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DETERMINANTS OF LIQUIDITY: THE CASE OF SELECTED PRIVATE COMMERCIAL BANKS IN ETHIOPIA

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ACRONYMS AND ABBREVIATIONS

AIB: Awash International Bank S.C**.**

AQ: Asset quality Quality

BOA: Bank of Abyssinia S.C.

CAR: Capital Adequacy Ratio

CBE: Commercial Bank of Ethiopia

CBO: Cooperative Bank of Oromia

CLRM: Classical Linear Regression Model

CPI: Consumer Price Index

DB: Dashen Bank S.C**.**

DW: Durbin-Watson

FEM: Fixed Effect Model

FERF: Foreign exchange Rate fluctuations

GDP: Gross Domestic Product

HP: Hypotheses

INF: General inflation rate

IRS: Interest Rate Spread

LG: Loan growth

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NIB: Nib International Bank S.C.

NPL: Non-performing loans

OLS: Ordinary Least Square

REM: Random Effect Model

UB: United Bank S.C.

WB: Wegagen Bank S.C

ABSTRACT

Liquidity management stands as a cornerstone of financial stability within banking institutions. This study investigates the primary factors influencing liquidity in selected private commercial banks operating in Ethiopia. With the rapid expansion of the country's banking sector and intensifying competition among financial institutions, understanding the internal and external determinants of bank liquidity has become crucial. This study investigates the key determinants influencing liquidity in selected private commercial banks operating in Ethiopia between 2008 and 2023. Quantitative research approach and explanatory Research design were adopted in carrying out this research. Secondary data were collected from the selected seven commercial banks using purposive sampling technique and macro-economic data are collected from Ministry of Finance and Economic Development (MOFED). The study used both descriptive and inferential statistics. Mean and standard deviation were used as descriptive statistics, whereas correlation and panel regressions were used from inferential statistics using Eviews-9. The study focuses on variables such as capital adequacy, asset quality, loan growth, bank size, and non-performing loans, alongside broader economic indicators like inflation, GDP growth, interest rate spreads, and exchange rate volatility. The findings of the study show that Capital Adequacy, Bank Size, GDP Growth, Inflation Rate, and Interest Rate Spread are significant determinants of bank liquidity, while increased non-performing loans and macroeconomic instability negatively impact liquidity levels. The research provides evidence-based insights for bank managers, regulators, and policymakers aiming to improve liquidity management practices and safeguard the resilience of Ethiopia's banking sector. By highlighting the interconnectedness of internal governance and external economic forces, this study contributes to a deeper understanding of liquidity dynamics in emerging financial markets.

Keywords: *bank liquidity, determinants of liquidity, internal factor, macroeconomic factor, Private Banks,*

CHAPTER ONE: INTRODUCTION

This chapter begins with presentation of the study's background, providing context on the various factors influencing liquidity within selected private commercial banks in Ethiopia. It then presents the problem statement, research objectives, and hypotheses for econometric analysis. Finally, the chapter discusses the study's significance, scope, limitations, organization, and definitions of key terms.

1.1 Background of the Study

The banking system is a crucial component of any nation's economy, functioning as the primary intermediary between individuals or organizations seeking capital for investments and those with surplus funds (depositors). Banks facilitate numerous financial activities, including lending, accepting deposits, transferring funds both locally and internationally, and acting as payment agents (Simeneh, 2012). To effectively perform these roles, a bank must maintain a delicate balance between profitability and liquidity, ensuring it can meet its obligations while remaining financially stable.

Liquidity in a commercial bank refers to its ability to fulfill its contractual obligations such as loan disbursements, deposits, withdrawals, and other liabilities when they come due (Amengor, 2010). Essentially, a bank's liquidity reflects its capacity to meet its cash needs and collateral requirements without incurring significant losses, thereby influencing its overall financial health and stability. As Berger (2009) notes, an asset's liquidity is defined by how quickly, easily, and cost-effectively it can be converted into cash. The Bank for International Settlements (2008) defines liquidity as "the capacity of a bank to support increases in assets and meet obligations as they come due without incurring unacceptable losses."

In Ethiopia, the banking sector has undergone substantial transformation since the fall of the Derg regime, leading to the establishment of sixteen private commercial banks over the past two decades. This rise in private banks has intensified competition within Ethiopia's banking industry, especially in terms of asset mobilization and liquidity management. Private banks, striving to compete effectively with state-owned banks, have focused on expanding branch

networks and adopting innovative strategies to attract assets. Understanding the determinants of bank liquidity, therefore, is essential for navigating this increasingly competitive environment.

Research on the determinants of bank liquidity indicates that liquidity is influenced by both bank-specific factors and macroeconomic conditions. Studies such as those by Boat & Taylor (2011), cited in van Ommeren (2017), suggest that the factors affecting liquidity can vary significantly from one country to another. In Ethiopia, the analysis of bank liquidity determinants remains limited. Although several studies including Rauch et al. (2009), Shen et al. (2009), and Vodova (2011) have explored liquidity influences, these analyses are based on data from other countries and may not fully apply to the Ethiopian banking context due to differing economic and institutional frameworks. Moreover, these studies often reach inconsistent conclusions due to variations in models and methodologies.

The only known study specific to Ethiopian banks, conducted by Tseganesh (2012), investigated liquidity determinants in commercial banks using a primarily quantitative approach. However, it overlooked several critical factors that could significantly impact liquidity in Ethiopian banks, relying solely on secondary data and documentary analysis. This study, therefore, provides limited insights and leaves room for a more comprehensive understanding of liquidity determinants in the Ethiopian context.

Therefore, the absence of a capital market, limited inter-bank lending, and other unique aspects of Ethiopia's financial system, an in-depth analysis of liquidity determinants is vital for better understanding liquidity risks in relation to other financial risks. For Ethiopia's financial institutions, maintaining adequate liquidity is crucial for the country's broader economic health and stability.

1.2. Statement of the Problem

Banks play a crucial role in the financial system by channeling funds from depositors to borrowers, making effective liquidity management essential to maintaining financial stability and fostering growth. Liquidity ensures that banks can meet their obligations promptly, supporting smooth market operations and protecting the health of financial institutions (Sekoni, 2015). However, inadequate liquidity management has led to crises globally, especially following the

2008 financial crisis, where many banks struggled due to poor liquidity oversight (Bhati, Zoysa, & Jitaree, 2012). Liquidity issues continue to impact both investors and borrowers (Diamond et al., 2015), with even profitable banks facing challenges from unexpected cash demands and insufficient liquid assets (Munteanu, 2012).

In Ethiopia, recent liquidity shortages have disrupted the banking sector, with severe impacts on inter-bank settlements and withdrawals. Therefore, liquidity issues have increasingly impacted Ethiopia's banking industry, disrupting inter-bank settlement processes at the central bank and complicating the withdrawal of large sums of cash from bank branches. In response, the National Bank of Ethiopia (NBE) recently injected 14.5 billion Birr into the banking system to alleviate the liquidity shortage, while also mandating commercial banks to provide detailed reports on their lending and cash flow activities. While seasonal factors can occasionally cause minor liquidity issues, the current situation stands out for its severity, prompting the NBE to closely scrutinize bank lending practices.

This study is particularly timely given Ethiopia's rapid banking sector growth, which has intensified competition and highlighted vulnerabilities in liquidity management. Recent years have seen a sharp decline in liquid assets, reflecting increased lending activity and reduced cash flow reserves (NBE, 2019). These pressures underscore an urgent need to understand the factors influencing liquidity in Ethiopian banks to safeguard against future crises and support sustainable growth. For example, between 2018 and 2019, liquid assets that is cash on hand and settlement accounts with the NBE, which are essential for banks' daily operations saw a sharp decline, from 14.3% to 7.6% of total deposits due to increased lending activity. Similarly, payment and settlement account balances dropped from 5.9% to 1.7% of deposits, a decline that affected the entire industry rather than isolated banks.

Liquidity measures provide insights into the liquidity levels with which commercial banks operate, typically assessed through two main approaches: the liquidity ratio and the financing gap. The liquidity ratio, a more straightforward measure derived from balance sheet ratios, is widely favored in academic research due to its standardized calculation method. Conversely, the financing gap approach, which considers the difference between cash inflows and outflows, is harder to measure accurately, as it requires extensive data and lacks standardization. As a result,

most studies, including this one, rely on the liquidity ratio due to data availability and simplicity, as demonstrated in studies by Anamika Singh and Anil Kumar Sharma (2015, 2016), Mekibeb (2016), and Vodová (2011). However, there remains a gap in accurately identifying the factors that drive bank liquidity in Ethiopia, which continues to be an area of active academic debate.

Existing literature on Ethiopian commercial banks has generally focused on profitability, with limited attention to liquidity determinants. For example, studies by Worku (2006) and Semu (2010) found that Ethiopian banks often hold excess liquidity, yet they did not delve into the reasons behind this trend. As it is known currently there is a rapid growth of Ethiopia's banking sector, hence, understanding these determinants is crucial.

To the best of the researcher's knowledge, in the Ethiopian context, Tseganesh (2012) is the only known study specifically analyzing the impact of macroeconomic and bank-specific variables on bank liquidity. However, this study overlooked several potentially important variables that could significantly influence bank liquidity, leaving gaps in understanding. Tseganesh's research utilized a balanced fixed-effect panel regression on data from eight commercial banks (spanning from 2000–2011), identifying factors like capital adequacy, bank size, nonperforming loans (NPL) share, interest rate margin, inflation, and short-term interest rates as significant positive influencers on liquidity. However, it was found that real GDP growth and loan growth to be statistically insignificant in her study.

Additionally, recent advances in digital banking and financial technologies, which are reshaping the banking sector globally, were not considered. Such advancements could affect liquidity needs by enhancing operational efficiencies or altering customer behavior. Furthermore, while Ethiopia's banking sector has seen rapid growth; the impact of heightened market competition on liquidity has yet to be fully explored. This study aims to address these gaps by incorporating a wider range of variables, including both internal and external factors, and by considering the broader macroeconomic and technological influences on bank liquidity. By taking this more comprehensive approach, the study seeks to offer a more complete understanding of the factors affecting liquidity in Ethiopia's commercial banking sector. Specifically, this research examined the impact of macroeconomic factors and firm-specific factors on the liquidity of Ethiopian commercial banks, giving equal consideration to both emerging and established banks. The study

will draw primarily on financial statement data from banks, as well as macroeconomic data from sources such as the National Bank of Ethiopia (NBE), individual banks, and the Ministry of Finance and Economic Development (MoFED), covering the period from 2008 to 2023.

1.3. Objective of the study

1.3.1 General objective

To find out determinants of liquidity in some selected private commercial banks in Ethiopia.

1.3.2 Specific objective

Specifically, this study addresses the following objectives;

- To identify firm-specific effects of determinants on selected private commercial banks liquidity in Ethiopia.
- To examine the effects of particular macroeconomic determinants on selected private commercial banks liquidity in Ethiopia.

1.4. Hypotheses of the study

The following testable hypotheseses are developed in light of the empirical data that is reviewed on chapter two:

H1: Capital adequacy has statistically significant and positive effect on the liquidity of commercial banks. According to Bourke (2010), there is a positive relationship between the capital ratio and liquidity, which in turn is associated with profitability.

H2: Asset quality has positive and significant effect on the liquidity of commercial banks. Dawit Badeg (2016) asserts that a higher asset quality is positively correlated with both liquidity and profitability.

H3: Bank size has positive and significant effect on the liquidity of commercial banks. Berger (2005) found a positive correlation between liquidity and bank size, indicating that larger banks have a better capacity to perform their intermediary functions effectively.

H4: Variations in interest rates has a positive and significant effect on the liquidity of commercial banks. Negugi (2001) suggests that fluctuations in interest rates can influence future inflation rates and the purchasing power of money.

H5: Non-performing loans (NPLs) have a positive and significant effect on the liquidity of second-tier banks. According to Owolabi (2011), NPLs loans that have not been repaid as per their contractual terms play a significant role in shaping a bank's liquidity status.

H6: Real GDP growth has a positive and significant effect on the liquidity of commercial banks. Azeze (2014) indicates that real GDP growth rates are associated with bank liquidity, suggesting that economic growth enhances liquidity levels.

H7: Inflation has a positive and significant effect on the liquidity of commercial banks. Kimari (2013) found that inflation negatively correlates with key indicators of liquidity, including the real money market rate and treasury bond rates.

H8: Credit growth positive and significant effect on the liquidity of commercial banks. Al-Khouri (2012) highlights that an increase in credit, particularly in education loans, can adversely affect liquidity, reflecting potential pressures on banks' liquid assets.

H9: Exchange rate fluctuations has positive and significant effect on the liquidity of commercial banks. Creswell (2013) argues that volatility in exchange rates can impair liquidity, leading to challenges for banks in managing their financial health.

1.5. Scope of the Study

Scope involves drawing boundaries or limiting the scope of the study in terms of the subject matter, respondents and study area (Best and Khan, 2006).This research specifically focuses on examining the internal and external factors influencing liquidity in nine major private commercial banks in Ethiopia: Awash Bank, Bank of Abyssinia S.C, Birhan International Bank S.C, Cooperative Bank of Oromia, Dashen Bank, Nib International Bank S.C, Oromia Bank, United Bank S.C, and Wegagen Bank. These banks were chosen due to their comprehensive data availability, extensive branch networks, wide geographical reach, and consistent operational records from 2008 to 2023.

A quantitative research design was employed to analyse these liquidity factors, using a causal-comparative approach to identify significant relationships. Data sources included secondary data, emphasizing financial reports, economic indicators, and performance metrics. To evaluate the impact of variables such as bank size, capital adequacy, economic conditions, and market

volatility on liquidity, the study used statistical models, including multiple regression analysis. This approach provides a structured framework for exploring key trends, challenges, and influential factors in liquidity management within Ethiopia's private banking sector.

1.6. Limitations of the Study

According to Best and Khan (2006), limitations are factors outside the researcher's control that can restrict data access and affect study conclusions. Key limitations in this study included challenges in selecting a representative sample due to the structure of Ethiopia's banking sector, which may limit the generalizability of findings given the small number of banks. Additionally, strict confidentiality around financial data, especially liquidity information, may limit data access and reduce the study's depth.

1.7. Significance of the Study

This study makes a major contribution to understanding the determinants of commercial bank liquidity in Ethiopia, offering valuable insights for supervisory authorities, policymakers, commercial banks, and researchers. It deepens knowledge on how specific factors, including macroeconomic and banking challenges, impact liquidity. Additionally, the study will expands on existing literature by highlighting the importance of effective liquidity policies and the need for banks to monitor their capital structure and manage short-term liquidity risks. Overall, this research will aid Ethiopian commercial banks in assessing liquidity requirements, developing sound policies, and focusing on key factors that significantly influence liquidity.

1.8. Organization of the Study

This study is organized into five chapters. Chapter one introduces the research, covering the background, problem statement, objectives, significance, scope, key terms, and paper outline. The second chapter presents a comprehensive review of relevant theoretical and empirical literature on liquidity management in commercial banks. Chapter three describes the research design and methodology for investigating liquidity determinants. Chapter four presents and analyzes data on liquidity factors in selected private banks. Lastly, chapter five summarizes findings, concludes the study, and provides recommendations for enhancing liquidity management in Ethiopia's private banking sector.

1.9. Operational Definitions

Liquidity: The capacity of a bank to meet its short-term financial obligations using its most liquid assets, measured by the ratio of liquid assets to total liabilities (Brealey et al., 2011).

Determinants of Liquidity: Various factors that affect a bank's liquidity position, including regulatory frameworks, asset quality, customer deposit behavior, and market conditions (Bikker & Hu, 2002).

Private Commercial Banks: Banking institutions owned by private entities or shareholders that operate for profit. They provide a variety of financial services including loans, deposits, and financial advice (Berger et al., 2009).

Regulatory Framework: A set of rules and guidelines established by government authorities that govern the operations of banks and financial institutions to promote stability and protect depositors (Solomon, 2013).

Asset Quality: The assessment of a bank's assets, particularly loans, to determine their risk and return profile. Higher asset quality typically corresponds with lower levels of non-performing loans, enhancing liquidity (Demirgüç-Kunt & Detragiache, 2002).

Customer Deposit Behavior: The patterns exhibited by customers in their depositing and withdrawing of funds, which can heavily influence the liquidity position of a bank, as fluctuations in deposits can lead to varying levels of cash available (Marinc & Belak, 2016).

Liquidity Ratio: A financial metric that expresses the degree to which a bank's liquid assets can cover its short-term liabilities, commonly measured by ratios such as the current ratio or the quick ratio (Hidayat & Purnamasari, 2019).

Market Conditions: The overall economic environment in which banks operate, including interest rates, inflation, and the availability of credit, all of which can influence a bank's liquidity (Almeida et al., 2014).

Liquidity Management: The strategic approach taken by banks to ensure that they have sufficient liquid reserves to meet short-term obligations while optimizing the return on their assets (Tanna et al., 2012).

CHAPTER TWO: LITERATURE REVIEW

2. Introduction `

This literature review examines the critical factors influencing liquidity in the context of selected private commercial banks in Ethiopia. It aims to synthesize existing research, theories, and empirical findings related to liquidity determinants, providing a foundation for understanding how various internal and external factors affect banks' ability to maintain adequate liquidity. By exploring the complexities of liquidity management within the Ethiopian banking sector, this review seeks to highlight gaps in current knowledge and set the stage for the study's methodology and analysis. The insights gained from this literature review will be instrumental in informing the subsequent chapters of this research proposal.

2.1 What is liquidity at a bank

Liquidity is the capacity of a financial institution to meet its immediate and short-term financial obligations. It ensures a bank's ability to fulfill depositors' demands, fund withdrawals, and cover operational costs without incurring significant losses. According to recent literature, liquidity is defined as the ability of banks to convert assets into cash efficiently to meet unexpected financial needs (Saunders & Cornett, 2020). Zewadi (2013) further explains that liquidity represents a bank's capability to promptly meet obligations as they arise. To maintain sufficient liquidity, banks rely on assets that can be easily converted to cash, including central bank deposits, interbank loans, and government securities (Alemayehu, 2016).

The Business Dictionary (n.d.) describes liquidity as a measure of how effectively a financial entity can convert assets to cash to meet short-term obligations. Liquid assets, such as cash reserves and short-term government bonds, play a critical role in maintaining a bank's solvency. For banks to remain viable, they must manage these assets to cover depositor withdrawals and fulfill financial obligations on time (Diamond & Dybvig, 1983). This conversion process inherently exposes banks to liquidity risk, as the transformation of liquid liabilities (deposits) into illiquid assets (loans) can create an asset-liability mismatch, especially if short-term liabilities exceed the available liquid assets (Jeinson, 2008).

To mitigate this risk, banks must manage their liquidity by maintaining a buffer of liquid assets, allowing them to cover immediate cash flow needs (Moore, 2009). In cases of unexpected demand, banks may resort to borrowing from interbank markets or the central bank to ensure they meet these demands effectively. By actively managing liquidity risks, banks can stabilize their financial position, reduce exposure to liquidity shocks, and support sustained growth (Berger & Bouwman, 2009).

A bank's inability to meet customer needs poses serious risks, including the potential for capital flight and, more critically, the erosion of trust in the entire banking system. A bank's liquidity position is shaped by its holdings of cash and readily marketable assets, the structure of its financial liabilities, and the types and amounts of contingent liabilities that may mature within specific timeframes. Assets and liabilities are thus categorized as liquid, semi-liquid, or illiquid based on their maturity profiles and nature (Saunders & Cornett, 2020).

Liquidity management also encompasses off-balance-sheet activities since banks often assume they can generate liquidity through loan commitments or other contingent arrangements (Diamond & Rajan, 2001). An asset is considered liquid if it can be converted to cash quickly without substantial loss in value, but defining what qualifies an asset as "liquid" remains a subject of debate among financial theorists. According to Kyle (1985), an asset's liquidity depends on the ease with which it can be sold in the market. Regulatory perspectives generally hold that highly liquid assets are those perceived as low-risk, such as government securities, and those with shorter maturities, which are less sensitive to interest rate fluctuations, thereby minimizing potential capital losses (Garber & Weisbrod, 1992; Hempel et al., 1994).

2.2 Theoretical literature on the factors influencing bank liquidity

Globally, the sufficiency of liquidity is crucial for the successful operation of all enterprises; however, it is especially vital for banking institutions. Unlike other businesses, banks are required to maintain cash and other highly liquid assets, often listed first on their balance sheets, to ensure they can meet short-term obligations promptly (Saunders & Cornett, 2020). In the context of financial institutions, liquidity has been defined in various ways. Yeager and Seitz (1989) described liquidity as a financial institution's ability to meet all legitimate demands for funds. The Bank for International Settlements (2008) adds that liquidity encompasses the

capacity to fund asset growth and satisfy obligations without incurring unacceptable losses. Kimberly Amadeo (2013) further defines liquidity as the capital available to meet immediate obligations, emphasizing its role in fulfilling short-term liabilities.

Liquidity management assesses not only a bank's cash availability but also the ease with which current assets can be converted into cash to meet regular or unexpected demands (Nwaezeaku, 2006). Numerous scholars view liquidity as indicative of a bank's negotiating power and financial stability. According to some perspectives, a bank that manages its liquidity effectively is better positioned to offer loanable funds, supporting both its profitability and resilience (Diamond & Rajan, 2001).

Proper liquidity enables banks to handle three primary types of risks. *Time risk* refers to a bank's ability to manage potential repayment defaults by borrowers at a specific time (Matz & Neu, 2006). *Funding risk* indicates the bank's capacity to replace outgoing funds, whether through regular withdrawals of retail deposits or non-renewal of wholesale funds (Allen & Gale, 2004). Finally, *lending risk* represents the bank's preparedness to accommodate unexpected withdrawals from significant clients, a critical aspect for banks heavily reliant on large depositors (Gatev & Strahan, 2006).

Two widely recognized methods for assessing liquidity risk in banks are the liquidity gap/flow approach and the liquidity ratio/stock approach. The liquidity gap approach evaluates the difference between a bank's assets and liabilities over current and future periods. A positive liquidity gap suggests a liquidity shortfall, which may require the bank to increase its liabilities to maintain financial stability (Bessis, 2015). In this approach, liquid reserves are viewed as a reservoir from which the bank determines its liquidity needs by analyzing the inflows and outflows of funds over a specified timeframe (Krause & D'Arcy, 2020).

In contrast, the liquidity ratio approach employs various financial ratios to assess liquidity dynamics. These ratios identify available immediate funding sources, illustrating a portfolio of liquid assets that can be readily converted to cash without significant complications, alongside a stable base of liabilities (Moore, 2010). A crucial component of this method is the availability of credit lines with other financial institutions that can serve as a vital liquidity buffer (Rychtárik,

2009; Praet & Herzberg, 2008). Scholars have discussed key liquidity ratios, such as the ratio of liquid assets to total assets, liquid assets to deposits, and loans to deposits, highlighting their relevance in liquidity assessments (Vodová, 2011).

While both methods offer valuable insights, the liquidity gap approach tends to be more complex due to its data-intensive nature and the absence of a standardized forecasting methodology for cash flows (Crosse & Hempel, 1980). Consequently, academic literature often favors the liquidity ratio approach for its more consistent and straightforward application (Yeager & Seitz, 1989; Hempel et al., 1994). According to Crosse and Hempel (1980), the most frequently used ratios include the loan-to-deposit ratio and the liquid asset-to-total asset ratio. Low values of these ratios indicate a high level of liquidity. However, the loan-to-deposit ratio has its limitations as it does not consider other assets that could be liquidated to generate cash, while the liquid asset-to-total asset ratio may overlook the impact of cash inflows from loan repayments and changes in liability structures (Crosse & Hempel, 1980). Nevertheless, these ratios generally move in the same direction, providing a coherent view of a bank's liquidity position.

2.3. Sources of bank's liquidity

Banks obtain liquidity through various sources, including new deposits, maturing assets, borrowed funds, and access to central bank facilities such as the discount window. Despite these sources, financial institutions remain susceptible to liquidity risk. According to Rochet (2008), liquidity risk can arise from three key areas: *Liability Side*: There is significant uncertainty regarding deposit withdrawals and the rollover of interbank loans. *Asset Side*: Banks face unpredictability about the volume of future loan requests they will receive. And from the *Off-Balance Sheet Items:* These include arrangements such as credit lines and other contingent obligations that may affect liquidity.

To mitigate liquidity crises, banks often maintain a buffer of liquid assets on the asset side of their balance sheets. These assets might include cash, balances with central banks and other financial institutions, government-issued debt securities, and other similar instruments. Additionally, engaging in reverse repurchase agreements (repos) can lower the likelihood that liquidity demands will jeopardize a bank's stability (Diamond & Dybvig, 2019).

Another approach involves utilizing the interbank market, where banks can borrow from one another during times of liquidity shortages. Furthermore, central banks typically act as a Lender of Last Resort (LOLR), providing emergency liquidity support to financial institutions facing liquidity challenges, thereby ensuring overall market stability in times of systemic shortages (Aspachs et al., 2005; Tiesset, 2005). These strategies collectively contribute to enhancing the liquidity management framework within banking institutions, allowing them to navigate potential liquidity challenges effectively.

2.4. Factors Influencing the Liquidity Position of Commercial Banks

The liquidity position of commercial banks is shaped by various factors, which are generally classified into two main categories: internal (bank-specific) factors and external (macro) factors. Internal factors are related to a bank's internal efficiency and management decisions, including aspects such as nonperforming loans, capital adequacy, bank size, asset quality, and loan growth (Gul et al., 2011; Bourke, 1989). These factors represent bank-specific characteristics that management can influence directly to enhance liquidity. In contrast, external or macroeconomic determinants are factors outside of a bank’s control that reflect broader economic and regulatory conditions, impacting a bank's liquidity position. Key macroeconomic variables include gross domestic product (GDP), interest rate margins, currency exchange rate volatility, inflation rates, and mandatory reserve requirements, which collectively influence the liquidity environment within which banks operate (Moussa & Chedia, 2016; Vodová, 2011).

2.4.1. Bank specific factors

Capital adequacy and bank liquidity Patheja (1994) defined bank capital as common stock plus surplus, undivided profits, and reserves for contingencies, alongside other capital reserves. Furthermore, as a bank's loan-loss reserves function as a cushion for absorbing losses, a wider understanding of bank capital includes this account. Contrary to the traditional perspective of liquidity creation where banks produce liquidity by converting liquid liabilities into illiquid assets, recent theories suggest liquidity creation through altering asset mixes. Diamond and Rajan (2000, 2001) and Gorton and Winton (2000) demonstrated that banks can enhance or reduce liquidity merely by adjusting their funding mix on the liability side. Thakor (1994) illustrates that capital may also influence a bank’s asset portfolio composition, impacting

liquidity creation via changes in the asset mix. According to Richard Cantor (2001), capital adequacy denotes having sufficient funds to absorb losses to safeguard depositors, creditors, and official entities, with the intent of maintaining stability within the banking system. The NBE Capital adequacy framework outlines the regulatory requirements for banking institutions to fulfill their obligations as they become due, while also fostering confidence among customers, depositors, creditors, and other stakeholders in their engagements with the institution. Ritab al-Khouri (2012) suggests that a bank's financial capacity to reimburse depositors upon request is crucial while retaining enough funds to enhance the bank's assets through additional lending. Based on the aforementioned definitions, it is evident that the NBE's interpretation is most applicable, given this research pertains to Ethiopia.

NBE provides the calculation of **Capital** adequacy = Total capital / Total Risk weighted assets an elevated ratio signifies low risk.

It indicates how much the market value of the bank's assets can decline before jeopardizing its depositors and creditors.

Capital Adequacy and Bank Liquidity

According to Patheja (1994), bank capital comprises common stock, surplus, undivided profits, and reserves for contingencies, in addition to other capital reserves. This definition encompasses loan-loss reserves, which act as a buffer against potential losses. Traditionally, liquidity creation was viewed as banks converting liquid liabilities into illiquid assets. However, contemporary theories propose that liquidity can also be generated through changes in asset composition. For instance, Diamond and Rajan (2000, 2001) and Gorton and Winton (2000) have shown that banks can manipulate liquidity by adjusting the funding mix on their liability side. Thakor (1994) further indicates that capital influences a bank's asset portfolio, thereby affecting liquidity creation through asset mix adjustments.

Richard Cantor (2001) explains that capital adequacy refers to a bank's ability to absorb losses, thereby protecting depositors, creditors, and regulatory authorities, which is essential for maintaining stability in the banking sector. The framework established by the National Bank of Ethiopia (NBE) stipulates regulatory capital adequacy requirements that enable banks to meet their obligations while instilling confidence among customers, depositors, creditors, and

stakeholders. Ritab al-Khouri (2012) emphasizes that a bank must possess adequate financial resources to repay depositors upon request while simultaneously retaining sufficient funds to enhance its asset base through further lending. Given the context of this research, the NBE's interpretation of capital adequacy is particularly relevant.The NBE calculates capital adequacy using the formula:

Capital Adequacy = Total Capital / Total Risk-Weighted Assets.

A higher ratio indicates lower risk, reflecting the extent to which the market value of a bank's assets can decline before putting depositors and creditors at risk.

Capital adequacy is fundamentally designed to ensure that banks maintain sufficient capital reserves to effectively absorb potential losses associated with their risk exposures. Regulatory authorities have established capital requirements to not only enhance liquidity among financial institutions but also to bolster public trust in these entities. Robert Anderson (n.d.) supports this perspective, asserting that a minimum capital threshold is crucial for managing unexpected losses and mitigating insolvency risks. This capacity is essential for banking institutions to fulfill their intermediation role, which is vital for fostering economic growth (Gorton & Winton, 2000).

2.4.2 Asset Quality

Asset quality is a key determinant in evaluating a bank's overall financial stability. It primarily assesses a bank's performance in managing its loan portfolio. Loans constitute a major source of income for banks, generating substantial revenue through interest payments. Consequently, banks must implement robust asset quality management practices to achieve their financial objectives (Tobias & Themba, 2011). The evaluation of asset quality in commercial banks typically employs the following formula:

Asset Quality = Loan Loss Provision / Total Loans

2.4.3. Bank size and bank liquidity

The size of a bank significantly influences its performance and capability to attain prominence within the banking sector (Ahmend and Ahmed, 2010). Larger banks may capitalize on economies of scale, enabling them to attract more clients and undertake more transactions,

resulting in greater returns. Additionally, larger banks often enjoy enhanced trust from customers, leading to a higher likelihood of clients choosing to invest in them over smaller institutions. Moreover, in the event of risk exposure, larger banks are capable of mitigating it and experiencing minimal effects, whereas smaller banks are more susceptible to failure and insolvency. Consequently, many smaller banks strive to expand their business and market influence. Thus, bank size has a positive effect on the liquidity of commercial banks.

Bank size = logarithm of total assets.

2.4.4. Loan growth and bank liquidity

The greatest asset and primary source of income for banks is their loan and advance portfolio. Diamond and Rajan (2005) state that lending is the main line of business for banks. Since loans are illiquid assets, a bank's asset portfolio will contain more illiquid assets as the quantity of loans increases. Loan demand has a significant impact on banks' liquidity holdings, which serves as the foundation for loan expansion (Pilbeam, K., 2005). Because long-term loans are often more profitable, banks prefer to maintain less liquid assets when demand for loans is strong and more liquid assets when demand is weak. Consequently, there is a negative correlation between loan growth and bank liquidity.

2.4.5. Non-performing loans and bank liquidity

Non-performing loans refer to loans and advances that have experienced a decline in credit quality to the extent that the complete recovery of principal and/or interest as per the agreed repayment schedule of the loan or advance is uncertain (NBE, 2008). As stated by (Ghafoor, 2009), non-performing loans are those for which a bank client does not fulfill their contractual responsibilities regarding either principal or interest payments that extend beyond the agreed repayment dates. Consequently, NPLs represent loans that adversely affect banks in their efforts to foster economic growth. The growth of non-performing loan portfolios has considerably contributed to financial turmoil within the banking industry. Banking systems play a pivotal role in mobilizing and distributing resources within the market by redirecting funds from surplus economic units to those in deficit. This process of converting short-term deposits into long-term loans and advances generates the majority of profits for banks. However, it carries significant risk, and if not properly managed, can lead to a substantial accumulation of non-performing

loans. An increase in non-performing loans indicates declining asset quality, elevated credit risk, and inefficiencies in the allocation of resources. According to (Bloem and Gorter, 2001), while non-performing loans may impact all sectors, the most severe consequences are felt by financial institutions that typically have extensive loan portfolios. Conversely, a large volume of non-performing loans can undermine banks' ability to extend credit, resulting in diminished confidence and liquidity challenges. Thus, the level of non-performing loans adversely affects a bank's liquidity. NPL ratio = NPLs Gross loan outstanding.

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

A. Macro-economic (external) determinant factorsinfluencing banksliquidity.

The performance and operations of financial institutions can be impacted by external variables such as the legal and economic contexts, which are unrelated to bank management. These variables affect a bank's operations from outside its surroundings and are outside the management's control (Aburime, 2005; Al-Temami, 2010). These outside (macro-economic) influencing elements are:

1. Real GDP or annual gross domestic product

Demand for bank loans tends to be higher during periods of economic growth compared to times of recession (Anderias & Gabrielle, 2009; Belayneh, 2011). In Ethiopia, the Gross Domestic Product (GDP) increased by 7.6 percent in 2016 from the previous year. From 1981 to 2016, Ethiopia's GDP growth rate averaged 5.72 percent, reaching a peak of 13.9 percent in 1986 and a low of -11.1 percent in 1984 (NBE, 2016). Although Ethiopia remains one of the world's poorest countries, with much of the population dependent on subsistence farming and foreign aid, it is among the fastest-growing non-oil economies globally. Government reforms have attracted foreign direct investment, spurring growth in commercial agriculture and manufacturing. Despite this progress, Ethiopia faces significant economic challenges, including persistent trade deficits, an underdeveloped financial sector, and high unemployment (NBE, 2016).

2. **Rate of inflation**.

Elevated earnings and increased expenses are positively correlated with elevated inflation. Bank financial performance is predicted to positively correlate with inflation. Numerous analysts discovered that nations with inefficient equities markets and limited banking sectors also have issues with high rates of inflation. The bank decreases the amount of loans it makes to the private sector as the rate of inflation rises. The rising rate of inflation induces banks to restrict loans (H.B and BruceC, 2006). Bank profitability and return on asset are also impacted by inflation. A high rate of inflation results in a lower return on asset. The rates of time deposits, Treasury bills, and real money markets are negatively correlated with inflation.

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

The worth of a domestic currency in relation to a foreign currency unit is known as the exchange rate. The exchange rate is not a fixed entity and tends to fluctuate depending on the specific currencies and the respective time frame. Some currencies may possess a greater value than others, but when the value diminishes, it is referred to as depreciation. Numerous factors contribute to shifts in the exchange rates, primarily the balance between demand and supply in the foreign exchange market. These shifts occur spontaneously and often appear nearly impossible to forecast. The changes impact organizational performance and liquidity as well. Nonetheless, this effect is mainly confined to organizations engaged predominantly in international transactions or currencies, as local firms will experience minimal impact (Nyandema and Langat, 2016). Consequently, elevated exchange rates will discourage most foreign investors from engaging in any transactions during that time. Banks will similarly be impacted, as depreciation of the domestic currency will lead to a decline in transactions like savings and borrowing, resulting in lower returns and adversely affecting the liquidity of commercial banks.

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

The total amount that banks charge when lending money is made up of interest rates. The kind of bank and the loan amount have an impact on this (Manyoet al, 2016). Low interest rates often promote more loans to be taken out, whereas high interest rates typically deter individuals from borrowing and instead urge them to invest more. The regulatory agencies may take advantage of this to influence the amount of money that banks bring in. Similar to this, the interest the interest

rates may also determine the currency values. The currency values may also be determined by rates. Interest rates are closely correlated with demand, meaning that a rise in demand would likely result in a rise in the value of the currency. This suggests that the spread between interest rates determines the liquidity of commercial banks.

2.5. Overview of Banking System in Ethiopia

The Ethiopian banking system traces its origins back to the establishment of the Bank of Abyssinia in 1905, founded through an agreement between the Ethiopian government and the National Bank of Egypt, with an initial capital of 1 million shillings. However, in 1932, under Emperor Haile Selassie, the Ethiopian government closed the Bank of Abyssinia and replaced it with the Bank of Ethiopia, which was capitalized with 750,000 pounds sterling. Following the Italian occupation from 1936 to 1941, the Bank of Ethiopia ceased operations. After the Italians left, Haile Selassie's government re-established banking with the creation of the State Bank of Ethiopia in 1943 (Fasil & Merhatbeb, 2009).

In 1963, to separate central banking from commercial activities, the State Bank of Ethiopia was split into two entities: the National Bank of Ethiopia (NBE) and the Commercial Bank of Ethiopia (CBE). This structural change allowed the NBE to serve as the central bank, focusing on regulatory functions, while the CBE operated as a commercial bank. Then, in 1974, following the nationalization of key sectors under the socialist regime, the government consolidated Addis Bank and the Commercial Bank of Ethiopia into a single entity by decree No. 84 on August 2, 1980, creating the sole commercial bank in the country until private banks were permitted in 1994 (Habtamu, 2012).

With the fall of the Derg regime, Ethiopia enacted the Monetary and Banking Proclamation of 1994, which formally established the NBE as an independent entity and laid the legal foundation for private sector participation in the banking industry through Licensing and Supervision of Banking Business Proclamation No. 84/1994. This legislation permitted the establishment of privately-owned commercial banks, which helped diversify the banking sector and improve financial services across Ethiopia.

2.5.1. Ethiopian Banking System (up to 2023)

As of 2023, Ethiopia's banking sector is expanding significantly. The number of private banks has increased, offering more branches, broader service coverage, and increased resources. This growth is supported by regulatory efforts from the National Bank of Ethiopia, which has introduced reforms to enhance the sector's resilience and stability. Major banks in Ethiopia include the Commercial Bank of Ethiopia, Dashen Bank, Awash Bank, and Bank of Abyssinia, among others, with new entrants continuing to join. The Ethiopian banking system, while showing improvements in branch network expansion and digital banking initiatives, still faces challenges related to limited outreach and financial inclusivity, particularly in rural areas (Tseganesh, 2012).

The Ethiopian government has encouraged advancements in digital banking, promoting mobile and internet banking to improve access to financial services. However, outreach limitations persist, categorizing Ethiopia as a largely underbanked nation compared to other African economies. Despite these challenges, the Ethiopian banking system is developing rapidly, demonstrating steady progress in both infrastructure and regulatory frameworks.

2.6. Empirical Literature on the Determinants of Liquidity

2.6.1. Reviews of International Studies

Research on factors influencing bank liquidity has been conducted in various global contexts. For example, Vodová (2011) investigated key determinants of commercial bank liquidity in the Czech Republic, analyzing both bank-specific and macroeconomic factors from 2001 to 2009. Using panel data regression analysis with the EViews7 software, the study examined four bank-specific and eight macroeconomic variables to determine their impact on bank liquidity. Vodová hypothesized that factors such as capital adequacy, inflation rate, and interbank/money market interest rates would positively influence liquidity, while variables like non-performing loans, profitability, GDP growth, loan interest rates, interest rate margin, monetary policy rate, unemployment rate, and a financial crisis dummy (representing the 2009 crisis) would have a negative impact. The expected effect of bank size on liquidity was indeterminate (+/-). Bank liquidity, the dependent variable, was measured using ratios such as liquid assets to total assets,

liquid assets to total deposits and borrowings, loans to total assets, and loans to deposits and short-term financing.

Vodová's findings revealed that bank liquidity positively correlated with capital adequacy, interest rates on loans, non-performing loans, and interbank transaction interest rates. In contrast, the financial crisis, higher inflation, and GDP growth negatively affected liquidity. The impact of bank size on liquidity remained inconclusive. Additionally, variables such as unemployment, interest margin, profitability, and the monetary policy rate showed no statistically significant effect on the liquidity of Czech banks.

In another study, Fadare (2011) explored banking sector liquidity during financial crises in Nigeria, aiming to identify primary liquidity determinants and their connection to economic challenges. Using a linear least squares model on time series data from 1980 to 2009, Fadare found that only liquidity ratios, monetary policy rates, and lagged loan-to-deposit ratios were significant predictors of banking liquidity. The study revealed that decreases in monetary policy rate, liquidity ratios, output volatility, and cash demand raised the current loan-to-deposit ratio, whereas declines in currency in circulation relative to bank deposits and lagged loan-to-deposit ratios reduced it. The findings underscored that during economic crises, Nigerian banks tended to experience greater liquidity shortages, highlighting the need for effective liquidity management policies to maintain banking sector stability in turbulent times.

Moore (2010) analyzed the impact of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean nations. The study had three primary objectives: to examine the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; to identify the main determinants of liquidity; and to evaluate whether the liquidity of commercial banks during crises was higher or lower than what economic fundamentals would suggest. Liquidity, measured by the loan-to-deposit ratio, was expected to depend on: cash demands from customers, as reflected by changes in the cash-to-deposit ratio which were anticipated to negatively influence liquidity; the macroeconomic environment, where a cyclical downturn would reduce banks' expected transaction demand for money and thereby decrease liquidity, which was expected to positively affect liquidity; and money market/short-term interest rates, regarded as a measure of the opportunity costs of maintaining liquidity, which was likely to negatively impact liquidity.

The liquidity generated by publicly-owned savings banks in Germany and the factors influencing it were investigated by Rauch et al. (2009). The study had two main objectives: first, to quantify the liquidity generated by all 457 publicly-owned savings banks in Germany between 1997 and 2006; and second, to analyze the impact of monetary policy on the liquidity created by these banks. Liquidity generation was assessed using methodologies established by Berger and Bouwman (2007) and Deep and Schaefer (2004). To evaluate monetary policy influences, the authors developed a dynamic panel regression model.

The findings indicated several factors affecting bank liquidity: (1) a higher monetary policy interest rate typically leads to decreased liquidity; (2) unemployment rates, which are related to loan demand, negatively affect liquidity; (3) a higher savings ratio correlates positively with liquidity generation; (4) previous liquidity levels have a positive influence on current liquidity; (5) the size of the bank, as measured by the total number of customers, has a negative impact on liquidity; and (6) increased bank profitability is associated with reduced liquidity. For the analysis, the researchers utilized balance sheet data from banks alongside broader macroeconomic indicators. The study found a positive relationship between overall economic health and bank liquidity creation, suggesting that stronger economies enable greater liquidity. Additionally, banks that maintain a higher ratio of interest to provision income were found to generate more liquidity, while other factors related to bank size and performance did not show significant effects on liquidity generation.

In contrast, Aspachs et al. (2005) explored the bank-specific and macroeconomic determinants of liquidity for banks in the UK. This research used unconsolidated balance sheet and profit and loss data from a panel of 57 UK banks, analyzed quarterly from 1985 to 2003. The authors hypothesized that the liquidity ratio should depend on several factors, including the likelihood of receiving support from the Lender of Last Resort (LOLR), which could reduce the incentive to hold liquid assets; interest margins that indicate the opportunity costs associated with maintaining liquidity, expected to negatively impact liquidity; profitability, which is theorized to correlate negatively with liquidity; loan growth, which signifies a rise in illiquid assets; bank size, which could have mixed effects; GDP growth as a business cycle indicator negatively correlated with liquidity; and short-term interest rates, which capture the influence of monetary policy, also anticipated to negatively affect liquidity.

Fielding and Shortland (2005) took a different approach by developing a time-series model to assess excess liquidity in the Egyptian banking sector. They identified several determinants of liquidity: economic output levels, discount rates, the rate of depreciation in the black market exchange rate, and violent political events, which are expected to positively influence bank liquidity. Conversely, the cash-to-deposit ratio and the effects of economic reforms were anticipated to negatively impact liquidity. The effect of reserve requirements was found to be ambiguous. The study concluded that while financial liberalization and stability tend to reduce excess liquidity, these effects were offset by an increase in violent political incidents resulting from conflicts between radical Islamic groups and the Egyptian state.

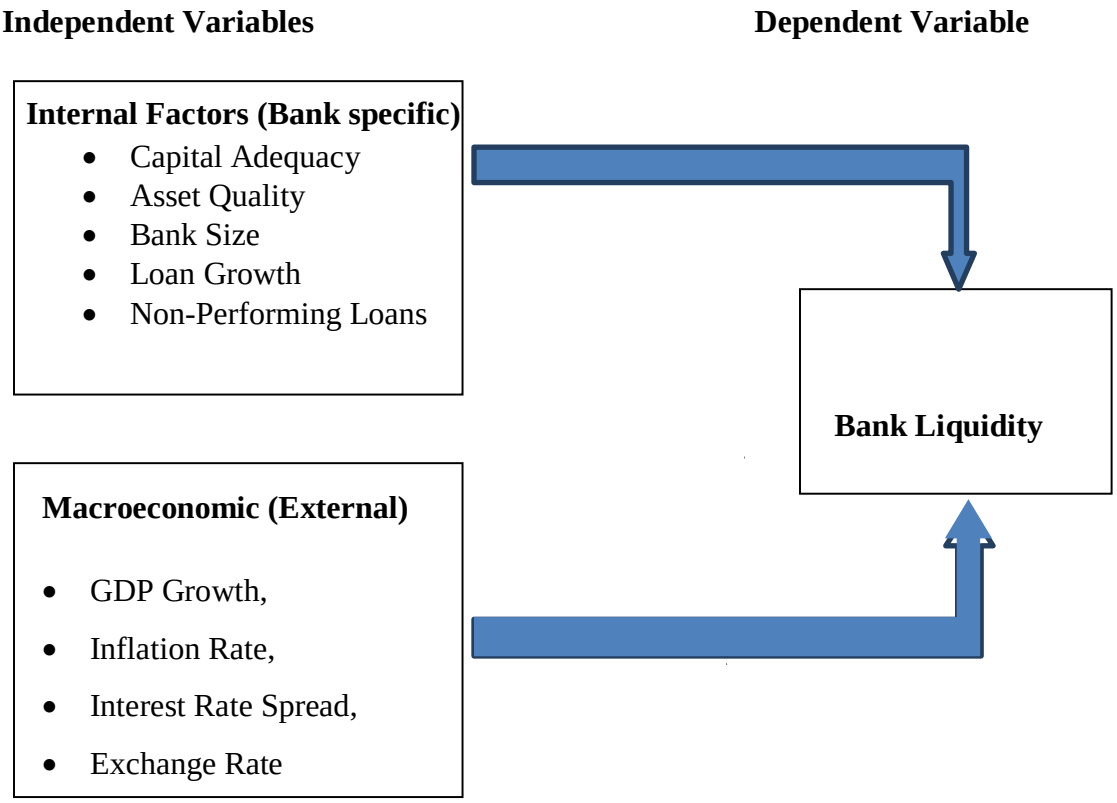
2.6.2. Related empirical studies in Ethiopia

Numerous relevant studies have been conducted by researchers in Ethiopia. Worku (2006) argued that liquidity significantly affects the performance of commercial banks in the country, noting an inverse relationship between deposits or net loans and return on equity (ROE). Additionally, the study found a positive correlation between the ratio of liquid assets to total assets and ROE. Worku also assessed capital adequacy, concluding that all banks in Ethiopia maintained capital levels above the required thresholds, suggesting they had sufficient capital to cover their risk-weighted assets. This finding indicates that depositors could feel secure, as all the banks examined met the National Bank of Ethiopia's (NBE) requirements (Worku, 2006). To evaluate the impact of liquidity on bank performance, Worku utilized several ratios, including liquid assets to net profit, liquid assets to total assets, net loans to net deposits, interest income to net deposits, and interest income to interest expenses.

In a subsequent study, Tseganesh (2012) investigated the factors influencing bank liquidity and its effects on financial performance among commercial banks in Ethiopia. This research aimed to identify the determinants of bank liquidity. A balanced fixed-effect panel regression model was applied to data from eight commercial banks, covering the period from 2000 to 2011. The study identified and analyzed eight factors affecting bank liquidity. The regression analysis results revealed that capital adequacy, bank size, the proportion of non-performing loans to total loans, interest rate margins, inflation rates, and short-term interest rates all had a positive and

statistically significant impact on bank liquidity. Conversely, the growth rates of real GDP and loans were found to have statistically insignificant effects on liquidity.

2.7. Conceptual Framework of the study



Source: Own researcher (2024)

Figure 2.1: Conceptual Framework of Factors Influencing Liquidity

In this conceptual framework, the liquidity of private commercial banks in Ethiopia is shaped by both internal (bank-specific) and external (macroeconomic) factors. Internally, capital adequacy, asset quality, bank size, loan growth, and non-performing loans (NPLs) play crucial roles. For instance, higher capital adequacy enhances a bank's ability to absorb shocks, thereby strengthening liquidity (Barua & Barua, 2023). Similarly, strong asset quality reflected by a low level of bad loans supports liquidity by ensuring reliable inflows from loan repayments. Larger banks often benefit from economies of scale and diversified funding sources, which positively affect liquidity (Getnet & Wondimagegnehu, 2022). Conversely, rapid loan growth can drain liquidity if not matched with stable funding, while a rise in NPLs directly impairs a bank's cash flow and hence its liquidity position.

On the macroeconomic side, GDP growth, inflation, interest rate spread, and exchange rate fluctuations exert significant influence. Strong GDP growth often boosts banking activity and customer deposits, thereby improving liquidity. However, high inflation may erode the real value of bank reserves and deter savings, thus negatively impacting liquidity (IMF, 2023). A wide interest rate spread can signal higher earnings potential for banks but may also indicate inefficiencies or increased credit risk, which can affect liquidity management. Additionally, volatile exchange rates pose risks to foreign-denominated assets and liabilities, thereby complicating liquidity forecasting.

Together, these internal and external variables interact dynamically. For example, even if a bank maintains solid capital and asset quality, macroeconomic shocks such as inflation surges or currency depreciation can undermine its liquidity buffers. Hence, an integrated understanding of both dimensions is critical for effective liquidity management. Banks and regulators in Ethiopia can use this framework to proactively monitor risk indicators and fine-tune strategies for resilience and financial stability.

CHAPTER THREE: THE RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

This chapter outlines the research design and methodology to be employed in the study, providing a comprehensive overview of the research area, current demographic attributes, and infrastructural context. It elaborates on the background of the research setting and details the research design, study population, sample size, and sampling procedures. Additionally, the chapter identifies data sources and tools for data collection, methods of data analysis, considerations for validity and reliability of the instruments used, and ethical considerations pertinent to the research. This structured approach ensures a thorough examination of the determinants of liquidity in selected private commercial banks in Ethiopia, facilitating meaningful and valid conclusions.

3.2. Research Design

This study employed an explanatory research design to investigate the *Determinants of Liquidity: The Case of Selected Private Commercial Banks in Ethiopia*. According to Muranaga and Ohsawa (2012), explanatory research is well-suited when the dependent variable is influenced by multiple independent variables. Liquidity in banks is affected by several determinant factors, making this design appropriate for the study's objectives. The explanatory component of the study incorporated both correlation and multiple regression analyses. As noted by Lucchetta (2007), correlation and regression techniques are valuable for examining relationships among variables and establishing causal connections.

To strengthen the analysis, the study employed a panel data approach, using data collected from selected private commercial banks in Ethiopia covering the period from 2008 to 2023. Panel data, which combines both cross-sectional and time-series dimensions, enhances the robustness of the findings by allowing for the control of unobserved heterogeneity across banks and over time (Baltagi, 2021). This method makes it possible to detect more possible effects of bank-specific and macroeconomic variables on liquidity than would be possible using purely cross-sectional or time-series data.

By incorporating panel regression models, the study not only examines the strength and direction of relationships but also tracks the dynamic behavior of liquidity determinants over a 16-year period. This approach is consistent with current empirical practices in financial research, where panel data techniques are increasingly preferred for their ability to generate more reliable and generalizable insights (Arellano & Bover, 2020). Overall, the explanatory design, reinforced with panel data analysis, provides a solid foundation for identifying and understanding the key drivers of liquidity in Ethiopia's private banking sector.

3.3. Source and Method of Data Collection

To effectively conduct research on the determinants of liquidity, it is essential to gather information from reliable sources. Research demonstrates that utilizing appropriate data collection instruments enhances the credibility and value of research findings (Koul, 2006). In this study, secondary data was collected from the audited annual financial statements of the selected commercial banks in Ethiopia, as well as from the annual reports published by the National Bank of Ethiopia (NBE).

Thus, the data encompassed bank-specific factors, such capital adequacy, asset quality, bank size, loan growth, and non-performing loans (NPLs) and macroeconomic variables, such as GDP Growth, Inflation Rate, Interest Rate Spread, and Exchange Rate. Specifically, bank specific data were extracted from the annual reports and financial statements of the chosen banks. In contrast, data regarding macroeconomic variables were obtained from the annual report bulletins released by the National Bank of Ethiopia.

3.4. Population and Sampling

The population of the study consisted of Private Commercial Banks in Ethiopia that are registered with the National Bank of Ethiopia (NBE). According to the NBE's annual report for January 2024, the major financial institutions operating in Ethiopia include banks, insurance companies, and micro-finance institutions. The number of banks operating in the country is 32, with 30 of these being private banks and the remaining 2 being state-owned (notably, the Construction and Business Bank was merged with the Commercial Bank of Ethiopia). Among

these, only 30 banks are classified as Commercial Banks, excluding the Development Bank of Ethiopia, which provides banking services to selected government priority sectors.

The sampling frame for this study, therefore, included privately owned commercial banks with a minimum of sixteen years of operational experience as of June 30, 2023. The choice of a sixteen-year timeframe aims to enhance the richness of the analysis by increasing the number of observations available. Consequently, from the 30 private commercial banks operating in the country, this study sample 9 (Nine) banks, namely NIB International Bank S.C, Abyssinia Bank S.C, United Bank S.C, Awash Bank, Dashen Bank, Wegagen Bank, Oromia Bank, Cooperative Bank of Oromia, and Birhan International Bank S.C.

3.5. Sampling Technique and Sample Size

The sampling design for this study addresses the sampling frame, sample size, and sampling method. Sampling was employed as a method to select an appropriate sample representing the overall population. The population consists of a list of elements from which the sample may be drawn (Tegene, 2016). This study selected a sample to allow generalization of findings to the broader population. Although in some cases data collection from the entire population is possible, this study used a sample-based approach due to time and budget limitations (Saunders et al., 2009).

Two main categories of sampling techniques probability (representative) sampling and non-probability (judgmental) sampling are commonly used in research. In probability sampling, each case in the population has a known and usually equal chance of selection. In contrast, in non-probability sampling, the probability of each case being selected is unknown (Saunders et al., 2009). For this study, non-probability sampling, specifically purposive sampling, was employed. As explained by Bhattacherjee (2012), purposive sampling is a method in which specific cases are selected based on non-random criteria such as availability and relevance to the study objectives. According to Saunders et al. (2009), purposive sampling is useful when working with small samples and selecting cases that are especially informative.

As a result, the study applied purposive sampling, focusing on banks with complete data over the sixteen-year period to ensure balanced panel data. Consequently, nine private commercial banks

will be purposefully selected as it is mentioned above, yielding 144 observations (9 banks x 16 years of data).

3.6 Data Analysis Methods

After data collection, the data was structured, and financial ratios were calculated for each bank concerning specific variables. In the subsequent phase, these ratios were analyzed and interpreted in alignment with the study's objectives. This research employed two types of statistical analyses to test the proposed hypotheses: descriptive statistics and inferential statistical analysis. These methods examined the relationships between independent (explanatory) variables and the dependent variable.

Descriptive statistics for both the dependent and independent variables were computed over the sampled time periods to transform raw data into a more comprehensible format. This process included calculations for standard deviation, mean, minimum, and maximum values, providing a statistical description that clarifies the underlying patterns in the data. To validate the model, diagnostic tests was conducted, including tests for normality, Heteroscedasticity, autocorrelation, and multi-collinearity. These tests ensured that the model used in the study is appropriate and meets the assumptions of the classical linear regression model.

Furthermore, Correlation analyses between the dependent and independent variables was then conducted, followed by panel regression analysis to assess the relative influence of each independent variable on the liquidity of the selected Ethiopian commercial banks. For this purpose, statistical software was used to carry out fixed effects regression models, which investigate the impact of each explanatory factor on bank liquidity. Additionally, diagnostic tests will confirm whether the assumptions of the linear regression model are upheld or violated.

3.7 Definitions of Variables & Research Hypotheses

This study aim to identify the determinants of liquidity within Ethiopian commercial banks by testing hypotheses about the relationships between bank liquidity and both bank-specific and macroeconomic factors that may influence it. Selecting appropriate explanatory variables was a critical task, as variables that positively impact liquidity in one country may have a different, or even opposite, effect in another. Additionally, factors that significantly influence liquidity in one

context may have minimal impact in another. Although a wide range of bank-specific and macroeconomic variables has been explored in previous international studies, this research will incorporate specific variables relevant to the Ethiopian context based on prior studies and current conditions.

The following variables were selected based on the Ethiopian context and previous relevant research findings. Each variable's description and operational definition will be provided below.

3.7.1 Dependent Variable: Bank Liquidity

The Bank for International Settlements (2008) defines liquidity as "the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses." Liquidity may also be measured as the proportion of assets in cash or those easily convertible to cash at stable value, allowing the bank to meet short-term obligations.

In the literature, there are two primary methods for measuring bank liquidity: liquidity ratios (the stock method) and the liquidity gap (the flow method). The liquidity gap measures the difference between assets and liabilities, while liquidity ratios calculate various ratios of balance sheet items to highlight liquidity trends. The liquidity ratio approach is often preferred because of its simplicity and standardized nature, as it involves analyzing readily available balance sheet data. On the other hand, the funding gap method, which calculates the difference between inflows and outflows, is data-intensive and lacks a standardized prediction method for future cash flows. Given its ease of computation and the support from the National Bank of Ethiopia (NBE) and prior research by Vodova (2011, 2012, 2013), Tseganesh (2012), Rafique & Malik (2013), and Chagwiza (2014), this study will adopt the liquidity ratio approach to evaluate the liquidity levels of Ethiopian commercial banks.

Liquidity = current asset / current liability

According to the National Bank of Ethiopia (NBE) establishment proclamation (No. 591), liquid assets for banks will include cash reserves, deposits in other banks, and short-term government securities recognized by the NBE as collateral, such as Treasury bills. A bank’s liquidity will indicate its ability to meet its debt obligations or current liabilities without needing to secure

external funding. High liquidity will suggest that a bank can easily fulfill its short-term debts, while low liquidity may imply financial instability risks (Alemayehu, 2016). A favorable liquidity ratio will be anything above 1, indicating financial soundness and a reduced likelihood of financial strain. A higher ratio will demonstrate a stronger margin of safety for a bank to cover its current liabilities.

3.7.2 Independent Variables

The following independent variables will be included in the econometric model to estimate the dependent variable, commercial bank liquidity.

Bank Capital Adequacy (CAR)

Capital adequacy refers to the amount of a bank's own funds available to support its activities and serve as a buffer in adverse situations (Athanasoglou et al., 2005). Bank capital will include paid-in capital, retained earnings, legal reserves, and surplus funds reserved for contingencies. Most regulatory authorities set and monitor capital adequacy ratios to protect depositors and maintain confidence in the banking system. Although CAR is generally measured as the ratio of total capital to risk-weighted assets, some literature also measures it as the ratio of capital to total assets. In this study, CAR will be proxied by the bank's ratio of total capital to total bank assets. This ratio will assess the portion of the bank's assets financed by equity, providing an indicator of the bank's capacity to absorb losses.

The literature reveals conflicting theories about the relationship between bank liquidity and capital adequacy. According to the "financial fragility" hypothesis, higher capital may reduce liquidity creation due to a decreased incentive for banks to engage in lending activities (Diamond and Rajan, 2000, 2001), suggesting a negative relationship between capital adequacy and liquidity. Conversely, studies like Al-Khouri (2012) propose that higher capital increases liquidity by enabling banks to absorb more risk, thereby fostering greater liquidity creation.

This study will hypothesize a positive relationship between capital adequacy and liquidity, and the following hypothesis will be formulated:

CAR = Total Capital ÷ Total Risk-Weighted Assets

H1: *Capital adequacy has positive and significant effect on the liquidity of commercial banks.*

Quality of Assets: The quality of assets will be regarded as one of the key factors influencing the liquidity of banks. It will be determined through the assessment of bank loans. High asset quality will be essential for liquidity accumulation, as it will enhance banks' ability to meet their liabilities in a timely manner. The studies conducted by Assfaw (2018) and Melese (2015) will measure asset quality by the ratio of loan loss provisions to total loans, suggesting that a lower ratio of loan loss provisions to total loans indicates a relatively better asset quality compared to other banks. Sudirman (2015) will further demonstrate that asset quality positively affects bank liquidity; that is, a higher asset quality ratio will correlate with a higher liquidity ratio. Conversely, poor asset quality, as measured by the ratio of non-performing loans to total loans, will show a negative relationship with liquidity, indicating that an increase in non-performing loans will reduce the level of liquid assets available to banks (Mazreku et al., 2019; Tibebu, 2019).

Asset Quality = Loan Loss Provision ÷ Total Loans

H2: *Asset quality has positive and significant effect on the liquidity of commercial banks.*

Size of the Bank (SB): The size of the bank will be measured using the natural logarithm of total assets for private commercial banks. Bonner and Zymek (2013) and Delechat et al. (2012) will argue that bank size negatively affects liquidity, though its impact remains significant. Larger banks will have greater access to external funding sources, while smaller banks will need to maintain sufficient liquidity. Thus, an increase in bank size wills likely result in a decreased liquid buffer for banks. Larger banks may also exploit economies of scale, allowing them to attract more clients and engage in more transactions, which will enhance their returns and overall liquidity.

Size of the Bank = Log(Total Assets)

H3: *Bank size has positive and significant effect on the liquidity of commercial banks.*

Loan Growth of the Bank (LG): According to NBE directive No. SBB/43/2008, loans and advances will be defined as financial assets arising from funds advanced by a bank to

individuals, conditional upon repayment with interest on a specified date or on demand. Loans and advances will represent the major earning assets of a bank, as they are issued to customers from funds collected from depositors. As banks convert short-term deposits into long-term loans, they will face potential liquidity challenges due to maturity mismatches. Therefore, an increase in loans will lead to an increase in illiquid assets and a decrease in short-term, liquid assets. The literature review suggests a negative relationship between bank loan growth and liquidity, leading to the formulation of the following hypothesis.

LG = Total Credit ÷ Deposit

H4: *Variations in interest rates has positive and significant effect on the liquidity of commercial banks.*

Non-Performing Loans (NPL): Non-performing loans will refer to loans whose credit quality has deteriorated to a point where full recovery of principal and/or interest is uncertain according to the repayment terms. An increase in non-performing loans will significantly contribute to liquidity risk, exposing banks to insufficient operational funds. Since loans and advances constitute a large portion of banks' assets, when they become non-performing, they will adversely affect both profitability and liquidity. For this study, the non-performing loan ratio will be defined as the proportion of non-performing loans relative to the total volume of loans and advances. Based on prior studies, a negative relationship between non-performing loans and bank liquidity is anticipated, leading to the following hypothesis.

NPL Ratio = NPLs ÷ Gross Loans

H5: *The Proportion of Non-Performing Loans in the Total Volume of Loans and Advances have positive and significant effect on the Bank's Liquidity.*

Gross Domestic Product (GDP): GDP will serve as an indicator of a country's economic health and standard of living, reflecting the level of economic activity. Previous studies indicate that during periods of economic growth or recovery, banks tend to increase loans and advances, which may lead to a decrease in liquidity. Conversely, during recessions, reduced business operations can impair lenders' ability to meet obligations, resulting in increased bad loans and

decreased liquidity. For this study, GDP will be measured by the real annual growth rate of gross domestic product, which is expected to have a negative effect on bank liquidity.

H6: *Real GDP growth has positive and significant effect on the liquidity of commercial banks.*

Inflation (INF): Inflation will be another crucial macroeconomic variable potentially impacting bank liquidity. During inflationary periods, central banks may increase borrowing costs, which can limit commercial banks' lending capacity. Recent theories underscore the role of informational asymmetries in credit markets and suggest that rising inflation negatively affects market frictions, adversely impacting the financial sector. During inflation, banks are likely to lend less while holding more liquid or short-term assets. Additionally, increased living costs during inflation can lead to a decrease in deposits, negatively affecting liquidity. For this study, inflation will be measured by the annual general consumer price index, with an expected negative relationship between inflation rates and bank liquidity.

H7: *Inflation has positive and significant effect on the liquidity of commercial banks.*

Interest Rate Differential: The interest rate differential will be calculated as the difference between loan and deposit interest rates. Interest rates represent the cost of borrowing, which varies by bank and the amount borrowed (Manyo et al., 2016). Higher interest rates typically discourage borrowing, prompting individuals to invest more, while lower rates encourage increased borrowing.

H8: *Interest Rate Gap has positive and significant effect on Bank Liquidity*

Exchange Rate Fluctuations: Exchange rate fluctuations, specifically the Ethiopian Birr to US Dollar exchange rate, will also be examined. Various factors can lead to changes in exchange rates, including supply and demand dynamics in foreign markets, which in turn can affect the liquidity of Ethiopian private commercial banks.

H9: *Exchange Rate has positive and significant effect on Bank Liquidity?*

Table 3.1: Description of the variables and their intended relationship, Symbol and Operational

VARIABLES	SYMBOL	PROVISION	EXPECTED SIGN
Dependent			
Liquidity ratios	LIQ	Current asset/current liability ratio	**NA**
Independent			
Adequacy Of The Banks Capital	CAR	Share of net capital total asset	+
Asset Quality	AQ	The ratio of provisions for loan losses to total loans	-
Bank size	BS	The natural logarithm of the banks total asset	+
Loan growth	LG	Annual variation of loans	-
Nonperforming loan	NPL	Gross loan/NPL ratio	-
Gross Domestic Product	GDP	Real annual growth rate of gross domestic product	-
Inflation	INF	Annual general index of consumer prices	-
Interest rate spread	IRS	The interest rate includes the amount charged by the bank over time peak period	-
Foreign exchange Rate fluctuations	ERF	Exchange rate (USD-Birr)	-

Source: Literature search, National Bank of Ethiopia (2023).

3.8. Model specification

As it is outlined in the research design section of this study, the analysis will utilize a balanced panel data set, which is expected to offer advantages over both cross-sectional and simple time series data. If there are many time series data points and few cross-sectional units, Gujarati (2004) asserts that the values of the parameters estimated by the fixed effect model. Panel data consists of cross-sectional observations collected over multiple time periods (Brooks, 2008). Specifically, this study will incorporate longitudinal data elements; the cross-sectional aspect will reflect the sample of nine Ethiopian commercial banks, while the time series component will cover the period from 2008 to 2023.

The study aims to determine whether the selected variables are economically relevant in the context of Ethiopian commercial banks. The regression model set to be utilized in this study will be adapted from the works of Vodova (2011, 2012, 2013), Tseganesh (2012), Rafique and Malik (2013), and Assfaw (2019). The following equation will represent the general model for this research:

$$Lit = \alpha + \beta Xit + \delta i + \varepsilon it$$

In this equation, (Lit) will represent one of the three liquidity ratios for bank *i*in time *t*, *Xit* will be a vector of explanatory variables for bank *I* in time *t*, α is constant, β are coefficient which represents the slope of variables, δi denotes fixed effects in bank *I* and εit is the error term. The subscript *I* denote the cross-section and *t* representing the time-series dimension. To comprehensively test the determinants of bank liquidity, the integrated model encompassing all relevant variables will be specified as follows:

$$L1it = \alpha + \beta 1\,(CARit) + \beta 2\,(AQit) + \beta 3\,(BSit) + \beta 4\,(LGAit) + \beta 5\,(NPLit) + \beta 6\,(GDPit) + \beta 7$$

$$(INFit)) + 8IRSit + 9\text{FERF}it + \varepsilon it).$$

Bank-Specific and Macroeconomic Factors

- Capital Adequacy Ratio **(CAR)**
- Asset Quality **(AQ)**
- Bank Size **(BS)**
- Loan Growth **(LG)**
- Nonperforming Loan Ratio **(NPL)**
- Gross Domestic Product Growth **(GDP)**
- Inflation Rate **(INF)**
- Interest Rate Spread **(IRS)**
- Foreign Exchange Rate Fluctuations **(FERF)**

Where:

***L1it*:** Indicates the bank's liquidity, calculated as the ratio of liquid assets to deposits and short-term borrowings for the *i-th* bank in year *t*.

***CAR it*:** Capital adequacy ratio for the *i-th* bank in year *t*.;

***AQit*:** Asset quality of the *i-th* bank in year *t*.

***BSit*:** Natural logarithm of the assets of the *i-th* bank in year *t*.

***LGit*:** Annual change in loans for the *i-th* bank in year *t*.

NPLit: Ratio of nonperforming loans to total loans for the *i-th* bank in year *t*.

***GDPit*:** Real GDP growth rate of Ethiopia in year *t*.

***INFIt*:** Inflation rate in Ethiopia in year *t*.

***IRSit*:** Interest rate spread applied by the bank in year *t*.

FERFit: Change in the USD to Ethiopian Birr exchange rate in year *t*.

Through this model specification, the study will aim to uncover the significant determinants of liquidity in the nine selected private commercial banks in Ethiopia.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter presents the analysis of the data and discussion of the results to achieve the research objectives and set the foundation for the conclusion. This study investigates the determinants of commercial bank liquidity in Ethiopia between 2008 and 2023. The chapter comprises four sections: descriptive statistics (Section 4.1), correlation analysis (Section 4.2), regression results (Section 4.3), and assessment of the regression model assumptions and the overall model fit, as well as the estimated model coefficients and the determinants of bank liquidity (Sections 4.4 to 4.6).

The study analyzes data from nine commercial banks in Ethiopia over a sixteen-year period (2008-2023). Bank-specific independent variables were extracted from the annual reports of each bank. Macroeconomic data were obtained from the National Bank of Ethiopia (NBE) and the Ministry of Finance and Economic Development (MoFED). The researcher used E-views 9 software to analyze this research findings and data. Further, the researcher carried out relevant diagnostic testing to identify for any presence of econometric problems using SPSS.V27 and E-views 9. E-views 9 was used for descriptive statistics, correlations, and regressions. Prior chapters reviewed relevant literature, providing context and identifying knowledge gaps. The research design employed to meet the research objective, answer research questions, and test research hypotheses was discussed in the preceding chapter.

4.2 Descriptive statistics

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

4.2.1 Descriptive Statistics Analysis

Table 4.1 presents the descriptive statistics for all variables used in this study, including the number of observations (N), minimum value, maximum value, mean, and standard deviation for liquidity, bank size, capital adequacy, GDP growth, inflation rate, interest rate spread, loan growth, non-performing loans, asset quality, and exchange rate over the period 2008-2023

Table 4.1: Summary of Descriptive Statistics of Study Variables over the Period of 2008-2023

Variable	N	Minimum	Maximum	Mean	Std. Dev.
Liquidity	119	0.08	1.30	0.3543	0.30716
Bank Size	119	0.76	1.10	0.9388	0.05615
Capital Adequacy	119	0.08	0.99	0.2565	0.26054
GDP Growth	119	-0.02	0.13	0.0838	0.03970
Inflation Rate	119	-0.11	0.36	0.1290	0.10609
Interest Rate Spread	119	0.04	0.12	0.0785	0.02012
Loan Growth	119	-0.10	0.78	0.2670	0.16931
Non-Performing Loans	119	0.01	0.10	0.0332	0.01747
Asset Quality	119	0.00	0.05	0.0290	0.00867
Exchange Rate	119	8.54	26.20	16.0972	6.80240

Source: Computed using Stata

As shown in Table 4.1, the mean liquidity ratio for the sampled banks is 0.3543, with values ranging from 0.08 to 1.30, indicating considerable variation in liquidity positions. The mean value of liquidity is substantially greater than the minimum requirement of the National Bank of Ethiopia (NBE) which is 15%. This suggests that, on average, the sampled banks maintained adequate liquid asset holdings during the study period. The mean bank size, measured by the natural logarithm of total assets, is 0.9388, with a standard deviation of 0.05615, reflecting differences in the scale of operations among the banks. The mean capital adequacy ratio is 0.2565, ranging from 0.08 to 0.99, with the average result of CAR implying above the minimum requirement set by the NBE. This implies that commercial banks are able to absorb losses. The

macroeconomic variables exhibit the following characteristics: GDP growth has a mean of 0.0838, with values ranging from -0.02 to 0.13; the inflation rate has a mean of 0.1290, ranging from -0.11 to 0.36; the interest rate spread has a mean of 0.0785, ranging from 0.04 to 0.12, and the Exchange rate has a mean of 16.0972, ranging from 8.54 to 26.20. The loan-related variables indicate a mean loan growth of 0.2670, ranging from -0.10 to 0.78. On average, the ratio of non-performing loans to total loans is 0.0332 and asset quality is 0.0290. Together, the range of descriptive data provides a summary of the variables used and how each contribute to the determinant of liquidity

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

The other external factor is economic growth showed GDP in Ethiopia during 2008-2023 of the mean 0.08, with a -0.02 and 0.12 minimum and a maximum of respectively and the standard deviation for was 0.03 during the period of 2008 to 2023.

4.2.2. Correlation Matrix

To explore the relationships between the dependent variable (bank liquidity) and the independent variables, as well as to assess the potential for multicollinearity among the independent variables, a Pearson correlation matrix was computed. Correlation analysis indexes the degree to which two or more variables are associated with each other (Brooks, 2008). The Pearson correlation coefficient (r) quantifies the strength and direction of linear association between two continuous variables, ranging from -1 to +1. A coefficient of +1 indicates a perfect positive linear relationship, meaning that as one variable increases, the other increases proportionally. Conversely, a coefficient of -1 indicates a perfect negative linear relationship, where an increase in one variable is associated with a proportional decrease in the other. A coefficient of 0 suggests the absence of a linear relationship between the two variables. The statistical significance of each correlation coefficient is determined by a p-value, with values below a pre-specified significance level (typically 0.05 or 0.01) indicating a statistically significant relationship. The computed correlation matrix is presented in Table 4.2.

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

		1	2	3	4	5	6	7	8	9	10
Liquidity(1)	Pearson Correlation	1	0.131	.638**	-0.167	-.393**	-.276**	.283**	0.015	-0.131	-0.072
	Sig. (2-tailed)		0.154	0.000	0.070	0.000	0.002	0.002	0.869	0.156	0.437
Bank Size(2)	Pearson Correlation		1	-0.102	-0.060	-0.076	.678**	-.240**	-.497**	.239**	.548**
	Sig. (2-tailed)			0.269	0.519	0.414	0.000	0.009	0.000	0.009	0.000
Capital Adequacy(3)	Pearson Correlation			1	0.072	-0.130	-.234*	.305**	0.047	-0.006	-0.059
	Sig. (2-tailed)				0.433	0.159	0.011	0.001	0.611	0.949	0.525
GDP Growth(4)	Pearson Correlation				1	.337**	-0.055	-.220*	.225*	.590**	-0.074
	Sig. (2-tailed)					0.000	0.551	0.016	0.014	0.000	0.427
Inflation Rate(5)	Pearson Correlation					1	0.138	-.294**	0.143	.298**	-0.039
	Sig. (2-tailed)						0.135	0.001	0.120	0.001	0.675
Interest Rate Spread(6)	Pearson Correlation						1	-.336**	-.519**	.247**	.616**
	Sig. (2-tailed)							0.000	0.000	0.007	0.000
Loan Growth(7)	Pearson Correlation							1	-0.171	-0.073	-0.041
	Sig. (2-tailed)								0.062	0.427	0.656
Non-Performing Loans(8)	Pearson Correlation								1	-.202*	-.484**
	Sig. (2-tailed)									0.028	0.000
Asset Quality(9)	Pearson Correlation									1	.234*
	Sig. (2-tailed)										0.010
Exchange Rate(10)	Pearson Correlation										1
	Sig. (2-tailed)										

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The results of the correlation analysis reveal several notable relationships between the study variables. First, Capital Adequacy (CAR) exhibits a statistically significant and positive correlation with Bank Liquidity (LIQ) ($r = 0.638$, $p < 0.01$). This finding suggests that banks with higher levels of capital adequacy tend to maintain higher liquidity positions. This positive association may reflect a greater capacity for well-capitalized banks to attract deposits, manage assets effectively, and meet short-term obligations.

Second, Inflation Rate (INF) demonstrates a statistically significant and negative correlation with Bank Liquidity (LIQ) ($r = -0.393$, $p < 0.01$). This negative relationship indicates that higher rates of inflation are associated with lower levels of bank liquidity. During periods of high inflation, banks may experience increased deposit withdrawals and reduced lending activity, leading to a decline in liquidity.

In contrast, Loan Growth (LG) shows a statistically significant and positive correlation with Bank Liquidity (LIQ) ($r = 0.283$, $p < 0.01$). This unexpected positive relationship suggests that an increase in loan growth can be associated with an increase in bank liquidity. This could be related to higher returns from loan growth, however further study will be required to explain this.

As for the Independent variables, Bank Size and Interest Rate have a high correlation. Since the two variables are above 0.5, they should be treated with caution.

A crucial aspect of correlation analysis in regression modeling is the assessment of multicollinearity among the independent variables. Multicollinearity occurs when two or more independent variables are highly correlated, potentially leading to unstable regression coefficients and difficulty in isolating the individual effects of each predictor variable (Gujarati & Porter, 2009). To identify potentially problematic multicollinearity, a threshold of 0.75 for the correlation coefficient was used, following recommendations by Cooper and Schindler (2009) and Mashotro (2007). As none of the correlation coefficients among the independent variables exceeded this threshold, multicollinearity is not expected to pose a significant threat to the validity of the subsequent regression analysis. However, given the correlation between Bank Size and Interest Rate, it will be necessary to assess these more closely to confirm this.

While correlation analysis provides valuable insights into the relationships between variables, it is important to acknowledge its limitations. Correlation does not imply causation, and the observed relationships may be influenced by other unmeasured factors or complex interactions. Furthermore, correlation analysis only captures linear relationships, potentially overlooking non-linear associations between variables. Therefore, the findings from the correlation analysis should be interpreted with caution and further investigated using more advanced statistical techniques, such as multiple regression analysis, which allows for the examination of the independent effects of each predictor variable while controlling for the influence of other variables in the model. The subsequent regression analysis will provide a more comprehensive understanding of the determinants of bank liquidity in the selected Ethiopian commercial banks.

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

In the descriptive statistics part, the study shows the mean, standard deviation, minimum and maximum values of the dependent and explanatory variables including the number of observation for each variable during the period under consideration, that is from 2008-2023. However, this section provide test for the classical linear regression model (CLRM) assumptions such as normality, heteroscedasticity, autocorrelation and multicolinearity tests. The linearity of the parameter is assumed since the model applies linear ordinary least square (OLS). The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Thus, in order to maintain the validity and robustness of the regression result of the research in CLRM, it is better to satisfy basic assumptions of CLRM. As noted by Brooks (2008), when these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there will be data that left out of the model. Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, normality, multicolinearity, autocorrelation and heteroscedasticity tests are made for identifying misspecification of data if any so as to fulfill research quality

4.3.1 Normality test

Normality assumes that the residuals are normally distributed. Figure 4.3 presents a histogram of the standardized residuals. While some residuals exhibit slight deviations from a perfect normal

distribution, particularly near zero, the majority of the residuals are closely aligned with the expected bell-shaped curve. We can examine this more effectively with the data provided in the Kolmogorov-Smirnova.

Table 4.3: Tests of Normality

Test	Statistic	df	Sig.
Kolmogorov-Smirnov	0.031	375	0.200*
Shapiro-Wilk	0.991	375	0.020

**This is a lower bound of the true significance. a. Lilliefors Significance Correction*

The Kolmogorov-Smirnov test and Shapiro-Wilk test can provide a numerical way of determining normality. The results indicate that p=0.200, which is greater than 0.05 which means that the findings indicate that we fail to reject the null hypothesis for the data and suggest that data is consistent with a normal distribution. Overall, based on visual inspection of the residual plots and the results of the normality tests, we conclude that the assumptions of linearity, homoscedasticity, and normality are reasonably well-met, supporting the use of multiple linear regression for this analysis

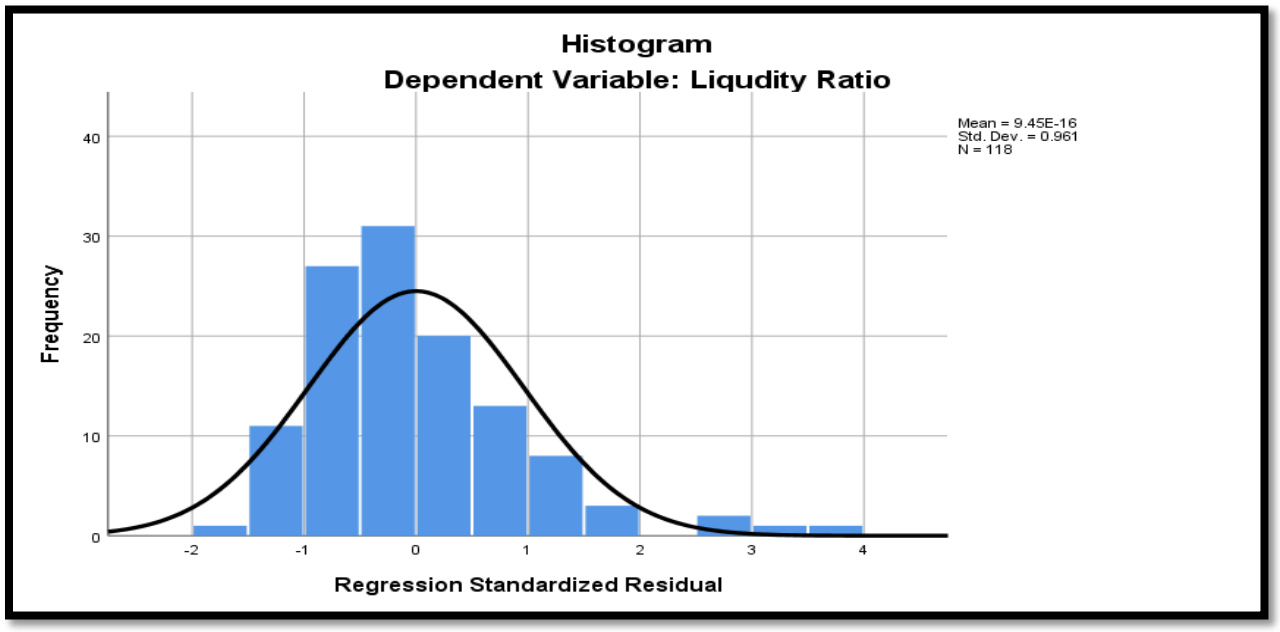


Figure 4.1: Frequency Distribution of Standardized Residual

4.3.2 Heteroscedasticity Test

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

Decision rule

HO: no relation or difference

HA: Their difference or similarity.

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

Table 4.4: Heteroscedasticity Test: Breusch-Pagan-Godfrey

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

Homoscedasticity assumes that the variance of the residuals is constant across all levels of the predictor variables. Heteroscedasticity, meaning there is variation in the residuals, suggests that the variability in our model is not consistent. As a result, this study relies on a consistent variance to suggest reliable and accurate findings. To evaluate this assumption, we assessed the distribution of residuals along the regression line. The residual follows linearity, and as a result, homoscedasticity is assumed. If the shape of the graph deviates from a cone-like structure and

the residuals are evenly dispersed at each level of the predictors, it suggests a violation of the homoscedasticity assumption.

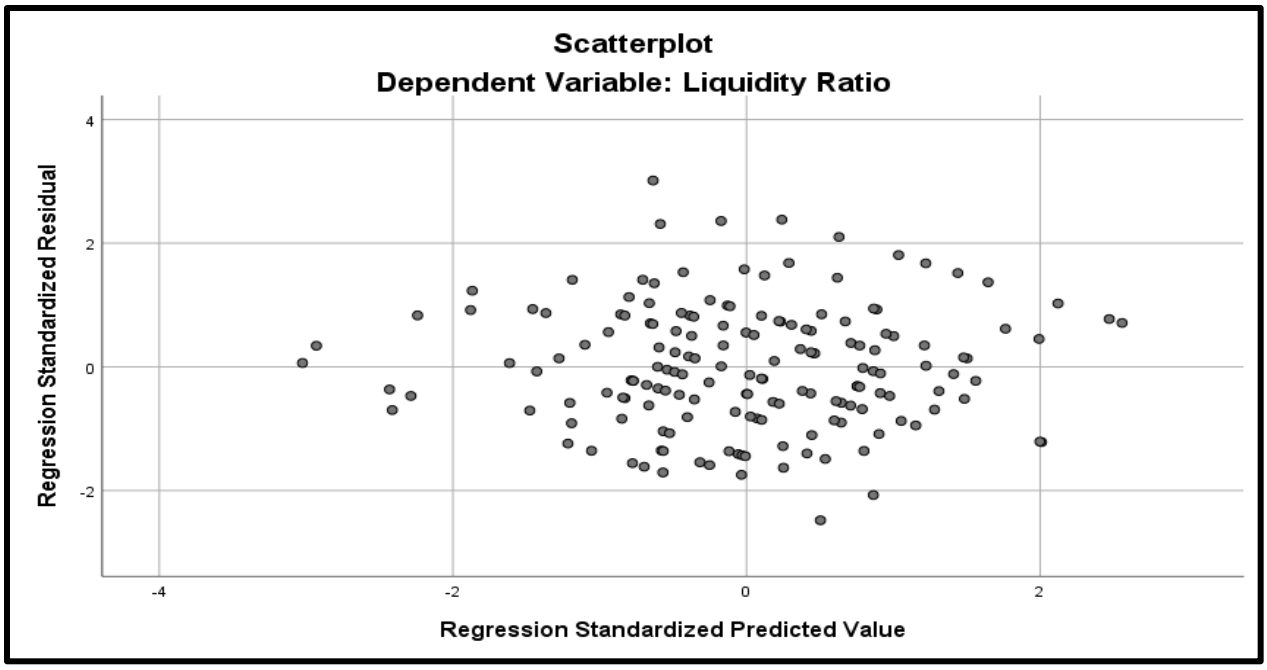


Figure 4.2: Scattered plot

4.3.3 Autocorrelation Test

(Chris books, 2008) argued that the CLRMs di error terms which are zero in cross sectional type errors are uncorrelated with one another. In addition he said that if the errors are not uncorrelated with one another, it would be stated that they are auto correlated or that they are serially correlated. This means they are auto correlated or they are serially correlated. To test this assumption the Durbin–Watson (DW) statistical test was applied. If the p-value of the auto correlation test is greater than the significance level of 5 percent the null hypothesis is accepted and the residual is serially correlated or auto correlated. If the p-value is less than 5 percent the null hypothesis is rejected and the alternative hypothesis is accepted and the residuals are not serially correlated or not auto correlated. . Therefore, the residuals are serially correlated or auto correlated. Furthermore, the researcher tested the autocorrelation assumptions that imply zero covariance of error terms over time. That means errors associated with one observation are uncorrelated with the errors of any other observation. As noted by Gujarati (2004), the best renowned test for detecting serial correlation is Durbin Watson test. Accordingly, if the

computed nearest to (2) in application, it is assumed that there is no autocorrelation problem. Thus, as shown in table (5) the computed below in this study was 1.79 which is nearest to 2 implying the absence of autocorrelation problem. Thus, this implies that error terms are not correlated with one another for different observation in this study.

Table 4.5.Autocorrelation Test summary

R-squared	0.70
Prob(F-statistic)	0.6
Durbin-Watson sta	1.79

4.3.4 Multicolinearity Test

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

Table 4.6. The results of Multicolinearity test

	1	2	3	4	5	6	7	8	9
Bank Size1	1								
Capital Adequacy2	-0.102	1							
GDP Growth3	-0.060	0.072	1						
Inflation Rate4	-0.076	-0.130	.337**	1					
Interest Rate Spread5	.678**	-.234*	-0.055	0.138	1				
Loan Growth	-.240**	.305**	-.220*	-.294**	-.336**	1			
Non-Performing Loans	-.497**	0.047	.225*	0.143	-.519**	-0.171	1		
Asset Quality	.239**	-0.006	.590**	.298**	.247**	-0.073	-.202*	1	
Exchange Rate	.548**	-0.059	-0.074	-0.039	.616**	-0.041	-.484**	.234*	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.3.5. Linearity

Linearity assumes that the relationship between the independent variables and the dependent variable (bank liquidity) is linear. To assess this assumption, we examined a scatterplot of standardized residuals (ZRESID) against standardized predicted values (ZPRED) generated in EViews. A linear regression requires that the residuals be approximately normally distributed and have constant variance. Thus, the ZRESID should be evenly and randomly distributed.

Ideally, this plot should exhibit a random scatter of points evenly distributed around zero. Any discernible patterns, such as a funnel shape, would suggest a violation of the linearity assumption or indicate heteroscedasticity. The visual inspection of Figure 4.2 reveals a pattern with evenly and randomly dispersed points around zero. This patter indicates that the pattern follows a normal distribution, which means that the linearity is maintained.

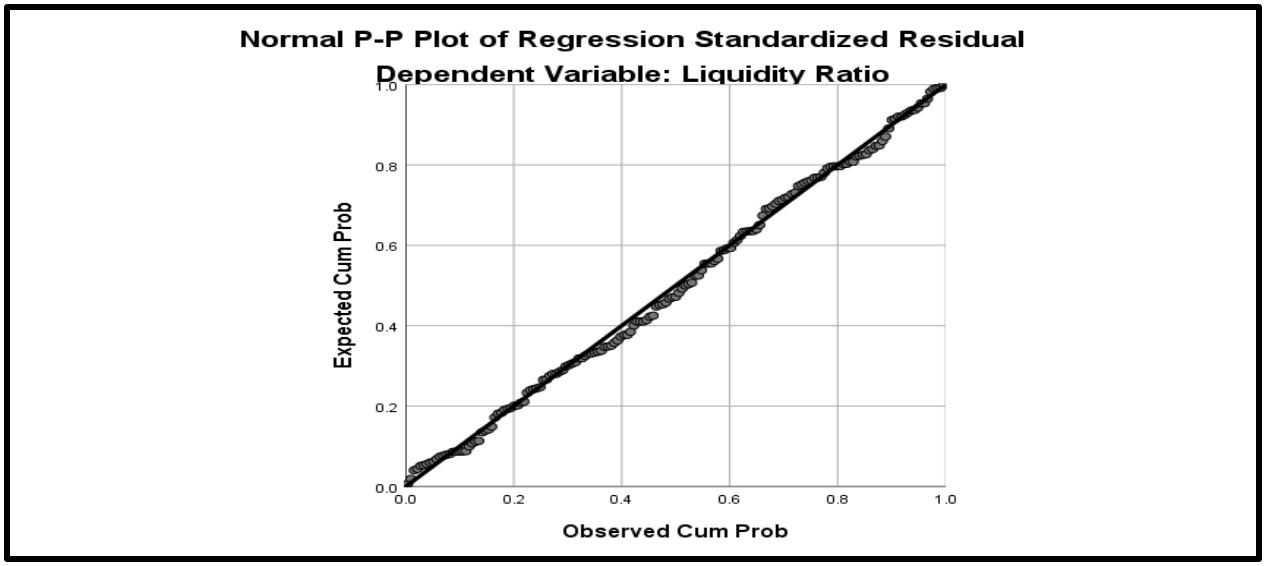


Figure 4.3: Normal Point Plot Standardized Residual

4.5. The Regression Analysis

4.5.1 The Overall Model Fit of Linear Regression

Prior to examining the individual coefficients and drawing conclusions about the specific effects of each independent variable on bank liquidity, it is essential to evaluate the overall goodness of fit of the multiple linear regression model. This assessment provides critical information about the extent to which the model, *as a whole*, is able to capture and explain the variation in bank liquidity. A well-fitting model is a prerequisite for drawing valid and reliable inferences about the relationships between the variables.

Table 4.7: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.805[a]	.648	.619	.18962	1.790

a. *Predictors: (Constant), Exchange Rate , Inflation Rate, Capital Adequacy, GDP Growth, Loan Growth, Non-Performing Loans, Bank Size, Asset Quality, Interest Rate Spread*

b. *Dependent Variable: Liqudity*

Prior to examining the individual regression coefficients, the overall fit of the multiple linear regression model was assessed to determine its effectiveness in explaining the variation in bank liquidity. Normality assessment, for normality using a Kolmogorov-Smirnov test (Section 4.4.3), and the results indicated reasonable consistency with a normal distribution.

As summarized in Table 4.14, the model achieved a multiple correlation coefficient (R) of 0.805, indicating a strong positive correlation between the observed and predicted values of bank liquidity. The coefficient of determination (R^2) was 0.648, signifying that approximately 64.8% of the variance in bank liquidity is explained by the set of independent variables included in the model: Exchange Rate, Inflation Rate, Capital Adequacy, GDP Growth, Loan Growth, Non-Performing Loans, Bank Size, and Asset Quality. The adjusted R-squared, which accounts for the number of predictors in the model, was slightly lower at 0.619, suggesting that the included predictors contribute meaningfully to the model's explanatory power without substantial overfitting. The standard error of the estimate (0.18962) indicates the typical deviation of observed values from the regression line, with a low value suggesting a precise and accurate model. The Durbin-Watson statistic, used to assess the independence of residuals, was 1.790, falling within the acceptable range and indicating that autocorrelation is not a significant concern for the validity of the regression results.

Table 4.8: ANOVA[a]

Model		Sum of Squares	*Df*	Mean Square	*F*	Sig.
1	Regression	7.214	9	.802	22.293	.000[b]
	Residual	3.919	119	.036		
	Total	11.133	128			

a. Predictors: (Constant), Exchange Rate , Inflation Rate, Capital Adequacy, GDP Growth, Loan Growth, Non-Performing Loans, Bank Size, Asset Quality, Interest Rate Spread

b. Dependent Variable: Liquidity Ratio

The Analysis of Variance (ANOVA) results, presented in Table 4.15, provide further evidence of the overall significance of the regression model. The F-statistic (22.293) tests the null hypothesis that all of the regression coefficients are equal to zero. In other words, it tests whether the independent variables, taken as a group, have any statistically significant effect on bank liquidity. The associated significance level (Sig. or p-value) is less than 0.001, which is far below the conventional significance level of 0.05 (or even 0.01). Therefore, we reject the null hypothesis and conclude that the independent variables, as a group, are statistically significant predictors of

bank liquidity. This strongly supports the claim that the model as a whole is a good fit for the data and explains a significant portion of the variance in bank liquidity. With all of this analysis, it is statistically clear that the model is significant.

In summary, the results of the regression model diagnosis, including the high R-squared value, acceptable standard error of the estimate, appropriate Durbin-Watson statistic, and statistically significant ANOVA results, provide strong support for the overall adequacy and goodness of fit of the multiple linear regression model. These findings justify proceeding to examine the individual regression coefficients and interpreting the specific relationships between each independent variable and bank liquidity

Table 4.9: Results of Collinearity Statistics

Variable	Tolerance	VIF
Bank Size	0.451	2.217
Capital Adequacy	0.857	1.166
GDP Growth	0.487	2.051
Inflation Rate	0.741	1.350
Interest Rate Spread	0.338	2.957
Loan Growth	0.601	1.664
Non-Performing Loans	0.510	1.960
Asset Quality	0.484	2.068
Exchange Rate	0.542	1.844

As shown in Table 4.16, all Tolerance values are well above the conventional threshold of 0.1, and all Variance Inflation Factors (VIFs) are below the common cutoff of 5. Therefore, we conclude that multicollinearity is unlikely to be a serious threat to the validity of the regression results in this study

4.5.2. Test of Multicollinearity

Multicollinearity, the presence of high correlation among independent variables in a regression model, can distort results and make it difficult to interpret the individual effects of predictors. To assess multicollinearity in this study, we examined both Tolerance values and Variance Inflation Factors (VIFs). Tolerance reflects the proportion of variance in an independent variable that is *not* explained by other independent variables. The VIF, conversely, quantifies the extent to which the variance of an estimated regression coefficient is increased due to multicollinearity. A high VIF indicates a stronger degree of multicollinearity.

In general, a VIF value of 1 suggests no multicollinearity, values between 1 and 5 indicate moderate multicollinearity, and values exceeding 5 are often considered indicative of problematic multicollinearity. Tolerance and VIF are inversely related: Tolerance = 1/VIF.

4.6. The Determinants of Bank Liquidity

This section presents the analysis of the determinants of bank liquidity based on the multiple regression results. The findings reveal the extent to which each independent variable influences the liquidity levels of selected Ethiopian commercial banks.

As indicated in Table 4.17, the comprehensive model, including Bank Size, Capital Adequacy, GDP Growth, Inflation Rate, Interest Rate Spread, Loan Growth, Non-Performing Loans, Asset Quality, and Exchange Rate, explains 61.5% of the variance in bank liquidity ($R^2 = 0.524$). This suggests that these factors collectively have a substantial impact on bank liquidity, though other unmeasured variables also play a role. The Durbin-Watson statistic of 1.785 indicates no significant autocorrelation.

To assess the relative importance of each determinant, we examine the standardized beta coefficients. A higher absolute beta value indicates a stronger influence. From Table 4.17, Capital Adequacy (Beta = 0.575, t = 9.368, p = 0.000) demonstrates the most substantial positive influence on bank liquidity. This implies that a one standard deviation increase in capital adequacy results in a 0.575 standard deviation increase in bank liquidity, holding all other variables constant. The unstandardized coefficient (B = 0.678) indicates that a one-unit increase in the Capital Adequacy Ratio (CAR) leads to an approximate 0.678 unit increase in the liquidity

ratio. This finding supports the hypothesis (H1) that Capital Adequacy has a positive and significant effect on bank liquidity, signifying that well-capitalized banks generally exhibit higher liquidity levels.

Bank Size (Beta = 0.495, t = 5.844, p = 0.000) also exerts a positive and significant influence on bank liquidity. An increase in bank size, as measured by the natural logarithm of total assets, contributes to enhanced liquidity. The regression coefficient value is 2.705 indicating that if Bank size increases by one unit, the liquidity ratio also increases by 2.705 units. This may be because the bank's has access to larger amounts of capital compared to others.

GDP Growth (Beta = -0.185, t = -2.274, p = 0.025), on the other hand, demonstrates a significant *negative* relationship with bank liquidity. The unstandardized coefficient (B = -1.432) suggests that a one-unit increase in GDP growth rate is associated with a decrease of approximately 1.432 units in bank liquidity. This may be due to the increase in bank loans, in which capital is converted to non-liquid capital. However, the relatively small beta value suggests that the effect size may be small compared to others.

Similarly, Inflation Rate (Beta = -0.190, t = -2.878, p = 0.005) exhibits a negative impact on bank liquidity. The negative unstandardized coefficient (B = -0.550) suggests that as inflation rises by one unit, bank liquidity tends to fall by approximately 0.550 units. This is because it has the potential of discouraging savings.

Interest Rate Spread (Beta = -0.386, t = -3.952, p = 0.000) reveals a stronger negative relationship with bank liquidity. The unstandardized coefficient (B = -5.898) suggests that a one-unit increase in interest rate spread is associated with a decrease of approximately 5.898 units in bank liquidity. This could indicate that higher interest rate spreads may discourage borrowing and investment activity, potentially leading to reduced liquidity.

Based on the multiple regression analysis, the estimated model for predicting bank liquidity is as follows:

$$L1it = -1.767 + 2.705(BSit) + 0.678(CARit) - 1.432(GDPit) - 0.550(INFIt) - 5.898(IRSit) - 0.028(LGit) + 1.488(NPLit) + 1.717(AQit) - 0.003(FERFit)$$ "

Table 4.10: Multiple Regression Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-1.767	.422		-4.189	.000	-2.603	-.931
	Bank Size	2.705	.463	.495	5.844	.000	1.788	3.623
	Capital Adequacy	.678	.072	.575	9.368	.000	.534	.821
	GDP Growth	-1.432	.630	-.185	-2.274	.025	-2.681	-.184
	Inflation Rate	-.550	.191	-.190	-2.878	.005	-.929	-.171
	Interest Rate Spread	-5.898	1.492	-.386	-3.952	.000	-8.856	-2.940
	Loan Growth	-.028	.133	.015	-.209	.835	-.236	-.291
	Non-Performing Loans	1.488	1.398	.085	1.064	.290	-1.284	4.259
	Asset Quality	1.717	2.896	.048	.593	.555	-4.023	7.456
	Exchange Rate	-.003	.003	-.062	-.799	.426	-.010	.004

The model also shows the results for macro level factors such as Loan Growth, Non-Performing Loans, Asset Quality and Exchange Rate as follows:

Loan Growth (Beta = 0.015, t = -0.209, p = 0.835): The p value is greater than 5% which means that the result is insignificant. The unstandardized coefficient (B = -0.028) suggests that the relationship between loan growth is negative, the result is still insignificant. This means the

effect of loan growth has little impact on bank liquidity. This does not give rise to the support of the hypothesis made during the study.

Non-Performing Loans (Beta = 0.085, t = 1.064, p = 0.290): The p value is greater than 5% which means that the result is insignificant. The unstandardized coefficient (B = 1.488) suggests that the relationship between non-performing loans is positive, the result is still insignificant.

Asset Quality (Beta = 0.048, t = 0.593, p = 0.555): The p value is greater than 5% which means that the result is insignificant. The unstandardized coefficient (B = 1.717) suggests that the relationship between asset quality is positive, the result is still insignificant. This means the effect of asset quality has little impact on bank liquidity.

Exchange Rate (Beta = -0.062, t = -0.799, p = 0.426): The p value is greater than 5% which means that the result is insignificant. The unstandardized coefficient (B = -0.003) suggests that the relationship between asset quality is negative, the result is still insignificant.

In conclusion, Capital Adequacy is the most important positive determinant of bank liquidity in this model. While other macroeconomic factors such as GDP growth, Inflation Rate, and Interest Rate Spread show negative influences

Table 4.11: Summary of the findings and Hypothesis test

Analysis	Key Findings	Hypothesis Tested
Descriptive Statistics	**Liquidity**: Mean = 0.3543, range 0.08-1.30, above NBE's 15% requirement.	N/A
	Bank Size: Mean = 0.9388, reflecting operational scale differences.	
	Capital Adequacy: Mean = 0.2565, above NBE minimum, indicating banks can absorb losses.	
	GDP Growth: Mean = 0.0838, indicating moderate economic growth.	
	Inflation Rate: Mean = 0.1290, indicating fluctuations in cost of living.	
Correlation	**Capital Adequacy** has a strong positive correlation with	H1: Capital Adequacy

Analysis	**Liquidity** ($r = 0.638$, $p < 0.01$).	positively affects bank liquidity.
	Inflation Rate negatively impacts **Liquidity** ($r = -0.393$, $p < 0.01$).	H2: Inflation negatively affects bank liquidity.
	Loan Growth positively correlates with **Liquidity** ($r = 0.283$, $p < 0.01$).	H3: Loan Growth positively affects bank liquidity.
Regression Analysis	**Model Fit**: $R^2 = 0.648$; model explains 64.8% of liquidity variance.	N/A
	Capital Adequacy: Significant positive coefficient ($B = 0.678$, $p < 0.001$).	Confirmed: Capital Adequacy significantly affects liquidity.
	Bank Size: Positive impact ($B = 2.705$, $p < 0.001$).	Confirmed: Larger banks tend to have better liquidity.
	GDP Growth: Negative impact ($B = -1.432$, $p < 0.05$).	Confirmed: Higher GDP growth correlates with lower liquidity.
	Inflation Rate: Negative impact ($B = -0.550$, $p < 0.01$).	Confirmed: Inflation discourages liquidity.
	Interest Rate Spread: Strong negative impact ($B = -5.898$, $p < 0.001$).	Confirmed: Higher spreads reduce liquidity.
Model Assumptions	**Normality**: Residuals show normal distribution ($p = 0.200$).	Assumption met.
	Homoscedasticity: No significant issues ($p = 0.0959$).	Assumption met.
	Autocorrelation: No significant correlation ($DW = 1.79$).	Assumption met.
	Multicollinearity: No issues detected ($VIF < 5$).	Assumption met.

The analysis clearly establishes that Capital Adequacy, Bank Size, GDP Growth, Inflation Rate, and Interest Rate Spread are significant determinants of bank liquidity in Ethiopian commercial banks from 2008 to 2023. This comprehensive assessment supports the hypotheses regarding the relationships between these factors and bank liquidity.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5. Introduction

This chapter provides a summary of the key findings, conclusions, and recommendations drawn from the study on the determinants of liquidity in selected private commercial banks in Ethiopia. The study aimed to assess the influence of bank-specific and macroeconomic factors on the liquidity positions of private commercial banks operating in Ethiopia.

5.1 Summary

This study comprehensively examined the factors influencing liquidity in nine selected private commercial banks in Ethiopia over the period from 2008 to 2023. Using panel data analysis, it explored both bank-specific internal factors and external macroeconomic variables that shape banks' liquidity positions. Key bank-specific variables included capital adequacy, bank size, asset quality, loan growth, and non-performing loans, while macroeconomic factors covered GDP growth, inflation, interest rate spread, and exchange rate fluctuations.

Descriptive statistics revealed that the average liquidity ratio among the banks was 35.43%, notably higher than the National Bank of Ethiopia's minimum liquidity requirement of 15%. The average capital adequacy ratio was 25.65%, also exceeding regulatory standards, suggesting that banks were generally well-capitalized during the study period. The study found substantial variability in macroeconomic indicators: average GDP growth was 8.38%, inflation averaged 12.9%, and the exchange rate fluctuated significantly.

Correlation analysis showed a strong positive relationship between capital adequacy and liquidity ($r = 0.638$, $p < 0.01$), indicating that banks with higher capital buffers tend to maintain better liquidity. Inflation and interest rate spread had significant negative correlations with liquidity ($r = -0.393$ and $r = -0.386$ respectively, both $p < 0.01$), highlighting the adverse impact of macroeconomic instability on liquidity levels.

The multiple regression model explained approximately 64.8% of the variation in bank liquidity ($R^2 = 0.648$), confirming the joint influence of the selected variables. Among all determinants,

capital adequacy emerged as the most influential positive predictor of liquidity (Beta = 0.575, $p < 0.001$), followed by bank size (Beta = 0.495, $p < 0.001$). Conversely, GDP growth (Beta = -0.185, $p = 0.025$), inflation rate (Beta = -0.190, $p = 0.005$), and interest rate spread (Beta = -0.386, $p < 0.001$) had significant negative effects on liquidity, possibly reflecting increased credit demand or reduced savings during economic expansions and inflationary periods. Other variables, such as loan growth, non-performing loans, asset quality, and exchange rate fluctuations, showed no statistically significant impact on liquidity. The diagnostic tests also confirmed the validity of the regression results, with no evidence of heteroscedasticity, multicollinearity, or autocorrelation. The model assumptions of normality and linearity were also reasonably satisfied, reinforcing confidence in the findings.

5.2 Conclusions

Based on the analysis, the study concludes that liquidity management in Ethiopian private commercial banks is significantly influenced by both internal capital strength and external economic conditions. Capital adequacy stands out as the cornerstone determinant, where stronger capital buffers allow banks to sustain higher liquidity levels. Larger banks also tend to hold more liquid assets, likely due to greater resource availability and diversified operations.

Macroeconomic variables exert a critical influence; inflation and wider interest rate spreads diminish banks' liquidity, potentially by discouraging deposits and increasing funding costs. Similarly, periods of higher GDP growth may reduce liquidity as banks channel more funds into loans and less into liquid assets. These findings underscore effective liquidity management must consider not only internal bank factors but also the wider economic environment in the banks under study.

On the other hand, insignificant Factors were identified in this study. As a result, Loan growth, non-performing loans, and asset quality were not found to have a statistically significant impact on liquidity. This suggests that variations in liquidity levels are more influenced by capital reserves and macroeconomic conditions than by asset quality indicators.

Overall, the study emphasizes that liquidity management in Ethiopian private commercial banks is significantly shaped by capital reserves, bank size, and economic conditions. Strategic efforts

should be directed towards improving capital adequacy and mitigating macroeconomic risks to ensure financial stability.

5.3 Recommendations

Based on the findings, the following recommendations are proposed for policymakers, bank executives, and regulatory bodies:

- **Enhance Capital Adequacy:** Banks should strengthen their capital reserves through strategic capital injections and efficient asset management to maintain strong liquidity buffers and withstand financial shocks.
- **Optimize Liquidity Management Strategies:** Given the strong impact of bank size, commercial banks should adopt robust liquidity management frameworks, including diversified investment portfolios and digital banking solutions, to enhance their liquidity positions.
- **Monitor Macroeconomic Indicators:** Policymakers should implement measures to stabilize inflation and interest rates, as these factors significantly impact bank liquidity. Effective monetary policies can help mitigate the adverse effects of macroeconomic fluctuations.
- **Improve Regulatory Compliance and Risk Assessment:** The National Bank of Ethiopia should reinforce compliance measures for liquidity management, ensuring that banks maintain adequate reserves. Additionally, improved risk assessment frameworks can help banks anticipate and mitigate liquidity risks.
- **Develop Innovative Financial Products:** Banks should consider introducing liquidity-enhancing financial instruments, such as interbank lending agreements and market-based liquidity buffers, to optimize cash flow management.
- **Strengthen Financial Literacy and Customer Engagement:** Encouraging savings and investment among customers through financial education can help banks maintain stable deposit bases, reducing liquidity volatility.

Suggestions for future studies

This study primarily focused on identifying the key factors influencing liquidity in selected private commercial banks in Ethiopia, considering both bank-specific and macroeconomic variables. However, given the dynamic nature of the banking sector and the evolving financial landscape, there remain several areas for further exploration.

Future researchers may benefit from incorporating additional variables that were not covered in this study, such as digital banking adoption, regulatory changes, or shifts in customer deposit behavior. This could provide a more comprehensive understanding of the determinants of liquidity and help validate the findings of this research.

Moreover, as new private banks continue to emerge in Ethiopia, future studies should extend their scope to include these institutions. Analyzing their liquidity trends and financial strategies in comparison with established banks could offer valuable insights into the evolving banking sector.

Finally, employing alternative research methodologies such as longitudinal studies or qualitative approaches-could provide deeper insights into how liquidity determinants change over time and how banks respond to economic fluctuations. Expanding the study across a broader timeframe or integrating qualitative perspectives from industry experts may further enhance the understanding of liquidity management in Ethiopia's private banking sector.

By implementing these recommendations, Ethiopian private commercial banks can enhance their liquidity management practices, improve financial stability, and mitigate the risks associated with liquidity fluctuations in a dynamic economic environment.

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Appendixes

Appendix A: Raw Data

Banks	Year	Liquidity	Bank Size	Capital Adequacy	GDP Growth	Inflation Rate	Interest Rate Spread	Loan Growth	Non-Performing Loans	Asset Quality	Exchange Rate
CBE	2007	0.28957	0.84596081	0.11781	0.016	0.106	0.064579	0.13547	0.03768	0.011887	8.54
CBE	2008	0.35261	0.86003479	0.29779	-0.021	0.109	0.050163	0.25589	0.055	0.011142	8.58
CBE	2009	0.31243	0.87382844	0.28757	0.117	0.073	0.051788	0.1825	0.07717	0.016399	8.63
CBE	2010	0.72089	0.88693945	0.90243	0.126	0.061	0.055342	0.36364	0.06202	0.019019	8.6518
CBE	2011	0.23426	0.90259678	0.210291	0.115	0.106	0.054485	0.45116	0.04915	0.030116	8.681
CBE	2012	0.22508	0.91648659	0.11319	0.118	0.158	0.065467	0.34188	0.04339	0.042158	8.7943
CBE	2013	0.19395	0.92842556	0.12388	0.112	0.253	0.064283	0.08992	0.04638	0.033016	9.24
CBE	2014	0.22043	0.94287924	0.11676	0.1	0.364	0.077698	-0.0091	0.05499	0.025433	10.42
CBE	2015	0.29978	0.95328939	0.11836	0.1057	0.028	0.071055	0.15949	0.04715	0.034461	12.89
CBE	2016	0.17564	0.96481805	0.12932	0.114	0.181	0.071962	0.26728	0.03635	0.039936	16.1
CBE	2017	0.1695	0.97254394	0.13491	0.1	0.341	0.090522	0.38083	0.02705	0.035771	17.3
CBE	2018	0.16615	0.98255841	0.13535	0.09	0.135	0.086552	0.40064	0.02305	0.037884	18.3
CBE	2019	0.13147	0.99585141	0.12609	0.064	0.081	0.087064	0.19019	0.0227	0.035428	19.1
CBE	2020	0.98897	1.00347777	0.892947	0.058	0.077	0.082593	0.36024	0.01739	0.029401	20.1
CBE	2021	0.98673	1.01266432	0.12886	0.056	0.097	0.09019	0.23784	0.01526	0.027815	21.1
CBE	2022	0.99072	1.02713751	0.81111	0.052	0.072	0.09019	0.46214	0.0146	0.02743	22.4
CBE	2023	1.17564	1.00347777	0.83535	0.099	0.028	0.087064	0.40064	0.05499	0.029401	26.2
AIB	2007	0.81962	0.94760597	0.12347	0.016	-0.106	0.059756	-0.0262	0.0568	0.001963	8.54
AIB	2008	0.32558	0.85704227	0.11178	-0.021	0.109	0.051545	0.20927	0.07664	0.004848	8.58
AIB	2009	0.3306	0.86736966	0.12177	0.117	0.073	0.078087	0.18912	0.07588	0.026045	8.63
AIB	2010	0.724419	0.88246761	0.92348	0.126	0.061	0.064806	0.28274	0.04943	0.033498	8.6518
AIB	2011	0.910903	0.90033654	0.94185	0.115	0.106	0.065222	0.59076	0.03108	0.034758	8.681
AIB	2012	0.17344	0.91010924	0.1384	0.118	0.158	0.065585	0.17422	0.04686	0.021509	8.7943
AIB	2013	0.14564	0.92217303	0.14017	0.112	0.253	0.062744	0.22219	0.08895	0.003803	9.24
AIB	2014	0.25822	0.93491437	0.11315	0.1	0.364	0.076909	-0.0384	0.09827	0.020615	10.42
AIB	2015	0.21594	0.9417623	0.11563	0.1057	0.028	0.058276	0.164	0.07407	0.023916	12.89
AIB	2016	0.21617	0.94902925	0.11565	0.114	0.181	0.085269	0.05152	0.03332	0.02669	16.1
AIB	2017	0.19868	0.95504762	0.13628	0.1	0.341	0.096862	0.17544	0.02568	0.02788	17.3
AIB	2018	0.11912	0.96488116	0.1307	0.09	0.135	0.081267	0.20646	0.01989	0.023552	18.3
AIB	2019	0.15386	0.96990352	0.17527	0.064	0.081	0.110319	0.07634	0.01794	0.041804	19.1
AIB	2020	0.17513	0.97876375	0.15382	0.058	0.077	0.111177	0.16681	0.01507	0.023392	20.1
AIB	2021	0.18859	0.98814855	0.094767	0.056	0.097	0.10382	0.3567	0.01373	0.023647	21.1
AIB	2022	1.07965	1.00601654	0.915359	0.052	0.072	0.10382	0.76062	0.01262	0.025371	22.4
AIB	2023	0.15386	0.94902925	0.1307	0.114	0.181	0.085269	0.20646	0.02568	0.023552	26.2
DB	2007	0.87456	0.96355125	0.180821	0.016	-0.106	0.058076	0.22129	0.03096	0.018561	8.54
DB	2008	0.25666	0.88060725	0.86479	-0.021	0.109	0.046213	0.45298	0.03867	0.015531	8.58
DB	2009	0.824169	0.89721184	0.96425	0.117	0.073	0.050406	0.33386	0.03728	0.023993	8.63
DB	2010	0.1845	0.91048566	0.17105	0.126	0.061	0.054226	0.32071	0.03226	0.02329	8.6518

DB	2011	0.14672	0.92541524	0.08491	0.115	0.106	0.058338	0.41756	0.02655	0.033392	8.681
DB	2012	0.13408	0.93983512	0.12109	0.118	0.158	0.061109	0.26043	0.02482	0.035326	8.7943
DB	2013	0.14597	0.95257645	0.12386	0.112	0.253	0.069505	0.0988	0.02317	0.034472	9.24
DB	2014	0.12958	0.96299546	0.11904	0.1	0.364	0.072503	0.01586	0.02297	0.028458	10.42
DB	2015	0.216916	0.97412881	0.11717	0.1057	0.028	0.071132	0.13419	0.02181	0.029344	12.89
DB	2016	0.13019	0.98194811	0.126	0.114	0.181	0.069623	0.23148	0.01989	0.033366	16.1
DB	2017	0.20137	0.98994346	0.14155	0.1	0.341	0.08134	0.3066	0.02147	0.040523	17.3
DB	2018	0.21937	0.9952301	0.13432	0.09	0.135	0.084276	0.09091	0.02246	0.032564	18.3
DB	2019	0.1849	0.99987317	0.15072	0.064	0.081	0.088567	0.06401	0.01746	0.034164	19.1
DB	2020	1.13334	1.00505604	0.14751	0.058	0.077	0.08901	0.22242	0.01571	0.031209	20.1
DB	2021	0.93687	1.01116006	0.14295	0.056	0.097	0.087309	0.10134	0.01705	0.027261	21.1
DB	2022	0.810811	1.01921187	0.814152	0.052	0.072	0.087309	0.4244	0.0202	0.023927	22.4
DB	2023	0.20137	0.99987317	0.13432	0.099	0.135	0.088567	0.22242	0.02246	0.034164	26.2
CBO	2007	1.30337	0.9979873	0.18539	0.016	-0.106	0.060521	0.54286	0.01235	0.029885	8.54
CBO	2008	0.23051	0.83158762	0.14124	-0.021	0.109	0.048565	0.69753	0.04	0.018323	8.58
CBO	2009	0.29118	0.85299815	0.13873	0.117	0.073	0.053218	0.42909	0.03817	0.032833	8.63
CBO	2010	0.21132	0.87256589	0.12933	0.126	0.061	0.053633	0.44148	0.04148	0.030883	8.6518
CBO	2011	0.825122	0.88163055	0.91406	0.115	0.106	0.049815	0.30185	0.03864	0.030859	8.681
CBO	2012	0.823056	0.89575173	0.97146	0.118	0.158	0.05855	0.23186	0.03412	0.032801	8.7943
CBO	2013	0.16783	0.91394677	0.17279	0.112	0.253	0.074156	0.16335	0.03786	0.036132	9.24
CBO	2014	0.29716	0.92827958	0.16078	0.1	0.364	0.091429	0.05037	0.04605	0.036341	10.42
CBO	2015	0.24948	0.93924911	0.1632	0.1057	0.028	0.082847	0.14676	0.039	0.037281	12.89
CBO	2016	0.27546	0.94789767	0.17339	0.114	0.181	0.097162	0.08656	0.04124	0.037675	16.1
CBO	2017	0.25928	0.95525853	0.19336	0.1	0.341	0.0909	0.34064	0.02712	0.037204	17.3
CBO	2018	0.19147	0.96003817	0.19151	0.09	0.135	0.097792	0.22489	0.02502	0.03437	18.3
CBO	2019	0.18251	0.96766075	0.18862	0.064	0.081	0.082158	0.19035	0.02096	0.029899	19.1
CBO	2020	0.156	0.9773678	0.17066	0.058	0.077	0.098074	0.27485	0.01502	0.028086	20.1
CBO	2021	0.18259	0.98541255	0.16686	0.056	0.097	0.120318	0.08963	0.01767	0.026802	21.1
CBO	2022	0.15614	0.9979636	0.14054	0.052	0.072	0.120318	0.4259	0.01654	0.028029	22.4
CBO	2023	0.156	0.9773678	0.19151	0.103	0.081	0.097792	0.27485	0.01767	0.029899	26.2
BOA	2007	0.12958	0.96299546	0.11904	0.1	0.364	0.072503	0.01586	0.02297	0.028458	10.42
BOA	2008	0.216916	0.97412881	0.11717	0.1057	0.028	0.071132	0.13419	0.02181	0.029344	12.89
BOA	2009	0.13019	0.98194811	0.126	0.114	0.181	0.069623	0.23148	0.01989	0.033366	16.1
BOA	2010	0.20137	0.98994346	0.14155	0.1	0.341	0.08134	0.3066	0.02147	0.040523	17.3
BOA	2011	0.21937	0.9952301	0.13432	0.09	0.135	0.084276	0.09091	0.02246	0.032564	18.3
BOA	2012	0.1849	0.99987317	0.15072	0.064	0.081	0.088567	0.06401	0.01746	0.034164	19.1
BOA	2013	1.13334	1.00505604	0.14751	0.058	0.077	0.08901	0.22242	0.01571	0.031209	20.1
BOA	2014	0.93687	1.01116006	0.14295	0.056	0.097	0.087309	0.10134	0.01705	0.027261	21.1
BOA	2015	0.810811	1.01921187	0.814152	0.052	0.072	0.087309	0.4244	0.0202	0.023927	22.4
BOA	2016	0.20137	0.99987317	0.13432	0.099	0.135	0.088567	0.22242	0.02246	0.034164	26.2
BOA	2017	1.30337	0.9979873	0.18539	0.016	-0.106	0.060521	0.54286	0.01235	0.029885	8.54

BOA	2018	0.23051	0.83158762	0.14124	-0.021	0.109	0.048565	0.69753	0.04	0.018323	8.58
BOA	2019	0.29118	0.85299815	0.13873	0.117	0.073	0.053218	0.42909	0.03817	0.032833	8.63
BOA	2020	0.21132	0.87256589	0.12933	0.126	0.061	0.053633	0.44148	0.04148	0.030883	8.6518
BOA	2021	0.825122	0.88163055	0.91406	0.115	0.106	0.049815	0.30185	0.03864	0.030859	8.681
BOA	2022	0.823056	0.89575173	0.97146	0.118	0.158	0.05855	0.23186	0.03412	0.032801	8.7943
BOA	2023	0.16783	0.91394677	0.17279	0.112	0.253	0.074156	0.16335	0.03786	0.036132	9.24
WB	2007	0.3344	0.75962177	0.28026	0.016	0.106	0.072548	0.21642	0.01227	0.015152	8.54
WB	2008	0.2516	0.78891748	0.19403	-0.021	0.109	0.044611	0.77914	0.02414	0.012771	8.58
WB	2009	0.36053	0.81379641	0.14243	0.117	0.073	0.049636	0.32414	0.03906	0.012248	8.63
WB	2010	0.32526	0.84374403	0.1165	0.126	0.061	0.057918	0.54427	0.03879	0.035489	8.6518
WB	2011	0.3192	0.86788744	0.11945	0.115	0.106	0.046947	0.69309	0.02888	0.032934	8.681
WB	2012	0.82827	0.88582637	0.99427	0.118	0.158	0.060568	0.40438	0.03014	0.033849	8.7943
WB	2013	0.2524	0.90775522	0.17195	0.112	0.253	0.066309	0.31891	0.02676	0.033516	9.24
WB	2014	0.24816	0.92659914	0.1319	0.1	0.364	0.073363	0.15733	0.03088	0.023688	10.42
WB	2015	0.259	0.93862328	0.13772	0.1057	0.028	0.073967	0.21437	0.03648	0.033078	12.89
WB	2016	0.19137	0.95193463	0.14668	0.114	0.181	0.079534	0.25381	0.0277	0.034038	16.1
WB	2017	0.22905	0.95813415	0.15928	0.1	0.341	0.097555	0.2467	0.02331	0.036077	17.3
WB	2018	0.16002	0.9641705	0.14181	0.09	0.135	0.097036	0.15308	0.01859	0.022781	18.3
WB	2019	0.13365	0.97230978	0.14933	0.064	0.081	0.110023	0.07618	0.01441	0.018145	19.1
WB	2020	0.14704	0.98101449	0.13701	0.058	0.077	0.105516	0.35317	0.01223	0.021444	20.1
WB	2021	0.12106	0.98930384	0.13964	0.056	0.097	0.103331	0.24406	0.013	0.021436	21.1
WB	2022	0.10396	0.99975673	0.13228	0.052	0.072	0.103331	0.4056	0.01246	0.019693	22.4
WB	2023	0.16002	0.97230978	0.13701	0.104	0.081	0.097036	0.07618	0.01441	0.036077	26.2
UB	2007	1.25232	1.01095798	0.29907	0.016	-0.106	0.064613	0.18023	0.04926	0.009764	8.54
UB	2008	0.29134	0.83187617	0.10461	-0.021	0.109	0.049407	0.4064	0.05079	0.014332	8.58
UB	2009	0.27544	0.84749739	0.11316	0.117	0.073	0.068883	0.29247	0.05827	0.031543	8.63
UB	2010	0.3453	0.86850984	0.11139	0.126	0.061	0.06276	0.35772	0.0509	0.034833	8.6518
UB	2011	0.821514	0.88776804	0.911288	0.115	0.106	0.055645	0.58982	0.04834	0.036645	8.681
UB	2012	0.28535	0.91141278	0.14799	0.118	0.158	0.065652	0.35279	0.04408	0.039031	8.7943
UB	2013	0.23238	0.92037329	0.18044	0.112	0.253	0.071287	0.08899	0.05917	0.036513	9.24
UB	2014	0.19984	0.93148737	0.19871	0.1	0.364	0.088175	-0.0999	0.0609	0.039084	10.42
UB	2015	0.26118	0.93729467	0.22206	0.1057	0.028	0.080637	0.17113	0.03971	0.04113	12.89
UB	2016	0.27545	0.95399151	0.20601	0.114	0.181	0.091377	0.17631	0.04542	0.046842	16.1
UB	2017	0.26506	0.95567236	0.23246	0.1	0.341	0.099573	0.2253	0.02432	0.040985	17.3
UB	2018	0.17013	0.9660929	0.20914	0.09	0.135	0.101996	0.31536	0.0224	0.036638	18.3
UB	2019	0.12214	0.9697634	0.21784	0.064	0.081	0.115851	-0.0183	0.0167	0.028184	19.1
UB	2020	0.07908	0.97890967	0.080179	0.058	0.077	0.111086	0.31872	0.01662	0.028248	20.1
UB	2021	0.12281	0.98641789	0.19651	0.056	0.097	0.105519	0.23622	0.01653	0.025124	21.1
UB	2022	0.09648	0.99781872	0.10744	0.052	0.072	0.105519	0.3635	0.0139	0.02866	22.4
UB	2023	0.12214	0.9660929	0.21784	0.104	0.135	0.088175	0.17113	0.04542	0.046842	26.2
NIB	2007	1.30337	1.0979873	0.18539	0.016	-0.106	0.060521	0.54286	0.01235	0.029885	26.2

NIB	2008	0.23051	0.83158762	0.14124	-0.021	0.109	0.048565	0.69753	0.04	0.018323	26.2
NIB	2009	0.29118	0.85299815	0.13873	0.117	0.073	0.053218	0.42909	0.03817	0.032833	26.2
NIB	2010	0.21132	0.87256589	0.12933	0.126	0.061	0.053633	0.44148	0.04148	0.030883	26.2
NIB	2011	0.825122	0.88163055	0.91406	0.115	0.106	0.049815	0.30185	0.03864	0.030859	26.2
NIB	2012	0.823056	0.89575173	0.917146	0.118	0.158	0.05855	0.23186	0.03412	0.032801	26.2
NIB	2013	0.16783	0.91394677	0.17279	0.112	0.253	0.074156	0.16335	0.03786	0.036132	26.2
NIB	2014	0.29716	0.92827958	0.16078	0.1	0.364	0.091429	0.05037	0.04605	0.036341	26.2
NIB	2015	0.24948	0.93924911	0.1632	0.1057	0.028	0.082847	0.14676	0.039	0.037281	26.2
NIB	2016	0.27546	0.94789767	0.17339	0.114	0.181	0.097162	0.08656	0.04124	0.037675	26.2
NIB	2017	0.25928	0.95525853	0.19336	0.087	0.341	0.0909	0.34064	0.02712	0.037204	26.2
NIB	2018	0.19147	0.96003817	0.19151	0.1	0.135	0.097792	0.22489	0.02502	0.03437	26.2
NIB	2019	0.18251	0.96766075	0.18862	0.09	0.081	0.082158	0.19035	0.02096	0.029899	26.2
NIB	2020	0.1856	0.9773678	0.17066	0.064	0.077	0.098074	0.27485	0.01502	0.028086	26.2
NIB	2021	0.18259	0.98541255	0.16686	0.058	0.097	0.120318	0.08963	0.01767	0.026802	26.2
NIB	2022	0.15614	0.9979636	0.14054	0.056	0.072	0.120318	0.4259	0.01654	0.028029	26.2
NIB	2023	0.1756	0.9773678	0.19151	0.052	0.081	0.097792	0.27485	0.01767	0.029899	26.2

Appendix B: Graph of Liquidity and GDP