent variable is out of the recommended range of multi co-linearity, which is -0.8 or 0.8. While Hair (2006), argued that correlation coefficient below 0.9 may not cause serious multi co-linearity problem.

The standard statistical method for testing data for multi co-linearity is analyzing by variance inflation factor (VIF) and explanatory variables correlation coefficients. The benchmark for variance inflation factor (VIF) often given as 10. Thus, if variance inflation factor (VIF) of explanatory variable exceeds 10 indicates that there is the presence of multi co-linearity. If the

variance inflation factor (VIF) of explanatory variable less than 10 indicates that, there is absence of multi co-linearity.

Table 7. Multi-collinearity test by variance inflation factor

Variable	VIF	1/VIF
CAD	3.97	0.251788
RR	2.24	0.308826
BS	3.08	0.324449
ROA	2.24	0.447242
NBE-bills	2.18	0.458691
OPEF	1.89	0.654021
GDP	1.54	0.648094
DG	1.33	0.754498
AM	1.11	0.898786
Mean VIF	2.29	

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

From the above table 7, the variance inflation factor (VIF) of all independent variables are less than 10. This showed that there is no Multicollinearity problem between explanatory variables.

4.3.4 .Test for Autocorrelation

Another assumption of the classical linear regression model is that the covariance between the error terms over the time or cross-sectional is zero. In other terms, it is assumed that the errors are uncorrelated with one another. In this regard to test this assumption, the Wooldridge test for autocorrelation in panel data serial correlation test was used. The hypothesis for test of autocorrelation was formulated as follows.

H₀: There is no autocorrelation

H₁: There is autocorrelation

Table 8. Test for Autocorrelation

Wooldridge test for autocorrelation in panel data	
H0: no first order autocorrelation	
F(1, 9) =	4.827
Prob > F	0.0556

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

Decision rule:

Reject H₀ if p-value is less than the significant level ($\alpha = 5\%$). Otherwise,

Do not reject H₀.

From the above table 8, under Wooldridge test for autocorrelation the probability value of F is 5.56 % which is greater than 5% significance level. This depicts that we fail to reject the null hypothesis. This means that there is no significance evidence for the presence of autocorrelation at 5% significance level in this research model.

4.3.5. Test for Model Specification: Ramsey RESET Tests

Model specification is one of classical linear regression model (CLRM) that the regression model used in the analysis should be correctly specified: If the model is not specified correctly, we encounter the problem of model specification error or model misspecification. Model specification error occurs when omitting an important independent variable, or including unnecessary variable or choosing wrong functional form. If the omitting variable is correlated with the variable which included, the estimators will be biased and inconsistent and model specification error will tends to occur as noted by (Gujarat, 2004). To test this assumption, Ramsey RESET test was used. The hypotheses for model specification test were formulated as follows.

Table 9. Test for Model Specification: Ramsey RESET Tests

Ramsey RESET test using powers of the fitted values of liq	
Ho: model has no omitted variables	
F(3, 37)	2.21
Prob > F	0.0826

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

The hypotheses for model specification test were formulated as follows.

HO: There is no omitting variable or model specification is correct

H1: There is omitting variable or model specification is incorrect

Decision rule: reject Ho if p-value is less than the significant level ($\alpha = 5\%$). Otherwise, do not reject Ho

As it is shown in the above table 9, the Ramsey RESET test F-statistics is 2.21 with p-value of 0.0826 which is greater than 5% significant level, so we failed to reject the null at 5% significant. Therefore, it depicts that this model is correctly specified and the estimated coefficients are appropriate to explain the liquidity factors.

4.3.6. Random Effect vs. Fixed Effect Models

According to (Brooks, 2008), there are broadly two classes of panel estimators' approach models that can be applied in financial research that is fixed effect model and random effect models. Choosing one of the two models depends on the assumption we make about the likely correlation between the cross-sections specification error and explanatory variable are uncorrelated. Hausman test is used to choose appropriate model for the study. The hypotheses for model selection were formulated as follows.

HO: random effect model is appropriate

H1: fixed effect model is appropriate

Decision rule: reject Ho if p-value is less than the significant level ($\alpha = 5\%$). Otherwise do not reject Ho.

Figure 3. Random effect vs. fixed effect model models

. hausman fixed random

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
bs	-.1167131	-.0495665	-.0671466	.0264395
cad	-.7338331	-.8850653	.1512322	.407263
roa	1.374792	2.789972	-1.41518	.4879633
am	-.0105996	.0342033	-.0448028	.
opef	-.7575139	-.4592552	-.2982586	1.032172
dg	.1868353	.0205938	.1662415	.0621971
gdp	-3.12392	-2.377937	-.7459828	.3145869
rr	-3.489488	1.348304	-4.837792	1.848945
nbebills	-.0600794	-1.406839	1.346759	.3240777

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
 = 5.65
 Prob>chi2 = 0.7742
 (V_b-V_B is not positive definite)

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

Therefore, the researcher made Hausman test for these models to check whether to use fixed effects or random effects model. Random effects model is found to be appropriate. Based on the Hausman model specification test, the P- value of the model is 0.7742 or 77.42% which is more than 5% level of significance. This showed that the null hypothesis of the model which is Random effect model is appropriate failed to reject at 5 percent of significant level.

Therefore, Random effect model is appropriate for this study and regression analysis will be made based on random effect estimates.

$$liq [b,t] = Xb + u[b] + e[b,t]$$

Table 10. Breusch and Pagan Lagrangian multiplier test for random effects

Breusch and Pagan Lagrangian multiplier test for random effects	
chibar2(01)	0.00
Prob > chibar2	1.0000

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

After running the Hausman test, it is better to test Breusch and Pagan Lagrange multiplier for random effects versus pooled ordinary least square method. The LM test (Lagrange Multiplier test) is used to decide between a random effect's regression and simple OLS regression. The null hypothesis is that there is no significant different across cross-sectional unites (i.e. no panel effect) implying that random effects model is inappropriate. Based on the above table 10, The LM test statistics is 0.00 for the Model with the p-value of 1.000 which is greater than 5 percent, so it is insignificant and the null hypothesis in favor of OLS is fail to reject. Thus, the pooled ordinary least square is chosen against Random effects model.

4.3. Regression Analysis and Interpretation

The operational panel regression model used to find the statistically significant factors affecting liquidity of commercial banks Ethiopia was:

$$LIQ = \beta_0 + \beta_1(BS_{it}) + \beta_2(CAD_{it}) + \beta_3(ROA_{it}) + \beta_4(AM_{it}) + \beta_5(OPEF_{it}) + \beta_6(DG_{it}) + \beta_7(RR_{it}) + \beta_8(GDPT_{it}) + \beta_9(NBE_{it}) + U_{it}$$

Where,

LIQ_{it} = is liquidity ratio measured by Liquidity for ith bank on year t.

BS_{it} = Bank size of bank i at time t.

CAD_{it} = Capital adequacy of bank i at time t

ROA_{it} = profitability of bank I at time t

AM_{it} = asset management for bank i at time t.

OPEF_{it} = operation efficiency for bank i at time t.

DG_{it} = deposit growth rate of bank i at time t

GDP_t=real gross domestic product/GDP growth of Ethiopia on the year t.

RR_{it}=Reserve requirement of bank i at time t

NBE-bill_{it}=is national bank bill purchase for bank i at time t.

U_{it} = is a random error term

Figure 4. Regression result by OLS

Source	SS	df	MS	Number of obs	=	50
Model	.122042201	9	.013560245	F(9, 40)	=	7.65
Residual	.07093347	40	.001773337	Prob > F	=	0.0000
				R-squared	=	0.6324
				Adj R-squared	=	0.5497
Total	.192975671	49	.003938279	Root MSE	=	.04211

liq	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bs	-.0495665	.0176595	-2.81	0.008	-.0852576	-.0138754
cad	-.8850653	.5594674	-1.58	0.122	-2.015791	.2456605
roa	2.789972	1.006202	2.77	0.008	.7563627	4.823582
am	.0342033	.0579882	0.59	0.559	-.0829952	.1514018
opef	-.4592552	1.077865	-0.43	0.672	-2.637703	1.719192
dg	.0205938	.0646476	0.32	0.752	-.110064	.1512515
gdp	-2.377937	.4918208	-4.83	0.000	-3.371944	-1.38393
rr	1.348304	1.288964	1.05	0.302	-1.256789	3.953398
nbebills	-1.406839	.4055274	-3.47	0.001	-2.22644	-.5872372
_cons	1.449856	.339907	4.27	0.000	.7628779	2.136833

Source: Computed through Stata, NBE and Banks audited annual report from 2018-2022

The above figure 4 depicts the effect of independent variables on commercial banks liquidity. Thus liquidity is the dependent variable while bank size, capital adequacy, profitability, asset Management, Operational efficiency, deposit growth rate, gross domestic product, Reserve requirement and NBE-bill purchases are independent variables.

Multiple regression analysis was conducted to establish the relationship between commercial banks liquidity and the independent variables. The OLS model equation which is applied in this thesis is as follows:

$$LIQ=1.4498-0.0495BS-0.8850CAD+2.7899ROA+0.03420AM-0.4592OPEF+0.0205DG-2.3779GDP-1.3483RR-1.0468NBEbillit+Uit$$

4.3.1. Interpretation of F- Statistic/variance Test/Model fit test

According to the above figure 4, the overall, F-statistic 7.65 which is highly significant at 1% with a p-value 0.000 revealed that, those independent variables collectively have statistically

significant effect on the dependent variable. Thus, it implies that the explanatory variables in the model can describe the variations in the dependent variable, in which the total model is significant and we can use these data for prediction, policy making and educational purpose.

4.3.2. Interpretation of Coefficient of Determination(R- squared)

The coefficient of determination measures the success of the regression in predicting the values of dependent variable in the sample. It is the contribution of the independent variables to dependent variable. As noted by Muijs (2004), there is a rule of thumb, which can be used to determine the R – squared values as follows: 0% to 10% poor fit, 11% to 30% weak fit, 31% to 50 % moderate fit, and greater than 50% strong fit. The result of regression in the above figure shows, R^2 is 63.24%, meaning that 63.24% variation of the dependent variable is explained by the selected independent variables. In other words (100% - 63.24% = 36.76%) change in the dependent variable is due to unknown variables or error variables. It means that explained variance is more than error variance, which is good sign for developing the model.

4.3.3. Interpretation of Adjusted R – Squared

The adjusted R – squared tells that whether the additional independent variable contributed to the total model or not. Only when the additional term enhances the model more than would be predicted by chance does the modified R^2 rise. It falls off when a predictor boosts the model by less than would be predicted by chance. Here in this study adjusted R^2 of 54.97% indicates that the formula is strongly fit for predicting the dependent variable liquidity. These means that 54.97% of changes occur in the dependent variable liquidity are attributable by the explanatory variable.

4.3.4. Interpretation of Regression Result

In this section, the relationship between dependent variable and each explanatory variable on the basis of findings were explained. The study includes the dependent variable which is liquidity and the independent variables, bank size, capital adequacy, Profitability, Asset Management, Operational efficiency, deposit growth rate, Gross Domestic Product, Reserve requirement and NBE-bill purchases.

4.3.5. Interpretation of Intercept (Constant)

The constant is often defined as the value of the dependent variable when you set all of the explanatory variables in the model to zero. Here, from the above figure the value of intercept is 1.4498 and probability value of 0.000 that is significant even at 1%. This indicates that when all value of the independent variable is equal to zero the dependent value is equal to 1.4498.

4.4. Discussion of Regression Results

4.4.1. Interpretation of Bank Size

According to the above figure 4, bank size has negative and significant effect on liquidity of commercial banks in Ethiopia during the study period. The regression result found to be negative and statistically significant result on liquidity. The coefficient value of the Bank size is -0.0495665 with p value of 0.008 which revealed, a unit increases in Bank size or total asset in commercial banks, results 0.0495665 decrease in liquidity of commercial banks in Ethiopia holding other variables constant, but it is statistically significant even at 1% confidence level. This outcome is similar with the study conducted by (Wubayehu, 2017) and (Rahel, 2019) and Eissa A. Al-Homaidi et al. (2019), which suggested as BS has negative statistically significant effect on commercial banks liquidity. However, the findings of the current study is inconsistent with that of Aspachs et al. (2005) who have suggested that bank size has an insignificant influence on LQD.

4.4.2. Interpretation of Capital Adequacy Ratio

Capital adequacy which is measured by the ratio of equity and reserve to total asset is positively related with LIQ of commercial banks and has statistically insignificant effect, with p-value of 0.122 and estimates of coefficient is -0.8850653 respectively. As it is revealed in figure 4, the negative coefficient of CAD indicated that, holding other variables constant one unit increases in capital adequacy results, 0.8850653 unit decrease in liquidity of Ethiopian commercial banks and this is in line with the findings of wassihune (2020); Laurine (2013) and Diamond DW and Rajan RG(2000,2001), the result also showed that it has negative and statistically insignificant impact with liquidity which is inconsistent with the study provided by Nigist (2015) and Tseganesh (2012) .

4.4.3. Interpretation of Profitability Ratio

The above OLS Regression model shows that, profitability ratio has positive and statistically significant impact on liquidity of Ethiopian commercial banks. This positive relation shows that, higher profitability leads to increase banks liquidity. Hence, the profitability ratio has the coefficient of estimate of 2.789972, t – value of 2.77 and its probability value of 0.008 indicated that profitability ratio has statistically significant result even at 1% significance level. The coefficient of estimate implies that holding other explanatory variable constant, when the profitability ratio increase by one percent 1, liquidity of commercial banks increase by 2.789972. Here the result of the study agreed with my expectation stated on hypothesis. In general, the result of this study was consistent with the findings of (Vodova, 2012) and Rahel (2019), but opposite to Tiesset, (2006) and (Nigist, 2015), claimed that profitability had negatively affected bank's liquidity Thus, the researcher concluded that profitability ratio has a positive and statistically significant effect on liquidity of commercial banks in Ethiopia during the study period.

4.4.4. Interpretation of Asset Management

The regression result shows that, asset management has positive and insignificant effect on liquidity of commercial banks in Ethiopia. Hence, Asset Management has the coefficient estimate of 0.0342033, t – value of 0.59 and its probability value of 0.559. The p -value of 0.559 showed that it is statistical insignificant even at 10% significance level. Whereas coefficient estimate of 0.0342033 implies that holding other explanatory variable constant, when the asset management of commercial banks of Ethiopia increases by one unit, liquidity of commercial banks also increase by 0.0342033 Thus, we concluded that asset management has a positive and insignificant effect on liquidity of commercial banks in Ethiopia.

This study is consistent with the previous studies of Eissa A. Al-Homaidi et al, (2019) so that the result suggested that when Asset Management increases the liquidity of commercial banks of Ethiopia increases.

4.4.5. Interpretation of Operational Efficiency

From the above figure 4, the operational efficiency has negative and insignificant effect on liquidity of commercial banks in Ethiopia. Hence, the operating efficiency has the coefficient estimate of -0.4592552, t – value of -0.43 and its probability value of 0.672. Its probability value 0.672 revealed that it is statistical insignificant at 5% significance level. The inverse relationship

between them implies that holding other explanatory variable constant, when the operating efficiency increase by one unit, liquidity of Ethiopian commercial banks decreases by 0.4592. The study consistent with my expectation since its effect was statistically insignificant as well as negative relationship. Thus, we concluded that operational efficiency has a negative and statistically insignificant effect on Ethiopian commercial banks in the study period.

This result is consistent with the previous studies of Eissa A. Al-Homaidi et, al (2019), so that the result suggested that when operational efficiency increases the liquidity commercial banks of Ethiopia decrease.

4.4.6. Interpretation of Deposit Growth

As it is evident in the above figure, deposit growth has a positive and insignificant effect on liquidity of commercial banks in Ethiopia. Hence, the deposit growth has the coefficient of estimate of 0.0205938, t – value of 0.32 and its probability value of 0.752 depicted that deposit growth is statistical insignificant even at 10% significance level with coefficient of estimate of 0.0205938 that implies holding other explanatory variables constant, when the deposit growth increase by 1 unit liquidity of commercial banks also increase by 0.0205938. This result is similar with the study conducted by Wubayehu, (2019).

4.4.7. Interpretation of Gross Domestic Product

As it is depicted in the above regression figure 4, GDP has -2.377937 coefficient of estimate, t-value of -4.83 and p-value of 0.000. The probability value shown in the figure implies GDP is statistically significant even at 1% level of significance. The coefficient of GDP being negative revealed that as GDP increase by one unit liquidity of commercial banks decrease by 2.377937. This result is consistent with Valla et al. (2006), Dinger (2009), (Vodova, 2011) and (Aspachs et. al. and Tiesset, 2005), which established negative relationships between the liquidity and GDP. This implies that in a recession of the economy commercial banks is more liquid than in the boom time. Hence, the result is similar with the hypothesis stating; real GDP growth rate has negative and significant impact on banks liquidity.

4.4.8. Interpretation Reserve Requirement

As it is seen in the above figure 4, the obligatory reserve has estimates of coefficient, t-value and p-value of 1.348304, 1.05, and 0.302 respectively. RR p-value revealed that it is statically insignificant at 5% significant level whereas, estimates of coefficient 1.348304, indicating that as

reserve requirement increase by one unit having other explanatory variables constant liquidity of commercial banks of Ethiopian increase by 1.348304. Indeed, the reserve requirement held by NBE is for reliability issue for depositors and it has positive impact on the banks liquidity. Liquidity will increase when customers deposit increases commercial banks of Ethiopian in the forms of demand deposit saving deposit and time deposit, similarly RR increase by 7% for every colander month. This result is inconsistent with the previous studies conducted by Rahel (2019).

4.4.9. Interpretation of National Bank bill and Liquidity

The regression result stated in figure 4, investment in NBE-Bills measured by NBE bill purchase to total asset is negatively related with liquidity of commercial banks in Ethiopia. As it is depicted in the above table p-value, t-value and coefficient estimate of NBE-bill purchase is 0.001, -3.47 and -1.406839 respectively. NBE bill purchase has a coefficient estimate of -1.406839 means, holding other factors constant, 1 unit increase in NBE bill will decrease liquidity of commercial banks in Ethiopia by 1.406839 and its p-value 0.001 revealed that it is statistically significant even at 1 percent level of significance. This study is consistent with the researchers' prior expectation, like Rahel (2019) ,Wubayehu (2017) and Belet (2015),which forces banks to invest 27 percent of total loans disbursed on bonds (NBE Bills) on which banks have no right to use it for payment and settlement purposes when the need arises. For 1 birr loan and advance to customer they must purchase 27 cents of national bill, Hence, the hypothesis stating NBE Bill has negative and significant impact on bank liquidity should be accepted.

4.5. Summary of Analysis

Table 11 summary of analysis

s.no	Explanatory variables	Expected sign and impact on liquidity	Actual impact on liquidity	Decision
1	BS	Negative significant	Negative and significant	Accepted
2	CAD	Positive significant	Negative and insignificant	Rejected
3	ROA	Positive significant	Positive and insignificant	Rejected
4	AM	Positive insignificant	Negative and insignificant	Rejected
5	OPEF	Negative insignificant	Negative and insignificant	Accepted
6	DG	Positive significant	Negative and insignificant	Rejected
7	GDP	Negative significant	Negative and significant	Accepted
8	RR	Negative significant	Positive and insignificant	Rejected
9	NBE-bills	Negative significant	Negative and significant	Accepted

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1. Introduction

This chapter consists of summary of finding, conclusions, recommendations and an indication of future researches. Since the study deals about the factors that affects liquidity in Ethiopia Commercial banks during the period from 2018-2022 G.C. Findings indicated that Ethiopian commercial banks liquidity are influenced by bank specific or internal factors including: Bank size (BS), Capital Adequacy (CAD), Profitability (ROA), Asset Management (AM), operational efficiency(OPEF),deposit growth (DG) and external or macroeconomic factors including: Gross domestic product (GDP),Reserve requirement(RR) and NBE-bill purchases(NBE-bills) .This chapter outlines the summary and conclusions of the study in accordance with the regression results. It also gives an insight on the policy recommendations as well as suggestions for future studies.

5.2. Summary of Findings

The thrust of the study was in investigating the factors affecting liquidity in selected commercial banks operating in Ethiopia. An explanatory research design adopted to explain the casual relationships between the variables. The study employed quantitative methods on secondary data sourced from audited financial statements of banks, NBE publications for macro-economic variables as well as from World Bank. Banks should remain liquid at all times to prevent falling into liquidity crisis, which cause distress among the stakeholders and tremor in the overall economy. Thus, this study attempts to identify the factors affecting liquidity of selected private commercial banks in Ethiopia. This research also provides summary of previous studies on similar topics. Nine variables affecting the selected private commercial banks liquidity were chosen and analyzed. Panel data was used for the sample of ten commercial banks in Ethiopia from the year 2018 to 2022 GC and estimate using Random effect model (REM). Data was presented by using descriptive statistics. The balanced

correlation and regression analysis for liquidity conducted. Before performing OLS regression the models were tested for the classical linear regression model assumptions. Analysis made for nine factors affecting selected private commercial banks liquidity. From the list of possible explanatory variables, bank size, profitability, gross domestic product and NBE-bill purchase proved to be statistically significant at 5% significant level whereas the rest are not statistically significant at 5% but positively or negatively affects at different significant or confidential level.

The specific findings on each of the factors are presented below as follows:

- Bank size has a negative and statistically significant effect on liquidity of Ethiopian commercial banks at 5 % level of significance. So bank size has inverse relationship with liquidity.
- Capital adequacy ratio has a negative and insignificant impact on liquidity of commercial banks in Ethiopia. This indicates that as capital adequacy ratio of the bank increase liquidity position of Ethiopian commercial banks decreases, more liquidity problem will happen.
- Profitability ratio has a positive and significant effect on liquidity of commercial banks in Ethiopia, So that as profitability of Ethiopian commercial banks increase liquidity position of the bank also increases. i.e. directly related.
- Asset management ratio has a positive and insignificant impact on Ethiopian commercial banks liquidity. This means that statistically asset management has insignificant effect on Ethiopian commercial banks liquidity with positive relationship.
- Operational efficiency has a negative and insignificance impact on commercial banks of Ethiopia at 5% and 1% significance level even at 10% significance level, And OPEF related negatively with liquidity.
- The relationship between deposit growth and bank liquidity is positive, as deposit growth increase liquidity of commercial banks also increase but statistically deposit growth has insignificant effect.
- Real GDP Growth rate has negative impact on the liquidity of commercial banks and it is statistically significant even at 1% significance level. Since as growth domestic product of the country increases liquidity position of commercial banks decreases.

The statistically significant effect of real GDP growth rate on commercial banks' liquidity was properly aligned to Angora and Roulet (2011) and Cucinelli (2013).

- Liquidity is positively influenced by reserve requirement and Reserve requirement has statistically insignificant impact even at 5% significance level. The positive relationship between the reserve requirement and banks liquidity indicates that as Reserve requirement increase also liquidity of commercial banks increase by estimates of coefficient.
- NBE bill Purchase has negative and statistically significant impact on the determination of liquidity of Ethiopian commercial banks and it was in line with the hypothesis. It depicts that statistically it is significant for liquidity determination, which is consistent with the researchers conducted by Rahel (2019). Based on the results from the regression analysis estimated by random effect regression model the following conclusions were made

5.3. Conclusion

The study finally concluded that the factors affecting liquidity of commercial banks' of Ethiopia are bank specific/internal factors/ that includes bank size ratio, capital adequacy ratio, profitability ratio, Asset management, operational efficiency, deposit growth and external/ macroeconomic factors/ includes Gross domestic product, Reserve requirement and NBE-bills purchase. Among the aforementioned variables, bank size, profitability ratio gross domestic product and NBE-bills purchase has statistically significant impact on determination of commercial banks liquidity. But, Asset management, operational efficiency, capital adequacy ratio, operational efficiency, deposit growth and Reserve requirement has statistically insignificant effect on determining liquidity of Ethiopian commercial banks during the sampled period.

5.4. Recommendations

Based on the finding and conclusion the study, the research forwards these recommendations to Ethiopia's commercial banks,

- As depicted in the finding Bank size was negatively related with liquidity of commercial bank in Ethiopia and statistically significant. For that matter, bank size has statistically

significant effect can be taken as the major factors of banks liquidity in this study. Since the size of the bank can be assessed in terms of total asset, deposit, total liability and capital. As bank size increases business organizations want mostly to invest their assets on illiquid assets, but for this investment concerned bodies should know that liquidity buffers of banks are obligatory.

- Capital adequacy: While issuing new directives or amending the existing policies, NBE takes into consideration that the increase of capital requirements has put pressure on the banks' liquidity. Since capital requirements have a negative and insignificant impact on banks' liquidity.
- Concerning the profitability ratio, it has a positive and significant effect on the liquidity of Ethiopian commercial banks as it was revealed in the findings. Following this, the researcher recommended that banks increase their profitability by putting high loans to borrowers and can get high interest income but it should be considered the relationship with their borrowers due to their inability to pay their loans and the occurrence of NPL because this NPL negatively affects the liquidity position of Ethiopian commercial banks.
- With respect to asset management and operational efficiency, the liquidity of Ethiopian commercial banks was negatively affected but statistically insignificant so that managers, boards and all staffs should manage banks' assets carefully and controllably and non-controllable expenses should be allocated and expensed in a responsible manner.
- Deposit growth: This finding implies that with an increase in customers' deposits, banks' liquidity positions also increase as a result, if banks hold more liquid assets which are idle leads a bank to more problems, so concerned bodies should take care of it.
- As it is seen in the findings and conclusions GDP has a negative effect on bank liquidity and is statistically significant so concerned bodies like the National Bank of Ethiopia and the Ethiopian government should be made all rounded inspection concerning financial institution activity and the country's economic condition by considering different aspects.
- While issuing new directives or amending the existing policies, NBE and the government of Ethiopia take into consideration that the increase of statutory reserve requirements policy has put pressure on the banks' liquidity even it has a positive relationship. At first huge amount of liquid assets should not be deposited at NBE especially at this time while liquidity problem is a bottleneck throughout the country.

- NBE Bill purchase: Since huge amount of loanable fund from the commercial banks is tied up in NBE with very small interest rate which is three percent and as it contributes negatively to the commercial banks liquidity. NBE should revise the policy by either increasing the interest rate provided on the bill purchase or to decrease the percentage of obligatory bill purchase by the commercial banks. Since it has still gaps when we compare it with the deposit rate of 7%.

5.5. Suggestion for Future Study

The major emphasis of this study was on factors affecting liquidity of selected commercial banks in Ethiopia using some selected variables. However, there are so many internal or bank specific factors and external or Macroeconomic factors that affects liquidity of commercial banks in Ethiopia like service quality of the bank, asset quality of the bank ,non-performing loan, interest rate, inflation rate etc. So by using the above listed factors future studies can be conducted on this area to improving knowledge

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APPENDIX 1

Bank	Year	LIQ	BS	CAD	ROA	AM	OPEF	DG	GDP	RR	NBE-bills
AB	2018	0.268	17.828	0.118	0.031	0.071	0.035	0.786	0.068	0.040	0.152
AB	2019	0.191	18.128	0.129	0.037	0.080	0.034	0.799	0.084	0.039	0.169
AB	2020	0.205	18.307	0.134	0.032	0.845	0.038	0.791	0.061	0.036	0.171
AB	2021	0.175	18.673	0.123	0.031	0.081	0.040	0.795	0.056	0.032	0.181
AB	2022	0.217	19.027	0.114	0.034	0.089	0.043	0.807	0.038	0.030	0.187
DB	2018	0.196	17.632	0.130	0.020	0.060	0.037	0.790	0.068	0.020	0.137
DB	2019	0.132	17.845	0.122	0.018	0.063	0.041	0.800	0.084	0.018	0.155
DB	2020	0.163	18.039	0.122	0.025	0.069	0.043	0.780	0.061	0.025	0.166
DB	2021	0.149	18.366	0.107	0.021	0.065	0.037	0.790	0.056	0.021	0.176
DB	2022	0.185	18.579	0.123	0.028	0.074	0.039	0.780	0.038	0.028	0.172
BOA	2018	0.174	17.281	0.133	0.017	0.069	0.042	0.807	0.068	0.027	0.151
BOA	2019	0.139	17.487	0.126	0.020	0.071	0.041	0.818	0.084	0.030	0.161
BOA	2020	0.134	17.857	0.100	0.018	0.068	0.047	0.837	0.061	0.024	0.175
BOA	2021	0.136	18.461	0.083	0.017	0.072	0.044	0.856	0.056	0.019	0.196
BOA	2022	0.151	18.822	0.095	0.028	0.084	0.048	0.817	0.038	0.022	0.201
WB	2018	0.197	17.126	0.140	0.029	0.085	0.044	0.733	0.068	0.041	0.146
WB	2019	0.182	17.209	0.144	0.029	0.072	0.046	0.773	0.084	0.045	0.156
WB	2020	0.211	17.457	0.134	0.024	0.083	0.050	0.767	0.061	0.043	0.165
WB	2021	0.154	17.496	0.127	0.003	0.089	0.062	0.746	0.056	0.046	0.177
WB	2022	0.304	17.579	0.130	0.013	0.073	0.061	0.737	0.038	0.045	0.181
HB	2018	0.196	17.149	0.105	0.020	0.067	0.057	0.705	0.068	0.028	0.143

HB	2019	0.132	17.392	0.108	0.021	0.062	0.037	0.710	0.084	0.038	0.232
HB	2020	0.153	17.577	0.125	0.026	0.071	0.043	0.714	0.061	0.036	0.171
HB	2021	0.155	17.577	0.120	0.025	0.073	0.042	0.739	0.056	0.035	0.177
HB	2022	0.198	17.806	0.108	0.018	0.085	0.048	0.709	0.038	0.035	0.181
NIB	2018	0.180	17.100	0.127	0.019	0.061	0.034	0.810	0.068	0.036	0.136
NIB	2019	0.142	17.334	0.131	0.021	0.063	0.033	0.820	0.084	0.038	0.154
NIB	2020	0.159	17.564	0.136	0.027	0.067	0.035	0.790	0.061	0.037	0.163
NIB	2021	0.175	17.808	0.129	0.025	0.070	0.039	0.800	0.056	0.037	0.171
NIB	2022	0.301	17.934	0.132	0.023	0.073	0.041	0.810	0.038	0.034	0.171
CBO	2018	0.302	17.213	0.080	0.017	0.063	0.042	0.850	0.068	0.019	0.133
CBO	2019	0.201	17.548	0.079	0.016	0.064	0.045	0.858	0.084	0.021	0.138
CBO	2020	0.152	17.776	0.097	0.026	0.080	0.050	0.856	0.061	0.025	0.151
CBO	2021	0.201	18.214	0.087	0.019	0.074	0.050	0.866	0.056	0.018	0.152
CBO	2022	0.172	18.557	0.099	0.021	0.082	0.052	0.836	0.038	0.019	0.163
LIB	2018	0.259	16.477	0.126	0.027	0.076	0.039	1.062	0.068	0.027	0.134
LIB	2019	0.220	16.831	0.126	0.026	0.079	0.038	1.145	0.084	0.030	0.154
LIB	2020	0.264	17.274	0.110	0.025	0.067	0.034	1.281	0.061	0.026	0.162
LIB	2021	0.150	17.288	0.113	0.010	0.072	0.038	0.818	0.056	0.030	0.183
LIB	2022	0.147	17.311	0.116	0.008	0.062	0.035	0.805	0.038	0.035	0.195
OIB	2018	0.343	16.985	0.109	0.031	0.081	0.040	0.711	0.068	0.025	0.131
OIB	2019	0.228	17.274	0.117	0.023	0.075	0.039	0.706	0.084	0.022	0.107
OIB	2020	0.224	17.337	0.136	0.026	0.077	0.045	0.703	0.061	0.033	0.156
OIB	2021	0.240	17.546	0.131	0.023	0.074	0.047	0.707	0.056	0.026	0.162

OIB	2022	0.265	17.768	0.132	0.026	0.079	0.048	0.712	0.038	0.031	0.162
ZB	2018	0.396	16.336	0.136	0.023	0.056	0.026	0.890	0.068	0.033	0.117
ZB	2019	0.217	16.503	0.159	0.040	0.072	0.028	0.950	0.084	0.047	0.168
ZB	2020	0.303	16.733	0.169	0.048	0.084	0.030	0.780	0.061	0.042	0.142
ZB	2021	0.317	17.040	0.178	0.044	0.084	0.031	0.760	0.056	0.042	0.151
ZB	2022	0.299	17.374	0.178	0.049	0.090	0.031	0.770	0.038	0.043	0.162

APPENDIX 2

Source	SS	df	MS	Number of obs	=	50
Model	.122042201	9	.013560245	F(9, 40)	=	7.65
Residual	.07093347	40	.001773337	Prob > F	=	0.0000
Total	.192975671	49	.003938279	R-squared	=	0.6324
				Adj R-squared	=	0.5497
				Root MSE	=	.04211

liq	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bs	-.0495665	.0176595	-2.81	0.008	-.0852576	-.0138754
cad	-.8850653	.5594674	-1.58	0.122	-2.015791	.2456605
roa	2.789972	1.006202	2.77	0.008	.7563627	4.823582
am	.0342033	.0579882	0.59	0.559	-.0829952	.1514018
opef	-.4592552	1.077865	-0.43	0.672	-2.637703	1.719192
dg	.0205938	.0646476	0.32	0.752	-.110064	.1512515
gdp	-2.377937	.4918208	-4.83	0.000	-3.371944	-1.38393
rr	1.348304	1.288964	1.05	0.302	-1.256789	3.953398
nbebills	-1.406839	.4055274	-3.47	0.001	-2.22644	-.5872372
_cons	1.449856	.339907	4.27	0.000	.7628779	2.136833

APPENDIX 3

```
. sum liq bs cad roa am opef dg gdp rr nbebills
```

Variable	Obs	Mean	Std. Dev.	Min	Max
liq	50	.20708	.0627557	.132	.396
bs	50	17.5965	.5980634	16.336	19.027
cad	50	.12266	.0214292	.079	.178
roa	50	.02456	.0089401	.003	.049
am	50	.08892	.1094284	.056	.845
opef	50	.04138	.0076795	.026	.062
dg	50	.80964	.1071312	.703	1.281
gdp	50	.0614	.015194	.038	.084
rr	50	.03158	.0083985	.018	.047
nbebills	50	.16194	.0219037	.107	.232

APPENDEX 4

```
. pwcorr liq bs cad roa am opef dg gdp rr nbeills
```

	liq	bs	cad	roa	am	opef	dg
liq	1.0000						
bs	-0.4306	1.0000					
cad	0.3515	-0.4177	1.0000				
roa	0.4055	-0.0688	0.6095	1.0000			
am	0.0065	0.1881	0.0967	0.1535	1.0000		
opef	-0.2453	0.3294	-0.4309	-0.5100	-0.0412	1.0000	
dg	0.1091	-0.2115	-0.1300	0.0216	-0.0367	-0.2872	1.0000
gdp	-0.1346	-0.4764	0.0192	0.0189	-0.0343	-0.2934	0.1898
rr	0.1796	-0.3493	0.7126	0.3394	0.0972	-0.1560	-0.2032
nbeills	-0.5013	0.5166	-0.1452	-0.1443	0.0699	0.1818	-0.1184

	gdp	rr	nbeills
gdp	1.0000		
rr	0.0077	1.0000	
nbeills	-0.3907	0.1800	1.0000

APPENDEX 5

```
. hetttest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of liq

chi2(1) = 2.83

Prob > chi2 = 0.0925

APPENDEX 6

```
. estat imtest,white
```

White's test for Ho: homoskedasticity

against Ha: unrestricted heteroskedasticity

chi2(49) = 50.00

Prob > chi2 = 0.4334

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	50.00	49	0.4334
Skewness	17.76	9	0.0380
Kurtosis	0.03	1	0.8671
Total	67.79	59	0.2025

APPENDIX 7

```
. swilk res
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
res	50	0.97891	0.992	-0.017	0.50698

APPENDIX 8

```
. vif
```

Variable	VIF	1/VIF
cad	3.97	0.251788
rr	3.24	0.308826
bs	3.08	0.324449
roa	2.24	0.447242
nbebills	2.18	0.458691
opef	1.89	0.528199
gdp	1.54	0.648094
dg	1.33	0.754498
am	1.11	0.898786
Mean VIF	2.29	

APPENDIX 9

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 9) = 4.827
Prob > F = 0.0556

APPENDIX 10

```
. sktest res
```

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	joint Prob>chi2
res	50	0.1295	0.5877	2.74	0.2542

APPENDIX 11

```
. ovtest
```

Ramsey RESET test using powers of the fitted values of liq

Ho: model has no omitted variables

F(3, 37) = 2.41
Prob > F = 0.0826

APPENDEIX 12

```
. ovtest

Ramsey RESET test using powers of the fitted values of liq
Ho: model has no omitted variables
      F(3, 38) =      2.26
      Prob > F =      0.0968
```

APPENDEIX 13

```
. hausman fixed random
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
bs	-.1167131	-.0495665	-.0671466	.0264395
cad	-.7338331	-.8850653	.1512322	.407263
roa	1.374792	2.789972	-1.41518	.4879633
am	-.0105996	.0342033	-.0448028	.
opef	-.7575139	-.4592552	-.2982586	1.032172
dg	.1868353	.0205938	.1662415	.0621971
gdp	-3.12392	-2.377937	-.7459828	.3145869
rr	-3.489488	1.348304	-4.837792	1.848945
nbeills	-.0600794	-1.406839	1.346759	.3240777

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =      5.65
Prob>chi2 =      0.7742
(V_b-V_B is not positive definite)
```

APPENDEIX 14

```
. xttest0
```

Breusch and Pagan Lagrangian multiplier test for random effects

liq[b,t] = Xb + u[b] + e[b,t]

Estimated results:

	Var	sd = sqrt(Var)
liq	.0039383	.0627557
e	.0011713	.0342247
u	0	0

Test: Var(u) = 0

```
chibar2(01) =      0.00
Prob > chibar2 =      1.0000
```