



ADDIS ABABA UNIVERSITY

COLLEGE OF BUSSINES AND ECONOMICS

**FACTORS AFFECTING BANKS LIQUIDITY: EMPERICAL EVIDENCE
FROM SELECTED ETHIOPIAN PRIVATE COMMERCIAL BANKS**

BY

ATNANAW SEWHUNEGN YIZENIGAW

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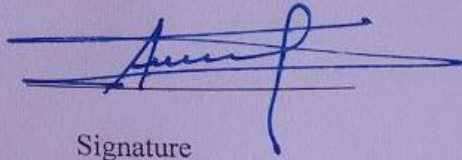
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STATEMENT OF DECLARATION

I, Atnanaw Sewhunegn, declare that this thesis entitled: factors affecting banks liquidity; empirical evidence from selected Ethiopian private banks is my original work prepared under the guidance of my Advisor Dr Abebe Yitayew, all sources of materials used for the thesis have been duly acknowledged, I would like to further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Atnanaw Sewhunegn

Name


A handwritten signature in blue ink, appearing to read 'Atnanaw', written over a set of three horizontal lines. The signature is stylized and extends to the right.


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Examining Committee:

External Examiner: Lemessa Barissa (PhD) Signature  Date 12/2/2026

Internal examiner: Abeban Kasse (PhD) Signature  Date 12-2-2026

Internal examiner : _____ (PhD) Signature _____ Date _____

Advisor: Abebe Yitayew (PhD) Signature  Date Feb. 12th, 2026

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LIST OF ACRONYMS

ABY:	Abay Bank
AB:	Awash Bank
BIS:	Bank for International Settlement
BOA:	Bank of Abyssinia
CAP:	Capital adequacy
CET1:	Minimum common equity tier 1
COOP:	Cooperative Bank of Oromia
CLRM:	Classical Linear Regression Model
DB:	Dashen Bank
EEA:	Ethiopian Economic Association
ESA:	Ethiopian statistical agency
FEM:	Fixed Effect Model
GB:	Global Bank
GDP:	Gross Domestic Product
GMM:	Generalized method of moments
H0:	Null Hypotheses
HA:	Alternative Hypotheses
HB:	Hibret Bank
IRM:	Interest rate margin
LBZ:	Natural logarithm of bank size
LR:	Liquidity Ratio
MoFED:	Ministry of Finance and Economic Development
MIS:	Management Information Systems
NBE:	National Bank of Ethiopia
NIB:	Nib International Bank
NPL:	Non-performing loans
NPLR:	Non-performing loans ratio
OECD:	Organization for Economic Cooperation and Development
OLS:	Ordinary Least Square
PEM:	Pooled Effect Model
REM:	Random Effect model
ROE:	Return on equity
RTGS:	Real-Time Gross Settlement System
VIF:	Variance inflation fact

ABSTRACT

Liquidity is one of the major concerns for private commercial banks in Ethiopia and holding the optimum level of liquidity is crucial. Since many of the empirical studies carried out on the commercial banking industry of Ethiopia were mainly focused on examinations of factors influencing the profitability of banks, and limited attention was given to consider the bank's liquidity and its determinants the objective of this study was to identify the determinants of liquidity position of private commercial banks in Ethiopia. Quantitative research approach and explanatory design adopted to show the cause and effect relationship between the dependent and independent variables. Balance panel data was collected from a sample of eight private commercial banks in Ethiopia from 2018 to 2024 by using purposive technique. Both bank specific and macroeconomic variables were analyzed using both inferential (balanced panel pooled effect regression model) and descriptive statistic (both graphical and summary statistics) with the aid of Stata19.5 software. The dependent variable (bank's liquidity) measured as the ratio of total customers loans and advance to its total deposit. The findings of the study revealed that at 5% significance level among the bank specific factors bank size and non-performing loan have negative and statistically significant impact on liquidity; while, profitability and capital adequacy ratio have positive and statistically significant impact on liquidity of Ethiopian private commercial banks. On other hand, from the macro-economic level factors except the foreign exchange rate all variables (GDP, CPI and IRM) have negative and statistically significant impact on private commercial banks liquidity. However; loan growth, deposit growth and foreign exchange rate have no statistically significant effect on the liquidity of Ethiopian private commercial banks. As the ratio of loans and advances to deposit LR of 0.796, indicated that the sampled banks on average does not offered loans to their clients almost 20.38% (greater than the threshold amount of 15% set by NBE) which implies that as far as considering the quantitative factors considered the sampled commercial banks have moderate liquidity risk. Finally, the study provides useful insights for interested parties on the liquidity levels of Ethiopian commercial banks and their determinants and contributes to the scarce empirical evidence.

Keywords: *Determinants of Liquidity, Ethiopian Private Commercial Banks, Liquidity Ratio, balanced panel data regression analysis.*

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Banks are not only sustain economic growth by providing finance but also, serves as financial mediator between the borrowers, lenders, and investors (Jan et al. 2021).To evaluate the effectiveness and soundness of a banking sector, it is interesting to associate the banking system with liquidity position . According to Bank for International Settlements (2008), liquidity in the context of banking is explained as “the ability of a bank to fund increases in assets and meet both expected and unexpected cash and collateral obligations at a reasonable cost and without incurring unacceptable losses”. Inadequately manage its liquidity, it may lead to insolvency (in case of low liquidity) or low profitability (in case of high liquidity) and ultimately destroy the wealth of shareholder and affects the entire financial institution.

The banks’ liquidity problems came into the spotlight when several big commercial banks went bankrupt due to substantial liquidity issues during the global financial crisis (Bhati et al. 2018). After the global financial crisis, the Bank for International Settlements (Bank for International Settlements, 2011) has created global minimum liquidity criteria and initiated several regulatory reforms for several nations aimed to manage the short-term liquidity of banks. In this regard, the study made by Greuning and Bratonovic(2021) suggested that ,in order to manage liquidity of banks, they must have a well-defined liquidity management policy that is communicated in the whole organization and there must be a liquidity control strategy that specifies certain rules regarding management of assets and liabilities.

The financial sector in Ethiopia has been experiencing major transformation on its operating environment following the downfall of the Dergue regime. On top of this, more than thirty private commercial banks have been opened during the last three decades it creates competition among banks in terms of resource mobilization which leads to curiosity in liquidity management. The banking industry is expected to maintain a robust liquidity position and resilience to short-term liquidity shocks. However, downside risks persist, including failure to meet weekly liquidity requirements, Real-Time Gross Settlement System (RTGS) payment

requirements, asset and liability mismatches and funding gaps at the short-term maturity buckets, and high deposit concentration (NBE stability report April, 2024).

Almost all countries in the world have a financial system that is based on banking system; therefore it is important to study the determinants of liquidity in banking sector (Aslam, asif, sultan, Nasir, &Iqbal, 2023). However, those factors which were statistically significant impact on liquidity in one country may not be replicated in another country. As a crucial component of Ethiopian's financial sector, the study of identifying variables that might affect the liquidity situation of private commercial banks, has much attention in Ethiopian's changing financial environment to the stability and resilience of the banking industry. The researchers' such as Mekonnen Kumlachew (2020), (mekibib shume, 2016) and Zemnu&Habtamu identified several variables that might affect the liquidity situation of commercial banks, such as macroeconomic conditions, and bank-specific factors. However, those study findings are contradicted each other and not explored based on the current macroeconomic status of the country. Therefore, empirical studies are essential to identifying those factors and hence this paper will aims to study on the determinants of banks liquidity in Ethiopian private commercial banks at macro and micro(bank specific) levels.

1.2. Statements of the Problem

Banks typically fulfill an intermediation role by receiving deposits from savers and extending loans to borrowers. By doing so, in recent years, the world economy has experienced a number of financial crises. Often, at the center of these crises are issues of liquidity provision by the banking sector and a financial market. For example, when crises are likely to arrive, banks seem less willing to lend and hold more liquidity due to the low level of liquidity in the market for external finance (Acharya et al, 2021), Berger and Bouwman (2022) found the connection between financial crises and bank liquidity creation: the subprime lending crisis was preceded by a dramatic build-up of positive abnormal liquidity creation, which implies that “too much” liquidity creation may also lead to financial fragility. Liquidity crisis, if not properly managed, can instantly destroy those good customer relationships built over the years. Managing liquidity is therefore a core daily process requiring bank managers to monitor and project cash flows to ensure that adequate liquidity is maintained at all times.

However, the liquidity fragility is also a source of efficiency. Diamond and Rajan (2022) argue that the financial intermediation structure is efficient in that it disciplines banks when carrying out their lending function. The threat of a run is an incentive for the bank to choose projects with high return. More generally, this also suggests that an “even more liquid” bank might not always be desirable for the efficiency of the financial system. Therefore, effective liquidity risk management helps ensure a bank’s ability to meet cash flow obligations, which are uncertain as they are affected by external events and other agents’ behavior and to keep their optimal profitability.

Episodes of failure of many conventional banks from the past and the present provide the testimony to this claim. For instance, as United States/U.S. subprime mortgage crisis reached its peak in the years 2008/9 unprecedented levels of liquidity support were required from central banks in order to sustain the financial system. Even with such extensive support, a number of banks failed, were forced into mergers or required resolution. A reduction in funding liquidity then caused significant distress. In response to the freezing up of the interbank market, the European Central Bank and U.S. Federal Reserve injected billions in overnight credit into the interbank market. It is evident that liquidity and liquidity risk is very up-to-date and important topic. Therefore banks and regulators are keen to keep a control on liquidity position.

In light of the above, research currently in publication identifies several variables that might affect the liquidity situation of commercial banks, both firm specific and macro- economic factors (Ali Shah & Tahir, 2018); (Aslam & Fizza, 2019); (Niroula and Gnawali, 2023) and (Probir, and Sarker, 2024).

In the context of Ethiopia, many of the empirical studies carried out on the commercial banking industry of Ethiopia were mainly focused on examinations of factors influencing the profitability of banks, and limited attention was given to consider the bank’s liquidity and its determinants with contradicted result findings and unjustified research methodology used. For instance Mekibeb shumet (2016) revealed that inflation, non-performing loan, and profitability have positive impacts on banks liquidity while bank size and loan growth negatively affect their liquidity position. Whereas; capital adequacy, GDP and interest rate have no any significant impact on Ethiopians private commercial banks liquidity position. On contrary, Mekonnen Kumlachew (2020) using the generalized method of moments (GMM) model found that capital

adequacy, interest rate and GDP have negative and statistically significant effect on private commercial bank's liquidity in Ethiopia.

Moreover, Ali Shah &Tahir (2018) from Pakistan revealed that from firm (bank) specific factors deposit growth has negative effect on commercial banks liquidity while profitability has no significant impact on it. However, Zemnu&Habtamu (2020) using OLS multiple linear regression models pointed out that commercial banks liquidity have positively and negatively relationship to deposit growth and profitability respectively. Therefore, it is imperative to investigate the determinants of commercial banks' liquidity in the context of Ethiopia. Thus, the purpose of this study is to examining the determinants of private commercial banks liquidity by take in to considering the past research finding debates lack of sufficient research on the determinants of bank liquidity in the context of Ethiopia and the existence of knowledge gap in the area was initiated this study with the current bank specific and macro-economic status in Ethiopia.

1.3. Objectives of the Study

1.3.1. General Objective

In the context of the problem, the general objective of this is study is to find out the significant factors that affects liquidity of private commercial banks in Ethiopia.

1.3.2. Specific Objective

- To determine the bank specific factors that affects bank's liquidity on selected private commercial banks in Ethiopian.
- To determine the macro-economic factors that affects bank's liquidity on selected private commercial banks in Ethiopian.

1.4. Research Hypotheses

As far as previous scholars and the stated statement of the problem considers to show the relationship between the dependent and independent variables for this study the following tentative hypotheses were construct in the case of Ethiopian selected private commercial banks.

To addresses banks specific factor affecting banks liquidity the following five hypotheses formulated:

H0: Capital adequacy has negative effect on bank's liquidity.

H1: Capital adequacy has positive effect on bank's liquidity

H0: There is a significant negative relationship between deposit growth and bank's liquidity.

H2: There is a significant positive relationship between deposit growth and bank's liquidity.

H0: Profitability has positive significant impact on bank's liquidity.

H3: Profitability has negative significant impact on bank's liquidity.

H0: There is no a significant negative relationship between loan growth and bank's liquidity.

H4: There is a significant negative relationship between loan growth and bank's liquidity.

H0: Size of the Bank has significance negative impact on bank's liquidity.

H5: Size of the Bank has positive impact on bank's liquidity.

H0: There is a positive significance relationship between non-performing loan and bank's liquidity

H6: There is a negative significant relationship between non-performing loan and bank's liquidity

To addresses macro-economic factors that affect banks liquidity the following hypotheses formulated:

H0: An increase in foreign exchange rate has no negative impact on bank's liquidity

H7: An increase in foreign exchange rate has negative impact on bank's liquidity

H0: An increase in interest Rate margin has positive significance impact on bank's liquidity.

H8: An increase in interest Rate margin has negative impact on bank's liquidity.

H0: Inflation has a significance positive impact on bank's liquidity.

H9: Inflation has negative impact on bank's liquidity.

H0: Real GDP growth has negative impact on bank's liquidity.

H10: Real GDP growth has positive impact on bank's liquidity.

1.5. Significance of the Study

The significance of this research includes the following:

- The study draws some conclusions and identifies the factors affecting bank liquidity significantly. Thus, it gives indicator to the management of the banks and policy makers to take remedial action;
- It helps other researchers as a source of reference and as a stepping stone for those who want to make further study on the area afterwards;
- It contributes its part to the well-being of the financial sector of the economy and the society as a whole; and
- It gives to all stake holders in the area the opportunity to gain deep knowledge about the relationship of internal and external factors and liquidity.

1.6. Scope of the Study

The study is restricted to the assessment of bank specific (profitability, deposit growth, loan growth, NPLR, bank size and capital adequacy ratio) and macro –economic (GDP, inflation rate IRM and foreign exchange rate) factors affecting banks liquidity on 30 private owned Ethiopian commercial banks registered by the NBE and that have at least six years data from 2018/19-2023/24(by considering national economic reformation and Covide-19 impacts).

1.7. Limitation of the study

As indicated in further research suggestion section the study employed on quantitative panel data for six years from 2018/19-2023/24 on eight banks, which lacks to incorporation of qualitative aspects of factors that will have significance effects on private commercial banks.

1.8. Organizations of the paper

The paper organized in to four chapters. Chapter one is an introduction part where back ground of the study, statement of the problem, and objectives of the study, scope and significance of the study are presented. Chapter two is review of literature in which theories, empirical evidence and conceptual frame work are identified. Chapter three contained research methodology where research design, research approach, population, sampling method, sample size, sources of data, instruments, and data analysis technique are incorporate. The fourth chapter provides data analysis and discussion. The final chapter presents conclusion and recommendations and at the end references and appendixes were attached.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Theoretically, factors that affecting bank liquidity are mainly divided into two major categories(internal and external).The internal (bank-specific factors) are factors that are related to internal efficiencies and managerial decisions. Factors such as bank profitability, bank capital adequacy, bank size, asset quality, growth of loan and the like are the most dominant determinant internal factors on private commercial Banks. On other hand macro-economic factors (GDP, interest rate margin, exchange rate and inflation rate) are a variable that affects operation and liquidity positions of banks liquidity position and they are beyond firm's control.

In light of the above, the purpose of this chapter is to review the literatures related to bank liquidity and its determinants. The review has three sections. Section 2.1 presents a review of the theoretical aspects related to bank liquidity and its determinants. This is followed by the review of the empirical literatures in relation to bank liquidity and its determinants in section 2.2. Section 2.3 presents the conceptual framework. Finally, conclusions on the literature review and knowledge gaps are presented in section 2.4.

2.2. Theoretical Review

2.2.1. Theories of bank liquidity

2.2.1.1. Inventory management theory

Baumol's (1952) inventory management model and 1966(Miller and Orr's model) recognized the dynamics of cash flows are some of the earlier research efforts attempted to develop pursuance of investment policy when financial constraints are met, and minimizes the costs of raising external funds or liquidating existing assets. The main cost of holding cash is the opportunity cost of the capital invested in liquid assets. Firms will therefore trade-off holding cash and investing it depending on its investment needs.models for optimal liquidity and cash balances. The model postulates that firms identify their optimal level of cash holdings by

weighting the marginal costs and marginal benefits of holding cash. The benefits related to cash holdings are: reducing the likelihood of financial distress, allows the

2.2.1.2. Keynes motives of money theory

Keynes (1936) identified three motives (the transaction, precautionary and Speculative motives) on why people demand and prefer liquidity. In transaction motive cash is held to carry out firms day to day operations. In the case of precautionary holding cash serves an emergency while, the speculative holding cash creating the ability for a firm to take advantage for expected cash demand.

2.2.1.3. Bank liquidity creation and financial fragility-theory

Diamond and Dybvig (1983) emphasize the “preference for liquidity” under uncertainty of economic agents to justify the existence of banks by funding long term, illiquid assets with short term, liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy

2.2.2. Factors affecting banks liquidity

2.2.2.1. Internal factors for banks liquidity position

2.2.2.1.1. Profitability and bank liquidity

Profitability accounts for the impact of better financial soundness on bank risk bearing capacity and on their ability to perform liquidity transformation (Rauch et al. 2018 and Shen et al. 2020). A sound and profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system (Athanasoglou et al. 2019).Banks shareholders and investors would like to gain profit from their investment which is realized by the role of bank transferring funds gained from lenders to borrowers in the form of credit facilities that affect bank financial solvency when bank have to face withdrawal needs from depositors (Mahmoud Yousef, 2018). The higher the volume of loans and advances extended to customers, the higher the interest income and highest profit potentials for banks but it affects liquidity of the bank.

The relationship between profitability and liquidity views differently among different scholars. The profitability level of a bank influences its liquidity risk parameter and several studies have

been found profitability to have a negative relationship with banks' liquidity (Moussa, 2021; Sudirman, 2019; Deléchat et al., 2017; Al-Khoury, 2018). Those scholars argued that holding liquid asset imposes an opportunity cost on the bank and has an inverse relationship with profitability. On other hand, Al-Homaidi et al. (2019), Singh and Sharma (2016), Melese and Laximikantham (2015), Lartey et al. (2022), and (Lee et al., 2023) found that banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability which contribute a positive effect on banks' liquidity.

2.2.2.1.2. Loans and bank liquidity

Loans and advances are the major earning asset of the bank because they grant to their customers to generate higher revenue as interest to banks. Banks liquidity risk arises primarily from the Bank's core lending activities— loans and advances to customers, placements with other banks, investments in debt securities, and off-balance sheet commitments such as guarantees and letters of credit. Since loans are illiquid assets, an increase in the volumes of loans means an increase in illiquid assets in the asset portfolio of a bank that decreases the bank's liquidity (Tibebu, 2019). The studies conducted by Assfaw (2019), Fekadu (2018), Berhanu (2015), and Melese and Laximikantham (2015) found a negative association between loan growth and liquidity of banks.

2.2.2.1.3. Capital adequacy and bank liquidity

According to Moh'd and Fakhri (2013), a bank's capital plays a very important role in maintaining the safety of banks and the security of banking systems in general as it prevents any unexpected loss that banks might face. National bank of Ethiopia (NBE) has issued a new directive that significantly raises the capital adequacy requirement for commercial banks and introduces quarterly reporting obligations. Under the risk-based capital adequacy requirements for banks' directive effective beginning November 10, 2025, banks must maintain a minimum common equity tier 1 (CET1) ratio of seven percent, a tier 1 capital of nine percent, and a total capital of 11 percent of risk weighted assets. CET1 refers to the core capital that truly belongs to a bank, mainly paid-up shares, retained earnings, and legal reserves and serves as the first line of defense when a bank incurs losses. The directive states that the CET1 must consist of the sum of common shares issued by the bank, stock surplus (share premium), legal or statutory reserves,

retained earnings and common shares issued by consolidated subsidiaries.(the reporter Published on 2025-12-04). The capital adequacy ratios of the Bank are computed in accordance primary capital sum this includes primary capital, share premium, general reserve and legal reserve over the risk weighted asset on balance sheet and off balance sheet. Total capital includes paid up capital, legal reserve and other reserves to be approved by the National Bank of Ethiopia

It has been found that the availability of high capital increases banks' risk-absorbing capacity (Berger & Bouwman, 2017). Other studies Al-Homaidi et al. (2019), Shamas et al. (2018), Singh and Sharma (2016), Melese and Laximikantham (2015), also found that banks capital has a positive impact on banks' liquidity through its ability to absorb risk. On the other hand, Gorton and Winton (2000) and (Diamond & Rajan, 2001) show that a higher capital ratio may reduce liquidity creation through another effect: "the crowding out of deposits". Consequently, higher capital ratios shift investors' funds from relatively liquid deposits to relatively illiquid bank capital.

Thus, the higher is the bank's capital ratio; the lower is its liquidity creation. Moreover, Moussa (2015), Bhati et al. (2015), Lee et al. (2013), Deléchat et al. (2012), and Bhati and DeZoysa (2012) found a significant and negative effect of capital adequacy on banks' liquidity.

2.2.2.1.4. Bank size and bank liquidity

There are two strands of literature regarding the effect of bank size on liquidity creation. The first view is too big to fail which considers the negative relationship between size and liquidity among the scholars Assfaw (2019), Sopan and Dutta (2018), Teshome (2017), Singh and Sharma (2016), Deléchat et al. (2012), and P. Vodová (2013) found a negative relationship between bank size and liquidity. They suggests that small banks tend to create more liquidity relative to their total assets because they have a comparative advantage over large banks in dealing more with entrepreneurial small businesses by using more flexible techniques to evaluate credit based primarily on soft qualitative information (Berger & Black, 2011). On the other hand, Studies conducted by Al-Homaidi et al. (2019), Shaha et al. (2018), Melese and Laximikantham (2015), Chagwiza (2014), and Malik and Rafique (2013) established a positive relationship between the bank size and banks liquidity i.e. larger banks are more liquid than smaller banks.

2.2.2.1.5. Deposit growth and bank liquidity

Deposit is highly determining the position of the banks' liquidity. The demand for liquidity may arrive at an inconvenient time and force the fire-sale liquidation of illiquid assets. It is measured by total deposits to total assets ratio. The study of Shah, Khan, Shaha & Tahir (2018) indicated that deposit measured by share of deposit to total asset has a statistically negative effect on the level of liquidity. But, other studies revealed that deposits had a positive and statistically significant effect on bank liquidity; i.e. as demand deposits increase, liquid assets holdings also increase (Mazreku, Morina, Misiri, Spiteri, & Grima, 2019).

2.2.2.1.6. Non-performing loans and banks liquidity

Non-performing loans are loans that a bank customer fails to meet contractual obligations on either principal or interest payments exceeding at the pre specified contracted time. This measures the quality of banks asset. Unlike other type of firms, banks' assets are composed of large amount of loans on short and long term bases. NPL is the main contributor to liquidity risk, which exposes private commercial banks to insufficient funds for their day to day business operations.

The study conducted by Assfaw (2018) and Melees (2015) measured it by the ratio of provisions of a loan to total loan provided and the lower the loan loss provision to total loan ratio indicate the quality of the asset of the bank is relatively better than the other banks. In the study of Sudirman (2015), asset quality has a positive effect on liquidity of banks, i.e. the greater asset quality ratio is, the greater liquidity ratio is or the worse asset quality of a bank is, the more liquid the bank will be. But, there is a negative relationship between asset quality measured by non-performing loan/total loan and liquidity. This means the growth of non-performing loan reduces the level of liquid assets of banks (Mazreku, Morina, Misiri, Spiteri, & Grima, 2019; Tibebe, 2019).

2.2.2.2. Macro-economic factors that affects banks liquidity

2.2.2.2.1. GDP and banks' liquidity

Real gross domestic product is an indicator of the financial health of a country. It is also a macroeconomic factor that affects bank liquidity. The theory of bank liquidity and financial fragility stated that when the economy is at boom, banks became optimistic and upsurge their

long term investment and reducing their holding of liquid assets while in the period of recession the reverse is true. But, sometimes banks prefer high liquidity due to lower confidence in reaping profits during an economic downturn. That means a real gross domestic product has a significant positive impact on a bank's liquidity (Sheefeni & Nyambe, 2016; Boadi et al., 2016; Berger & Sedunov (2017) and Mazreku, & Grima, (2019). Conversely, the study of Sopan and Dutta (2018), Singh and Sharma (2016) and Assfaw, 2019 presented that liquidity is inversely related to GDP.

2.2.2.2.2. Inflation and bank liquidity

Inflation implies a situation where the demand for goods and services exceeds their supply in the economy. At high inflation rate the bank's non-performing loans will expand, collateral security values deteriorate and value of loan repayments on banks loans declines consequently it affects banks liquidity negatively (Heffernan; 2005). Not only this but also researchers like Abderrassoul (2014), Malik (2013) and Vodová (2011) found out that the inflation rate has a negative impact on the liquidity position of banks found out that due to cost of living will rise and deposits are expected to be reduced and as result, liquidity will be affected negatively. In contrast; as results of the financial sector makes fewer loans, less resource allocation efficient, and intermediary activity diminishes with adverse implications for capital/long term investment which affects banks liquidity positively Singh & Sharma (2016); Belete (2015); Mekibb (2016); Rahel & Abdu (2018) and Ahmad (2017).

H8. There is a significant negative relationship between inflation and bank liquidity

2.2.2.2.3. Foreign Exchange rates and banks' liquidity

The foreign exchange rate is value of local currency against a unit of the foreign currency. The main causes for changes in the exchange rates are unbalance between demand and supply in the foreign market. Banks will be affecting negatively as local currency depreciation in the market and commercial banks will face to fulfill the clients' foreign currency request (Nyandema and Langat, 2016).

2.2.2.2.4. Interest rates margin and bank liquidity

The interest rates comprise the amount charged by the banks during lending and; varies with the type of bank and the amount being borrowed (Manyoet al, 2016). According to scholars like,(Al-Homaidi et al., 2019; Tibebu, 2019; Mekonnen,2020; Ahokossi, 2013; Vodova, 2012) a higher interest rate margin will force banks to lend more and reduce their holding of liquid assets. On the other view a high interest rates tend to discourage people from borrowing and has a positive effect on the liquidity risk of banks (Mazreku et al., 2019; Abdu(2018) and Malik & Rafique, 2013).

2.3. Empirical literature on factors of liquidity

Modern financial theories have long recognized that banks exist because they perform two critical activities in the economy: liquidity creation and risk transformation (Berger & Bouwman, 2017). Indeed, banks have a special intermediate role in transforming liquid liabilities (deposits) into illiquid assets (loans) (Dietrich et al., 2014; Bonfim & Kim, 2012). When the bank customer deposit cash, a liability is created in a bank's balance sheet and an asset is formed when the bank provides loans to borrowers (Hartlage, 2012). A bank must manage its liability and asset sides to be able keeping optimal liquidity and to meeting the accidental demands from the depositors.

The current research has thoroughly examined various variables that may impact bank liquidity. For instance, Sathyamoorthi et al. (2020) specified that the existence of commercial banks primarily depends on the amount of liquidity, and its degradation might lead to a loss of public trust. Similarly, during the most recent global financial crisis, large government guarantees and resource injections were given to European and US banks, supporting the claim made by Krishnamurthy, Bai, and Weymuller that bank liquidity is crucial during financial crises (Cardoso et al., 2019). These results highlight how crucial it is to comprehend the various factors that influence bank liquidity to maintain the financial system's stability

Macroeconomic factors, including GDP growth, foreign exchange rate and inflation can also impact bank liquidity. An increased in credit demand could pressure bank liquidity if the economy grows more quickly, and high inflation could decrease the real value of bank deposits

and, thus, the amount of loan able funds available (Imhof et al., 2018). Moreover, bank liquidity may be significantly impacted by regulatory frameworks, such as reserve requirements and liquidity ratios (Polizzi et al., 2020).

Several studies have been carried out globally on the liquidity risk of banks and determinants of bank liquidity, such as Al-Homaidi et al. (2019) who studied the liquidity determinants of Indian listed commercial banks and figured out that bank size, capital adequacy, deposits, and return on assets had a significant positive impact on banks' liquidity, whereas assets quality, assets management, return on equity, and net interest margin had a significant negative impact on banks.

Moore (2017), investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. According to the study cash-to-deposit ratio expected to have negative impact, the macroeconomic situation, expected and have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity.

According to Berger and Bouwman (2018); and Deepand Schaefer (2015) on Germany's state-owned saving banks study, tightening monetary policy interest rate, expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity.

An empirical data from Nepal, remittances, capital adequacy, deposit growth, and bank size are significant factors affecting banks liquidity (Bista & Basnet, 2020). An increased in deposit levels can progress a bank's liquidity by fortifying its capacity to fulfill its short-term obligations (Agarwal, 2019). Additionally, the makeup of the deposit base, such as the proportion of steady deposits versus volatile deposits, can significantly affect a bank's liquidity situation (Al-Khouri, 2012).

A study made by Fadare (2021), on the banking sector liquidity and financial crisis in Nigeria by employed a linear least square model and time series data from 1980 to 2009. The study found that only liquidity ratio, monetary policy rate and lagged loan-to deposit ratio were significant for predicting banking sector liquidity. Empirical data studies from Fofack (2015) and Klein

(2022) shows that greater inflation leads to higher loan rates, especially with variable credit conditions, which leads to more non-performance loans and less bank liquidity. Also Liquidity and inflation rates, on the other hand, failed to depict a substantial association with the sustainability of Middle East and North African area banks (Kassem, 2022).

As far as Ethiopians' scholars considered banks size, loan growth, non-performing and profitability have a significant impact on banks liquidity and inflation had statically significant impact on liquidity (Mekibeb, 2016). In addition, (Nigist Melese, 2015), analyzed the bank specific factors that affect liquidity of Ethiopian commercial banks from the period 2007 to 2013 for the sampled commercial banks in Ethiopia. The result of the study indicated that, capital adequacy and profitability have statistically significant impacts on liquidity of Ethiopian commercial banks. Bank size has positive and statistically significant impact on liquidity. On the other hand non-performing loan and loan growth were found to be statistically insignificant on liquidity of Ethiopian commercial banks for the tested period.

Moreover, the empirical analysis carried out by Mekonnen Kumlachew(2019) through the use of the generalized method of moments (GMM) estimation of dynamic panel data from 15 commercial banks from 2009–2019. The result shows that lagged value of liquidity and deposit had a positive and statistically significant effect on commercial banks' liquidity. On the other hand, capital adequacy, bank size, interest rate margin, and gross domestic product had a negative and statistically significant effect on the commercial bank's liquidity. The study suggested that commercial banks in Ethiopia shall be more concerned about deposit mobilization to maintain a sufficient liquidity buffer and improve liquidity performance.

2.4. Conceptual Framework

Despite larger banks have more customer bases and diversified assets they are expose to liquidity risk due they assume them as too big to fail and engaging in high risk investment activities. Strong capital used as loss absorbing buffer for private commercial banks and enables them to stabilized liquidity problem. A bank that have higher deposit growth with aggressive lending and rising in interest costs, may leads to paradoxically worsen a bank's liquidity. As the main source of banks profit generating loan converting liquid deposits(assets) into the illiquid which causes for a maturity mismatch as result it leads to cash shortfalls and increasing NPL

with in private banks. Finally, profitability measured by (ROE) increases the private commercial banks capital base and enhancing ability to meet short-term liquidity needs by attracting more funds.

From the macro-economic factors higher real growth domestic product (GDP) rate may affect banks liquidity negatively due to as increased economic activity boosts loan demand, prompting banks to reduce liquid assets for lending and causes for loan faults (NPLR) increment. Increases in operational costs, demand for loans as purchasing power falls due to inflation (CPI) affects private commercial banks liquidity negatively. Depreciating of local currency (ETB) makes foreign currency debt more expensive for importers and exporters which causes to foreign currency shortage and default on loans (NPLR) which will affects the banks liquidity negatively. Finally, interest rate margin (IRM) as the difference between banks' lending rate and funding cost private commercial banks may exposes to the risk of changes in market interest rates and causes for liquidity problems.

The conceptual frame work which describes the relationship between bank liquidity (LR) with bank-specific and macroeconomic determinants based on the above theoretical and empirical perspectives illustrated as follows:

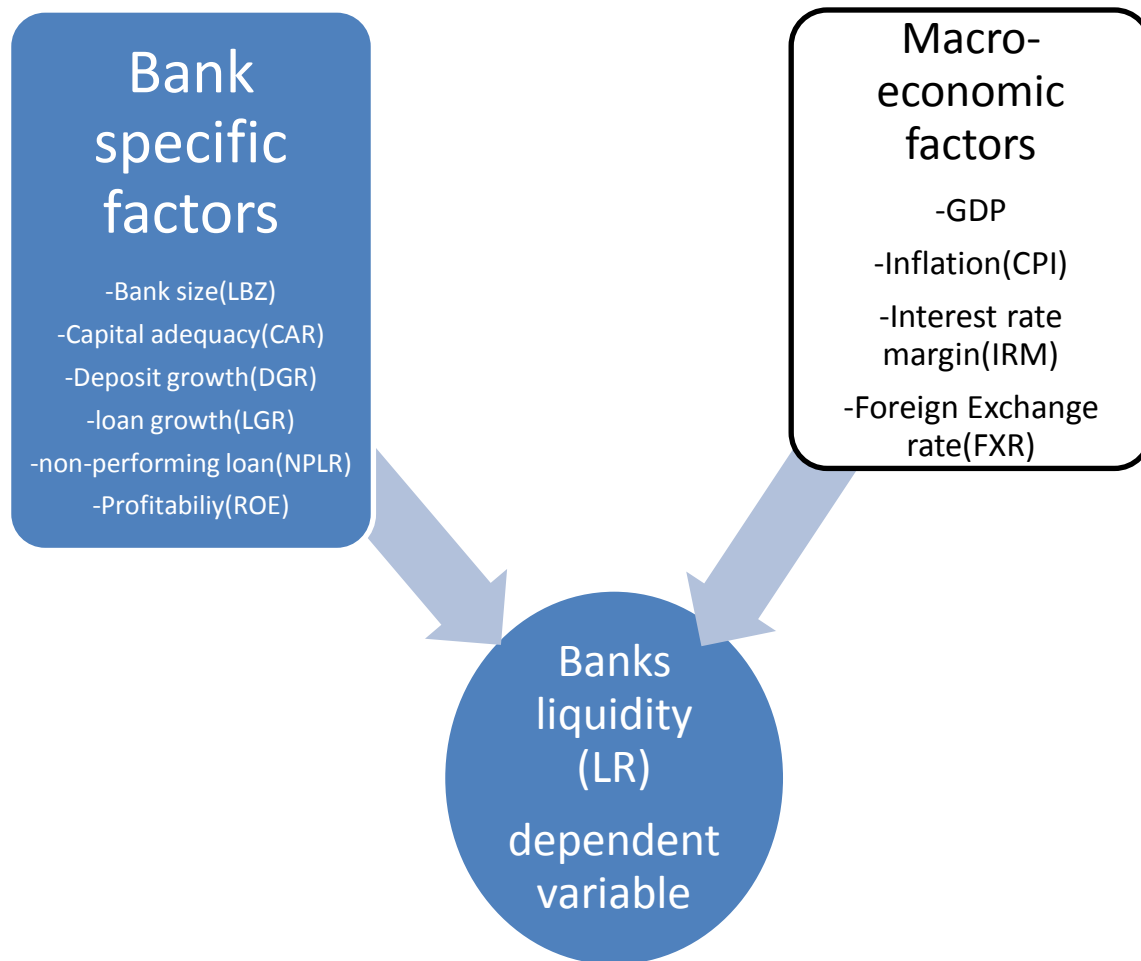


Figure 1 Relationship between Banks liquidity and its determinants

2.5. Justification of the Research Project

According to above theoretical as well as empirical review, liquidity is important to banking industry since it plays vital role of liquidity creation. “Liquidity creation” refers to the fact that banks provide illiquid loans to borrowers while giving depositors the ability to withdraw funds at par value at a moment’s notice Diamond and Dybvig (1983). The review of the literature reveals that the existence of many gaps of knowledge in respect of the factors affecting bank liquidity. So as far as the review of the literature discloses, in the past research findings there is lack of consistency or debates on the relation-ship between banks liquidity and its determinants (including both bank specific and macro-economic factors) along with their research methodology.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. Research philosophy

Since the study relies on quantitative research approach it is a positivism research type of philosophy.

3.2. Research approach

The study conduct based on quantitative research approach to see the causal relationship between banks liquidity and factors that impacts on it as a result, it is a quantitative type of research approach. By using such research approach it enables to establish the cause and effect relationship between dependent and independent variables of the study test various hypothesis and theories for the generalization of determinants of private commercial banks in Ethiopia.

3.3. Research design

Since the purpose of this study is to assess the impact of both bank specific and macro-economic factors that affects private commercial banks in Ethiopia, it is an explanatory/cause and effect/ research design type.

3.4. Study population

According to the data that recorded on National Bank of Ethiopia portal the overall total population size of the two categories of banking industries (state owned and private owned banks) are 32. From a total population of 32 banks in the country thirty of them are private owned commercial and the remaining two are state owned banks. For the purpose of this study only consider private owned commercial banks consider as a sample frame.

3.5. Sampling Design and Sample size

Sampling is the process of selecting samples from the entire population to gather information for making draw conclusions on population with available resources. There are two types of sampling techniques; probability and non -probability sampling. In the probability sampling,

each element within the sample frame have equal and non-zero chance to be selected for making drawn conclusion through random selection process. In contrary, in case of non-probability sampling the selection process is non-random and each element have no equal chance for sample. The sampling technique used in this study used a non-probabilistic sampling and among these methods the purposive sampling technique applied. As stated by (Saunders et al, 2009), purposive sampling is appropriate when working with small samples and when we wish to select cases that are particularly informative in addition to the nature of the study(aimed for variations among the level of independent variables).

In order to have balanced panel data for the six years and examine more on the effects of independent variables on banks liquidity from the first level(Awash bank) by major performance indicators in Ethiopian private commercial banks to the least one (Nib bank) using purposely the eight banks included in the sample. The sample size for this study was determined based on the theoretical aspects of rule of thumbs and average of the previous research works along with personal judgement of eight private commercial banks as sample size is sufficient to make sound conclusion about the total population of 30 banks. Those eight elements selected for sample are Awash Bank (AB), Dashen Bank (DB), Bank of Abyssinia (BOA), Abay bank (ABY), Nib International Bank (NIB), Hibret Bank (UB), Global bank (GB) and Cooperative bank of Oromia (COOP).

3.6. Source and Method of Data Collection

According to Koul, L (2003) consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings. The sources of data for this research are secondary sources. Bank specific data will be collected from independent audited financial statements from both on and off-balance sheet of each selected commercial banks included in the sample which increases the reliability of sourced data. On other hand, macro-economic data collected from both NBE Annual Report, Ethiopian Economic Association (EEA) reports, Ethiopian statistical agency (ESA). The nature of data used is a balanced-panel data which deemed to have advantages over simple cross sectional and time series data. Panel data involves the pooling of observations on the cross sectional over several time periods (Brooks, 2008). The panel data/longitudinal data comprises of both cross-sectional elements and time-series elements; the cross-sectional element is

reflected by the sample of Ethiopian private commercial banks and the time-series element is reflected in the period of study (2018- 2024).The data collected from 2018/2019 to 2023/2024 on annual base and the figures for the variables will be on June 30th for each year.

3.7. Methods of data analysis technique

Since the nature of the study is an explanatory type the collected data analyzed using both descriptive and inferential statistics. From descriptive statistics of both dependent and independent variables over the sampled periods illustrated using both graphically and numerically computations. This helps to convert the raw data in to a more meaning full form which enables to understand the ideas clearly. And then interpret with statistical description including standard deviation, mean, and minimum & maximum along with correlation analyses between dependent and independent variables were made. On the other hand, as inferential statistical tools a pooled multiple linear regressions with its assumptions test and t-test analysis used to determine the relative importance of each independent variable in influencing liquidity of Ethiopian private commercial banks variable using the sophisticated Stata version 19.5 software application.

3.8. Study Variables and their measurement

Since the study is focused on factors affecting banks liquidity on selected Ethiopian private commercial banks. Bank liquidity is the dependent variable. On the other hand, both the bank specific and macro-economic factors are the independent variables in the study. Though various bank specific and macroeconomic variables were conducted in the previous studies made worldwide, in this study some new variables considered which factors could influence the liquidity of banks in the Ethiopia private commercial banks context.

3.8.1. Dependent variable

In this study, liquidity has been used as a dependent variable. Bank liquidity is the ability of a bank to meet its obligations due at any time, especially to repay customer deposits or to make a payment on the client's order (P. K. Vodová, 2016). Generally, as stated on literature review there are two methods of measuring liquidity of banks which are stock/ratio approach and the flow/gap approach. The first approach employs various on and off balance sheet ratios to

identify liquidity trends and it is easy to compute. Whereas, the second flow approach is more data intensive and there is no standard technique to forecast inflows and outflows. As a result, the ratio approaches are more popular in practice and in the academically acceptable. Therefore, this study attempts to measure liquidity as the ratio of loans and advances to deposit i.e. $Liquidity = \frac{\text{loans and advances}}{\text{customers deposits and borrowing}}$. It indicates that percentage of the volatile funding of the bank is tied up in illiquid loans. The ratio reflects the proportion of the customers' deposits that have been given out in the form of loans. Therefore, the higher this ratio the less liquid the bank is and interpreted inversely.

3.8.2. Summary of independent Variables and their measurement

3.8.2.1. Bank specific factors

Independent Variables	Definition	Acronyms	Measurement
Return on Equity	The ratio of net income to total equity of the company	ROE	Annual Net Income / Shareholder's Equity
Loans and Advances	debt provided by the bank to customer	LGR	percentage change
Capital Adequacy Ratio	amount of capital need to cover liquidity risk	CAR	Capital/ risk-weighted assets
Deposit Growth	money deposit by customer to bank in the form of demand or fixed time	DGR	percentage change
Bank Size	How big or small a bank is	BZ	Natural Logarithm of Total Asset
Non-Performing Loan Ratio	The percentage of non-performing loans on total volume of loans	NPLR	Non-Performing Loans / Total Loans

TABLE I SUMMARY OF BANK SPECIFIC INDEPENDENT VARIABLES AND THEIR MEASUREMENT

3.8.2.2. Macro-economic factors

Independent Variables	Definition	Acronym	Measurement
Interest rate Margin	difference between banks' lending rate and funding cost	IRM	Interest income rate – interest expense rate
Real growth domestic product	percentage increase in a country's total economic output	GDP	percentage change
foreign exchange rate another	value of one country's currency in relation to another	FRX	ETB/USD
Inflation Rate	the general increase in prices for goods and services over time	CPI	The percentage change in this basket's cost from a base period

TABLE 2 SUMMARIES OF INDEPENDENT VARIABLES AND THEIR MEASUREMENT

3.9. Model Specification

There are three main regression estimation models (common/pooled, fixed and random effect models) for panel data analysis and the selection of which to use typically guided by the statistical test tools (Chow, and Lagrange Multiplier).

3.9.1. Test for Random Effects (Pooled OLS vs. RE)

```
. xttest0
Breusch and Pagan Lagrangian multiplier test for random effects
LR[ID,t] = Xb + u[ID] + e[ID,t]
Estimated results:
-----+-----+-----
LR      |      Var      |      SD = sqrt(Var)
e       |      .0010468  |      .0323538
u       |      0         |      0
Test: Var(u) = 0
          chibar2(01) =      0.00
          Prob > chibar2 =      1.0000
```

TABLE 3 LAGRANGE MULTIPLIER TEST FOR RANDOM EFFECT

Null Hypothesis (H0): Common/pooled Effect Model is appropriate (no random effects).

Alternative Hypothesis (HA): Random Effect Model is appropriate. Since p-value (1.000)>0.05(its level of significance) we do not reject H0 Common Effect Model is appropriate panel regression model is appropriate.

3.9.2. Chow Test (pooled Effect Model vs. Fixed Effect Model)

Null Hypothesis (H0): pooled Effect Model is appropriate.

Alternative Hypothesis (HA): Fixed Effect Model is appropriate

xtreg LR ROE LBZ CAR LGR NPLR DGR IRM GDP CPI FRX,fe

F test that all u_i=0: F (n-1, N-n-k) = ... Prob > F = 0.07543

Since based on the above Stata output p-value (0.07543)>0.05 we do not reject the null hypothesis which indicates that Pooled model is preferred over fixed effect model (FEM). Hence, by take into account the above the statistical panel regression model test result to study the main internal and external drivers influencing bank liquidity creation on Ethiopian private commercial a pooled /common multiple linear regression model is developed and expressed as follows:

$$\begin{aligned} LR_{it} = & \beta_0 + \beta_1 ROE_{it} + \beta_2 LBZ_{it} + \beta_3 CAR_{it} + \beta_4 LGR_{it} + \beta_5 NPLR_{it} + \beta_6 DGR_{it} \\ & + \beta_7 IRM_{it} + \beta_8 GDP_{it} + \beta_9 CPI_{it} + \beta_{10} FRX_{it} + \epsilon_{it} \end{aligned}$$

Where, LR is the Liquidity, ROE is the Return on equity, CAR is the Capital Adequacy ratio, DGR is the Deposit growth rate, LGR is the Loan Growth rate, NPLR is non-performing loan ratio, LBZ is the natural logarithm of Bank Size, IRM is the Interest rate margin, CPI is general inflation, GDP is the Real Gross Domestic Product, and FRX is foreign exchange rate.

Where, i is the ith Banks=1, 2....8

t is the time=2018, 2019.....2024.

B_0 is the constant term of the model and ϵ_{it} is the error term.

$\beta_1; \beta_2; \beta_3; \beta_4; \beta_5; \beta_6, \beta_7, \beta_8, \beta_9, \text{ and } \beta_{10}$ are the coefficients for each explanatory variables in the model.

3.9.3. Testing for omitted variable

Testing for the omitted variable enables us to know we have included all necessary variables to explain the dependent variable in the stated regression model. It is important for our model since

it is related to the assumption that the error term and the independent variables in the model are not correlated. In Stata, test for omitted-variable bias using the `ovtest` command after running `regress` gives the following output;

`ovtest`

Ramsey RESET test using powers of the fitted values of LR

Ho: model has no omitted variables

F (3, 34) = 1.43

Prob > F = 0.2497

The null hypothesis is that the model does not have omitted-variables bias, the p-value is higher than the usual threshold of 0.05 (95% significance), so we fail to reject the null and conclude that no need of more variables.

3.10. Ethical Considerations

Research ethics is particularly important for Business research specifically conducted on bank sectors financial data that are mostly competitive and often confidential. Therefore, as a researcher I exercise it utmost due care in unanimously using financial data only for the purpose of this research. Thus, I ensure the rights, privacy and welfare of study variables/participants in this paper by take in to account all the ethical issues respective to each stakeholder in the study journey. To gain the relevant information/or data on study variable (banks liquidity) I have concerned the following major ethical issues on participants (banks) along with researchers professional ethics.

- Seeking consent/permission
- Privacy of participants
- Not harm the participants
- Maintaining confidentiality

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1. Introduction

The preceding two chapters deal with literatures related to the topic and research methodology. In this chapter, detail analyses about the descriptive statistics and regression result have been made. Specifically, this chapter has included five sections. The first section presented descriptive analysis of the dependent and independent variables with both summary statistics and graphical methods to provide an insight on the distribution of the data by bank and across time. Section two presented the classical linear regression model assumptions diagnostic test results. The third section presented the results of the regression analysis and finally discussion of the regression results were presented under section four.

4.2. Descriptive Analysis

4.2.1. Descriptive Analysis of the dependent Variable

The dependent variable of the study is liquidity of private commercial banks in Ethiopia. As stated in the previous chapter's liquidity ratio approach is more popular in practice and in the academic literature due to the availability of a more standardized method. As a result in this paper liquidity computed as a ratio of loans and advances to customers' deposits, which measures the volumes of customers' deposits that have been given out in the form of loans. If the higher this ratio, the less liquid the bank is to cover any unforeseen fund requirements and vice versa. As shown in figure.2 the average value of banks liquidity ratio(as ratio of loans and advances to customers' deposits) is 0.796 (79.62%), which indicated that the sampled banks on average does not offered loans to their clients less than 20.38% of the customers' deposit during the study period, which is higher than NBE directive number SBB/57/2014 issued by the National Bank of Ethiopia, any licensed commercial banks are required to maintain liquid asset of not less than fifteen percent (15%).The maximum and minimum values of the liquidity are 0.9610and 0.5918 respectively with a standard deviation of 0.0841, which shows the lower disparity of banks liquidity form the mean value. Thus, it can be concluded that on average Ethiopian private Commercial Banks have effectively deploys deposits into interest-earning

loans and have volatile deposits tied up with illiquid loans, which puts the bank at a moderate liquidity risk.

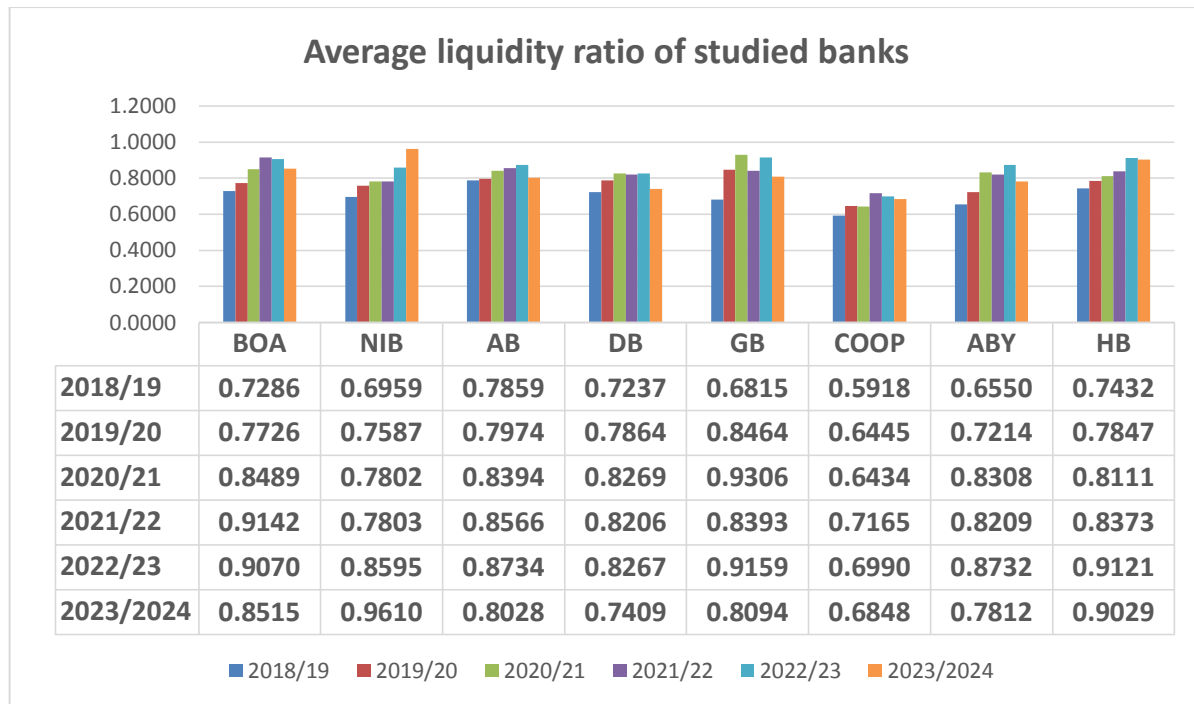


FIGURE 2 AVERAGE LIQUIDITY RATIO OF STUDIED BANKS

Figure 2.above depicts the overall average liquidity ratio of the studied banks for the period from 2018 to 2024. On average, Cooperative bank of Oromia has shown the minimum ratio of loans and advances to customers’ deposit (highest liquidity) of 0.6633(66.33 %) from the sampled private commercial banks. On the other hand, Hibret Bank has shown on average the maximum a ratio of loans and advances to customers’ deposits (lowest liquidity) from other selected private commercial banks.

4.2.2. Descriptive Analysis of the independent Variables

The independent variables used in this study includes; return on equity , bank size ,capital adequacy ratio, loan growth , non-performing loans, Deposit growth ,interest rate margin, gross domestic product, inflation and foreign exchange rate and the descriptive analyses of each independent variable are discussed here below.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	48	0.2372	0.0651	0.0374	0.3557
		17.913		15.518	19.458
LBZ	48	6	0.8892	0	9
CAR	48	0.1383	0.0454	0.0843	0.3500
LGR	48	0.3634	0.2195	-0.0901	1.0504
NPLR	48	0.0316	0.0197	0.0050	0.1076
DGR	48	0.3078	0.1675	-0.1861	0.8662
IRM	48	0.0999	0.0141	0.0698	0.1344
GDP	48	7.1333	1.1111	6.1000	9.0000
		24.266		12.600	33.800
CPI	48	7	7.5606	0	0
		42.704	10.753	28.054	55.962
FRX	48	3	5	3	3

TABLE 4 SUMMARY OF STATA OUTPUT DESCRIPTIVE STATISTICS OF INDEPENDENT VARIABLES

Based on the above Stata statistics summary the average value of profitability (ROE) is 0.0374, which shows that 3.74 cents were generated from one birr investment on equity of banks with 0.5918 minimum and 0.9610 maximum values.

The average value of capital adequacy ratio (CAR) is 0.1383, which shows that on average the sampled commercial banks holds 13.83% to its risk weighted assets with a minimum value and maximum value of 0.0843 and 0.0843 respectively (above the 8% NBE requirement).

The average value of the deposit growth rate (DGR) is 0.3078, which shows that on average the customers' deposit increased by 30.78% which increases the bank's asset with a minimum value of -0.1861 and a maximum value of 0.8662. The standard deviation among banks in terms of bank deposit growth 0.1675 this confirms that there is highest rate variations of deposit growth among commercial banks during the study period.

The loan growth (LGR) has an average value of 0.3634, which shows that on average the loan and advances given to the customers grown by 36.34 percent with a minimum value of -0.0901 and maximum values of 105.04%, and a standard deviation of 0.2195 which shows there is a great variation among banks loan growth.

The average total asset (LBZ) of Ethiopian commercial banks is 17.9136 which range from minimum of 15.5180 to 19.4589.

Interest rate margin in this study is computed by the difference between the interest earned on loans & advances as a fraction of total loans & advances and the interest paid out on deposit as a fraction of total deposits. The mean value of interest rate margin is 0.0999 (almost 10%) which is a moderate which ranging from 0.0698 to 0.1344.

Non-performing loans ratio (NPLR) measured as the percentage of non-performing loans on total volume of loans and advance ranges from 0.0050 to 0.1076. It has a mean of 0.0316 with 0.0197 variations which is bellow requirement of National Bank of Ethiopia direction to all commercial banks to maintain the NPL ratio below 5%

Gross Domestic Product (GDP) is an indicator of the economic health of a country as well as the gauge of a country's standard of living. It is the measurement of level of economic activity of a country. For the purpose of this study, GDP is measured by the annual real growth rate of gross domestic product which shows that on average there was 7.1% growth rate between 2018– 2024 varies from 6.1 percent to 9 percent

Another important macroeconomic variable which may affect liquidity of banks is the inflation rate. During inflation, the central bank can raise the cost of borrowing and reduce the credit creating capacity of commercial banks. During inflation, it is expected that, banks will make fewer loans and the amount of liquid or short term assets held by economic agents including banks will rise. On the other hand, during inflation the cost of living will rise and deposits are expected to be reduced and as a result liquidity will be affected negatively. Table 4.1 shows that, on average the general inflation rate of Ethiopia over the past six years was 24.26%, which was more than that of the average real GDP growth rate with minimum and maximum value of 12.6% and 33.8% respectively.

Lastly, among the macro-economic factor for commercial private banks weighted inter-bank forex market rate(FRX) Birr 42.7043/ USD with minimum of 28.0543 Birr /USD, and maximum of Birr 55.9623 Birr per USD and the highest standard deviation of Birr 10.7535per USD indicated there is an increment of foreign exchange rate (depreciation of birr value) from time to time.

4.3. Inferential Analysis/pooled multiple linear regression

4.3.1. Test results for the classical linear regression model assumptions

Investigating the violation of basic assumptions of classical linear regression model (CLRM) enables to avoid the consequences of wrong coefficient, standard errors and inappropriate test statistics distribution. To ensure whether the basic assumptions of classical linear regression model ($LR_{it} = \beta_0 + \beta_1 ROE_{it} + \beta_2 LBZ_{it} + \beta_3 CAR_{it} + \beta_4 LGR_{it} + \beta_5 NPLR_{it} + \beta_6 DGR_{it}$) in study is violated or not the following basic diagnostic tests conducted.

4.3.1.1. Assumption of zero mean error $E(\varepsilon) = 0$

Non representative of sample size and excluding of the dependent variable slope(y-intercept) are possibilities of the assumption to be violate. Even if there is no formal test it is possible to say the assumption is violate or not by observing the regression model. So, the regression model for study ($LR_{it} = \beta_0 + \beta_1 ROE_{it} + \beta_2 LBZ_{it} + \beta_3 CAR_{it} + \beta_4 LGR_{it} + \beta_5 NPLR_{it} + \beta_6 DGR_{it} + \beta_7 IRM_{it} + \beta_8 GDP_{it} + \beta_9 CPI_{it} + \beta_{10} FRX_{it} + \varepsilon_{it}$) incorporated the constant term (β_0) once it is possible to conclude the assumption of zero mean error is not violated.

4.3.1.2. Assumption of homoscedasticity/constant variance of errors

The assumption of homoscedasticity not violated if residuals have constant variance across all levels of the independent variables. A plot of residuals versus predicted values should show a random scatter of points without any discernible pattern (e.g., a cone shape indicates a violation c heteroscedasticity). There will be the possibility of heteroscedasticity if there is an omission of important variable(s) that have strong relationship with the dependent variable. To detect the heteroscedasticity assumption both graphical as well as statistical test (Breusch-Pagan test) may appropriate and for the purpose of this study both methods presented as follow;

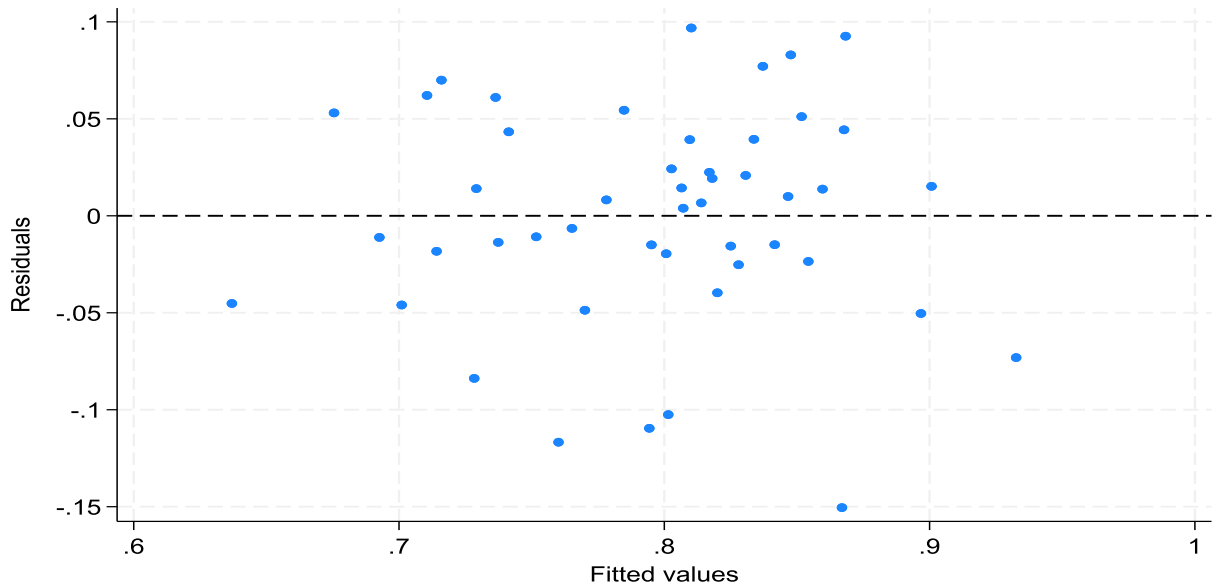


FIGURE 3 RESIDUALS VERSES ITS FITTED VALUES FOR HOMOSCEDASTICITY TEST

On the other hand, the Breusch-Pagan statistical method to test homoscedasticity with the syntax `estat hettest` after run the regression model Stata software generated the following output;

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of LR

$\chi^2(1) = 0.63$

$\text{Prob} > \chi^2 = 0.4273$

Hence, P-value (0.4273) is greater than its significance level (α) = 0.05 we do not reject the null at 95% level and conclude that residuals are non-heteroscedastic/ homoscedastic.

4.3.1.3. Assumption of non-autocorrelation

The violation of the assumption of non-autocorrelation (serial correlation) occurs when error terms in a regression model are correlated with one another and trends in the dependent variable.

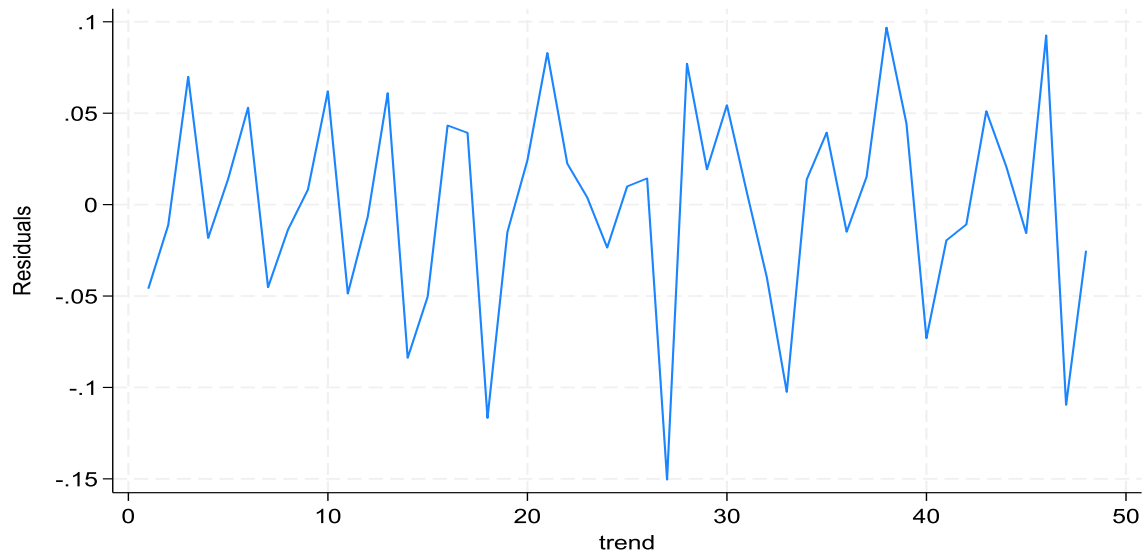


FIGURE 4 TIME PLOT OF RESIDUALS FOR AUTOCORRELATION TEST

Breusch-Godfrey LM test is a post estimation test for higher-order autocorrelation unlike Durbin Watson test. The Stata software generated the following out puts as far as Breusch-Godfrey LM test considered;

```
. estat bgodfrey
```

Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	1.438	1	0.2304

H₀: no serial correlation

TABLE 5 BREUSCH-GODFREY LM TEST FOR HIGHER ORDER AUTOCORRELATION TEST

Since LM (chi-square) p-value of 0.2304 is greater than its significance level (alpha value of 0.05) we do not the nun hypothesis of no serial conclusion. Hence based on the above statistical method the data has no higher order autocorrelation which consistent with the graphical method above figure 4.3 time plot of residuals.

4.3.1.4. Assumption of no Multicollinearity

An implicit assumption that is made when using the OLS estimation method is that the explanatory (independent) variables are not correlated with one another. In any practical context, the correlation between explanatory variables will be nonzero, although this will generally be relatively benign in the sense that a small degree of association between explanatory variables will almost always occur but will not cause too much loss of precision (Chris Brooks 2019). Pearson’s correlation coefficient and variance inflation factors (VIF) are the two formal methods for measuring the extent of multicollinearity. The variance inflation factors (VIF) provide an estimate of to what extent the variance of a parameter estimate increases because the explanatory variables are correlated. Some researchers use a rule of thumb $VIF > 10$ or a $1/VIF < 0.10$ indicates the presence of multicollinearity in the model. For this study Stata 19.5 generated the following outputs using the syntax of vif (variance inflation factor) after running the regression model.

Variable	VIF	1/VIF
CPI	9.9576	0.1044
LGR	9.9065	0.1009
FRX	8.9765	0.1114
DGR	6.79	0.1472
IRM	4.78	0.2092
LBZ	3.43	0.2915
GDP	3.18	0.3144
CAR	2.43	0.4115
ROE	1.98	0.5050
NPLR	1.78	0.5617
Mean VIF	5.321	

TABLE 6 VIF INDEPENDENT VARIABLES SERIAL CORRELATION TEST

As figured out in the above table all VIF values are less than the stated rule of thumb assumption (VIF <10 or 1/VIF > 0.10) indicated that there is no evidence to conclude the existence of perfect multicollinearity between independent variables in the regression model

pworth LR LBZ CAR LGR NPLR DGR IRM GDP CPI FRX

	LR	LBZ	CAR	LGR	NPLR	DGR	IRM
LR	1.000						
LBZ	0.161	1.000					
CAR	0.089	0.717	1.000				
LGR	0.001	0.349	0.096	1.000			
NPLR	0.005	0.347	0.254	0.431	1.000		
DGR	0.048	0.266	0.115	0.694	0.421	1.000	
IRM	0.131	0.252	0.060	0.598	0.530	0.698	1.000
GDP	0.298	0.074	0.200	0.259	0.223	0.234	0.367
CPI	0.535	0.431	0.320	0.350	0.219	0.246	0.187
FRX	0.524	0.506	0.296	0.496	0.409	0.330	0.429
	GDP	CPI	FRX				
GDP	1.000						
CPI	0.423	1.000					
FRX	0.072	0.572	1.000				

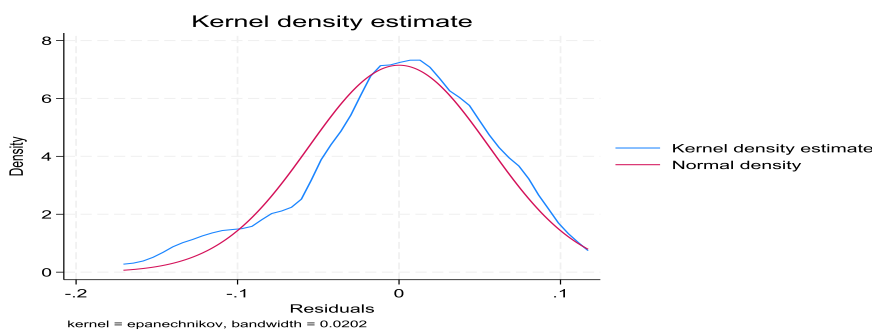
TABLE 7 PEARSON CORRELATION COEFFICIENTS FOR INDEPENDENT VARIABLES SERIAL CORRELATION

The above table Pearson correlation coefficients indicates that there is no perfect serial correlation between the independent variables (less than 0.70) which is a tolerable value in most research findings.

4.3.1.5. Assumption of normality

A normal distribution is not skewed and has a coefficient of kurtosis of 3. Insufficient number of observations, nature of data (non-continuous) and the existence of extreme values/outliers are the possible causes for the existence of non-normality assumptions.

FIGURE 5 KERNEL DENSITY ESTIMATE FOR NORMALITY TEST



Shapiro-Wilk test is the formal statistical tool to verify whether the coefficient of skewness and the coefficient of excess kurtosis are jointly zero. A p-value > 0.05 suggests normality (fail to reject the null hypothesis); p-value < 0.05 suggests non-normality.

TABLE 8 SHAPIRO-WILK W TEST FOR NORMAL DATA

Variable	Obs	W	V	Z	Prob>z	
E	48	0.9688	3	1.419	0.745	0.2280

The null hypothesis is that the distribution of the residuals is normal, here the p-value is 0.2280 which is greater than 0.05 so; we fail to reject the null and conclude that residuals are normally distributed.

4.3.2. Interpreting key results in the regression output

TABLE 9 SUMMARY OF STATA SOFTWARE OUTPUT OPERATIONAL POOLED PANEL REGRESSION MODEL

source	SS	Df	MS	Number of obs =48
model	0.5732	10	0.0573	F(10,37) = 4.70
residual	0.1463	37	0.0039	prob >F =0.0000
Total	0.7195	47	0.0612	R-squared =0.8243 Adjusted R ² = 0.8043

LR	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]
ROE	0.0877	0.1983	0.44	0.661	-0.3140 0.4896
LBZ	-0.0032	0.0191	0.17	0.866	-0.0419 0.0354
CAR	0.2959	0.3147	0.94	0.353	-0.3418 0.9336
LGR	0.2969	0.1438	2.06	0.047	0.0044 0.5875
NPLR	-0.5421	0.6219	0.87	0.389	-1.8023 0.7181
DGR	-0.4049	0.1427	2.84	0.007	-0.6941 -0.1157
IRM	-1.9431	0.9622	1.37	0.18	-4.8254 0.9397
GDP	-0.0207	0.0147	1.41	0.167	-0.0505 0.0090
CPI	-0.0046	0.0041	1.12	0.269	-0.0131 0.0037
FRX	0.0096	0.0028	3.35	0.002	0.0038 0.0155
_cons	0.8702	0.4456	1.95	0.058	-0.0327 1.7732

Based on the above summarized regression output result the following fitted model constructed;

$$LR=0.8702+0.0877(ROE)-0.0032(LBZ)+0.2959(CAR)+0.2969(LGR)-0.5421(NPLR)-0.4049(DGR)-1.9431(IRM)-0.0207(GDP)-0.0046(CPI)+0.0096(FRX)+ \epsilon_{it}.$$

4.3.2.1. R^2 , Adjusted R^2 and Regression F-test

As shown in the above table the R^2 (coefficient of determination) value of 0.8243 indicates that 82.43 percent of the variability in private commercial banks' liquidity in Ethiopia are explained by variation on the selected explanatory variables (Size of the Bank (LBZ), Capital Adequacy (CAR), and Deposit Growth (DGR), Non-Performing Loan (NPLR), Profitability (ROE), loan growth(LGR), interest rate margin (IRM),Growth domestic product (GDP), inflation (CPI) and Foreign exchange Rate(FRX)) in the stated regression model while remaining 17.57% explained by the error term. The adjusted R^2 value (0.8043) indicates that penalty of R^2 due to an increasing on its value due to adding extra predictor variables with in the model. The probability of F-statistics (0.0000) is less than its α -value (0.05) which is an indication of all the seven independent variables are jointly significant at 5% significance level; suggesting that at least one independent variable significantly affect the private commercial banks liquidity in Ethiopia.

4.3.2.2. Coefficients and their statistical significance

4.3.2.2.1. Return on equity and banks liquidity significance

Commercial banks profitability increasing stability and depositor confidence which improves liquidity by attracting capital , building reserves and making banks more efficient with holding sufficient liquid assets for safety. The regression output indicates that by holding the other factors constant, when banks ROE increased by one unit liquidity improved by 8.77 percent and the relationship is statistically significance at 5% significance level (95%confidence level). The result is consistent with researchers' like Mekbib Shumet(2016), Al-Homaidi et al. (2019), Singh and Sharma (2016), Melese and Laximikantham (2015), Lartey et al. (2022), and (Lee et al., 2023) which revealed that profitable banks' able to withstand negative shocks and contribute to the stability of its liquidity position similar to the tentative hypothesis in this paper.

On contradict study made by Habtamu and Zemenu (2022), Rahel -Aweke (2019), (Moussa, 2021; Sudirman, 2019; Deléchat et al., 2017; Al-Khour, 2018) (Athanasoglou et al. 2019), Rauch et al. 2018 and Shen et al. 2020) suggested that ROE have negative impact on banks liquidity.

4.3.2.2.2. Bank size and banks liquidity significance

Despite larger banks often having better market access they are exposed to liquidity risk due to their higher funding options. The coefficient value -0.0032 in the estimated pooled regression model indicates that by keeping all other factors constant a one percent increasing in bank size results 0.32 percent of liquidity decrease of sampled Ethiopian private commercial banks and the relationship is significant at 5% significance level (95% confidence level). The result recaps the view of too big to fail which considers the negative relationship between size and liquidity supported by Assfaw (2019), Sopan and Dutta (2018), Teshome (2017), Singh and Sharma (2016), Deléchat et al. (2012), and P. Vodová (2013), Mekonnen Kumlachew (2020), Rahel Aweke (2019) and Mekbib Shumet (2016) and consistent with the tentative hypothesis of the study. However, contradicted to research result found by Habtamu and Zemenu (2022), Al-Homaidi et al. (2019), Shaha et al. (2018), Melese and Laximikantham (2015), Chagwiza (2014), and Malik and Rafique (2013).

4.3.2.2.3. Capital Adequacy ratio and Banks Liquidity significance

The objectives of managing capital in bank industry are to comply with the capital requirements set by the National Bank of Ethiopia, safeguard its ability to continue as a going concern, and to maintain a strong capital base so as to maintain investor, creditor and market confidence and to sustain future development of the business. The pooled regression model result showed that capital adequacy has a positive and statistically significant effect on the Ethiopian private commercial banks liquidity (0.2959), which indicated that keeping other things constant on average a unit change in capital adequacy results to an improvement of banks liquidity by 0.2959 and the relationship is statistically significant at 5% significance level (95% confidence level). It has been found that the availability of high capital increases banks' liquidity absorbing capacity and liquidity creation capability which is consistent with the finding of Belete Fola (2015), Berger & Bouwman, 2017), Al-Homaidi et al. (2019), Shamas et al. (2018), Singh and Sharma (2016), Habtamu and Zemenu (2022), Melese and Laximikantham (2015). However, the result is against the tentative hypothesis and the study findings made by Gorton and Winton (2000) and (Diamond & Rajan, 2001) Mekonnen Kumlachew (2020), Rahel Aweke (2019) which stated that capital adequacy ratio has negative effect on banks liquidity.

4.3.2.2.4. Loan growth and banks liquidity significance

Its coefficient value 0.2969 reveals by keeping other variables constant on average a unit increment in banks loan results for a 0.2969 on liquidity ,but, the relationship is statistically insignificant at 5% significance level which is consistent with the null hypothesis of the study. The balanced pooled effect regression result revealed that there is no evidence to conclude loan growth has significance impact on banks liquidity similar to the previous researcher findings like Belete Fola (2015), Mekbib Shumet (2016) and Rahel Aweke (2019).

4.3.2.2.5. Non-performing loan (NPLR) and banks liquidity significance

As the percentage of non-performing loans on total volume of loans incremental of NPL banks are unable to collect both the principal and the stated amount of interest due to their NPLs they will have less money available and causes for liquidity problem. The Stata output revealed that by holding the other factors constant when NPLR increased by one unit privates' banks liquidity risk increased by 54.21 percent and the relationship is statistically significance at 5% significance level (95% confidence level).which is consistent to the finding of Assfaw (2018), Melese (2015, Mazreku, Morina, Misiri, Spiteri, & Grima,(2019), Tibebe,2019 and Sudirman (2015).Which is contradict to the stated null-hypothesis along with Mekbib Shumet(2016) and Rahel Aweke(2019) finding conducted in Ethiopia.

4.3.2.2.6. Deposit growth and banks liquidity significance

Uncontrolled deposit growth with aggressive lending and rising in interest costs may lead to paradoxically worsen a bank's liquidity by reducing its cushion of readily available cash, making it vulnerable to sudden withdrawal demands. By holding other factors constant the coefficient value of deposit -0.4049 in the pooled regression model indicates that on average a unit incremental in banks deposit rate result 40.49% decrease banks liquidity similar to tentative null-hypothesis but, the relationship is statistically insignificant at 5% significance level (95% confidence level). Which is contradicted to the previous researchers findings stated that significance positive effect (Habtamu and Zemen; 2022, Mekonnen; 2020 and Rahel Aweke; 2019).

4.3.2.2.7. Interest rates margin (IRM) and banks liquidity significance

Interest rate is banks' liquidity risk that the value of a financial instrument will be affected by changes in market interest rates. Borrowings and lending obtained at variable rates give rise to interest rate risk. The Bank's exposure to the risk of changes in market interest rates relates primarily to the Bank's obligations and financial assets with both fixed floating interest rates. The regression coefficient value -1.943 of interest rate margin indicates that on average a unit increase in interest rate results for 1.943 incremental liquidity problem for private banks and the relationship is statistically significance at 5% significance level (95% confidence level) which enables the ground room to rejection the stated null-hypothesis, *ceteris paribus*. Which revealed that a higher interest rate margin will force banks to lend more and reduce their holding of liquid assets similar to the finding of Al-Homaidi et al. and Tibebe,(2019),Mekonnen(2020), Ahokposi(2013,Vodova(2012) and Rahel Aweke(2019).

4.3.2.2.8. Real growth domestic (GDP) and banks liquidity significance

The higher real growth domestic product (GDP) rate may affect banks liquidity negatively due to as increased economic activity boosts loan demand, prompting banks to reduce liquid assets for lending and causes for loan faults (NPLR) increment. The regression coefficient value -0.0207 of real growth domestic product indicates that on average a unit increase in GDP results for 0.0207 incremental liquidity problem for private banks and the relationship is statistically significance at 5% significance level (95% confidence level), *ceteris paribus*. The result is consistent with research the tentative hypotheses in the study, and researches findings conducted by Sopan and Dutta (2018), Singh and Sharma (2016), Habtamu and Zemenu (2022), Assfaw, 2019 and Mekonnen (2020). However the result contradicted to the finding of Sheefeni & Nyambe, 2016; Boadi et al., 2016; Berger & Sedunov(2017) and Mazreku, & Grima, (2019).

4.3.2.2.9. Inflation rate (CPI) and banks liquidity significance

Depreciation of birr value increases operational costs, causing funding mismatches (more demand for loans as purchasing power falls), and rise for borrowing costs which have significance impact on banks liquidity. The regression coefficient value -0.0046 of inflation rate indicates that on average a unit increase in CPI results for -0.0046 incremental liquidity problem

for private banks and the relationship is significance at 5% significance level (95% confidence level), which enables to conclude accept the alternative hypothesis's rather than the null one, ceteris paribus. Which is similar to the result found by Abderrassoul (2014), Malik (2013) and Vodová (2011), but contracted with Belete Fola (2015), Mekbib Shumet (2016) and Rahel Aweke (2019).

4.3.2.2.10. Foreign exchange rate (FRX) and banks' liquidity significance

Finally, depreciating of local currency (ETB) makes foreign currency debt more expensive for importers and exporters which cause to default on loans (NPLR) and results for banks liquidity problem. The regression coefficient value 0.0096 of foreign exchange rate indicates that on average a unit increase in FXR results for improvement of banks liquidity by 0.0096, but, the relationship is statistically insignificant at 5% significance level which is similar to the stated tentative null-hypothesis. The balanced panel data pooled multiple linear regression result is different from the alternative hypothesis (have negative effect) and research found by Nyandema and Langat; 2016(negatively) and Rahel Aweke; 2019(positively) effects on Ethiopian private commercial banks liquidity.

CHAPTER FIVE

CONCLUSIONS, RECOMMENDATIONS AND DIRECTIONS FOR FURTHER STUDIES

5.1. Introduction

The main objective of the study was to identify both the bank-specific/micro-economic and macro-economic factors that can affect Ethiopian private commercial banks liquidity using secondary quantitative balanced panel data during the period from 2018/19-2023/24. The preceding chapter presented the analysis of key Stata software outputs, while this chapter outlines the conclusion, recommendation and giving directions for further studies based on the limitation of the study. So, the chapter is organized into three sub-sections, the first section presented the major conclusions of the study, the second section deals with the recommendation drawn from the study and lastly, part three presents the needs for the further studies based on the limitation of the study.

5.2. Summary of Key Findings of the Study

Based on previous studies reviewed, liquidity and its determinants theories, this study has been chosen and investigated the impact of six bank-specific and four macro-economic factors on the liquidity of the Ethiopian private commercial banks over the period of 2018/19-2023/24 for the eight sampled banks. Among the bank specific variables capital adequacy (CAR), bank size (LBZ), loan growth (LGR), deposit growth (DGR) non-performing loans (NPR) and profitability (ROE) were considered. On the other hand, interest rate margin (IRM), real growth domestic product (GDP), general inflation rate (CPI) and foreign exchange rate (FXR) were selected as macro-economic factors that can affect the liquidity of private commercial banks in Ethiopia. Explanatory research design adopted to explain the causal relationships between the variables. The study employed quantitative methods on secondary balanced panel data sourced from annual audited financial statements of banks, Ethiopian Economic Association reports, Ethiopian statistical agency, and NBE publications along with pooled multiple regression model used as multivariate variables analysis tool with the aid of Stata 19.5 version software.

Based on the result findings from the descriptive analysis, the average value of banks liquidity (as the ratio of loans and advances to deposit) 0.796, which indicated that the sampled banks on average does not offered loans to their clients almost 20.38% (greater than the threshold amount of 15% set by NBE) of the customers' deposit and bank effectively deploys deposits into interest-earning loans during the study period.

From the inferential statistical/balanced pooled multiple linear regression results of this study confirmed that, among the six bank specific variables except banks deposit(DGR) and loan growth(LGR) all factors(bank size, non-performing loans, capital adequacy and profitability) had statistically significant impact on liquidity of Ethiopian private commercial at 5% level of significance. Among those factors profitability measured by ROE and capital adequacy as the ratio of capital to risk-weighted assets had direct relationship with the dependent variable (LR). On contrary, both bank size (LBZ) and non-performing loans (NPLR) had negatively and statistically significant effect on Ethiopian private commercial banks liquidity.

The multiple regression output also revealed that among the macro-economic variables except the foreign exchange rate (FXR) all independent variables (interest rate margin (IRM), real growth domestic product (GDP) and general inflation rate) had negatively and statistically significant impact on liquidity of Ethiopian private commercial banks at 5 % level of significance(95% confidence interval).

5.3. Recommendations

- Since loans and advances constitutes the highest portion of Ethiopian private commercial banks total assets , credit risk(NPLR) remains one of the most important factor on banks liquidity negatively that need's to effectively manage through follow prudent, principle-based lending and financing practices that are in line with a bank's risk strategy and appetite, as well as applicable legal requirements.
- Even if the liquidity risk to the sampled private commercial banks remained moderate during the review period, although exposure to doubled digit with radical incremental inflation rate with in the country banks liquidity problem expected to be increase which need's remedial action by respective body at macroeconomic level.

- To mitigate the negative effect of bank size on liquidity at micro-economic/bank level private commercial banks should have good management practices like, ensuring they can meet obligations without excessive idle assets, conduct rigorous internal stress tests with realistic scenarios, implement strong management information systems (MIS) to monitor and review maturity profiles.
- As the result finding by enhancing private commercial profitability through diversifying non-interest income, operation efficiency via digitalization and effective loan management(by reducing NPLR) contributes for the improvement of liquidity position at bank specific level.
- To mitigate the potential negative effect of interest rate margin/spread as the difference between banks' lending rate and funding cost to improve liquidity senior management should take regular stress testing, and expand fee-based service on day to day banking operation.

5.4. Suggestions for future research

As the fundamental axiom of research replicability findings should be observed more than once before they are accepted. The study employed on quantitative panel data for six years from 2018/19-2023/24 on eight banks, which lacks the incorporation of qualitative aspects of factors that will have significant effects on private commercial banks' liquidity. Therefore, further investigation and research findings are needed to gain a better understanding of factors contributing to the liquidity of Ethiopian banks.

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APPENDICES

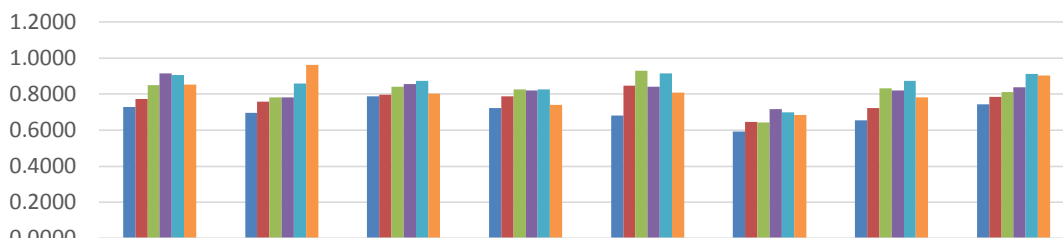
Appendix 1-Personally computed data that has been imported to Stata 19.5o software

Years	ID	LR	ROA	ROE	LBZ	CAR	NPLR	DGR	IRM	GDP	CP	FRX
2018/19	1	0.7286	0.0261	0.2069	17.4866	0.1466	0.0353	0.2463	0.1027	9.00	12.6	28.0543
2019/20	1	0.7726	0.0190	0.1905	17.8566	0.1070	0.0456	0.4816	0.0938	6.10	19.9	31.3427
2020/21	1	0.8489	0.0197	0.2372	18.4604	0.0983	0.0336	0.8662	0.0741	6.30	20.2	39.0163
2021/22	1	0.9142	0.0311	0.3274	18.8225	0.0937	0.0379	0.3731	0.0939	6.10	33.8	48.5673
2022/23	1	0.9070	0.0276	0.2685	19.0600	0.0985	0.0371	0.2990	0.1071	7.20	32.5	53.283
2023/24	1	0.8515	0.0237	0.2276	19.2196	0.1010	0.0345	0.2143	0.1084	8.10	26.6	55.9623
2018/19	2	0.6959	0.0275	0.3504	17.3335	0.1450	0.0242	0.2676	0.1046	9.00	12.6	28.0543
2019/20	2	0.7587	0.0308	0.2263	17.5642	0.1490	0.0109	0.2184	0.1017	6.10	19.9	31.3427
2020/21	2	0.7802	0.0300	0.2315	17.8082	0.1840	0.0267	0.3013	0.1065	6.30	20.2	39.0163
2021/22	2	0.7803	0.0287	0.2513	17.9344	0.1370	0.0290	0.1377	0.1070	6.10	33.8	48.5673
2022/23	2	0.8595	0.0256	0.1979	18.1596	0.1270	0.0111	0.2421	0.0779	7.20	32.5	53.283
2023/24	2	0.9610	0.0213	0.1162	17.8528	0.1710	0.0737	(0.1861)	0.1344	8.10	26.6	55.9623
2018/19	3	0.7859	0.0448	0.3470	18.1281	0.1200	0.0134	0.3720	0.0922	9.00	12.6	28.0543
2019/20	3	0.7974	0.0290	0.2165	18.3073	0.1600	0.0183	0.1839	0.1023	6.10	19.9	31.3427
2020/21	3	0.8394	0.0264	0.2142	18.6730	0.1200	0.0192	0.4522	0.0830	6.30	20.2	39.0163
2021/22	3	0.8566	0.0406	0.3557	19.0271	0.1100	0.0192	0.4454	0.0820	6.10	33.8	48.5673

2022 /23	3	0.87 34	0.04 35	0.34 86	19.22 73	0.12 00	0.01 13	0.2318	0.10 44	7.2 0	32. 5	53.283
2023 /24	3	0.80 28	0.03 83	0.28 49	19.45 89	0.14 00	0.01 55	0.2379	0.11 80	8.1 0	26. 6	55.962 3
2018 /19	4	0.72 37	0.02 28	0.18 68	17.84 48	0.18 00	0.03 01	0.2427	0.08 98	9.0 0	12. 6	28.054 3
2019 /20	4	0.78 64	0.02 62	0.21 53	18.03 89	0.15 00	0.01 69	0.1962	0.09 25	6.1 0	19. 9	31.342 7
2020 /21	4	0.82 69	0.02 56	0.23 97	18.36 62	0.10 00	0.02 65	0.3937	0.08 95	6.3 0	20. 2	39.016 3
2021 /22	4	0.82 06	0.03 25	0.26 45	18.57 89	0.12 00	0.05 22	0.2238	0.09 43	6.1 0	33. 8	48.567 3
2022 /23	4	0.82 67	0.03 47	0.25 97	18.79 06	0.12 00	0.05 22	0.2601	0.09 52	7.2 0	32. 5	53.283
2023 /24	4	0.74 09	0.03 46	0.26 59	19.02 89	0.14 00	0.07 65	0.2687	0.13 36	8.1 0	26. 6	55.962 3
2018 /19	5	0.68 15	0.05 17	0.28 56	15.51 80	0.35 00	0.02 12	0.6175	0.09 31	9.0 0	12. 6	28.054 3
2019 /20	5	0.84 64	0.03 11	0.04 20	15.87 12	0.26 00	0.00 50	0.5012	0.06 98	6.1 0	19. 9	31.342 7
2020 /21	5	0.93 06	0.02 26	0.03 74	16.26 90	0.18 00	0.01 56	0.6846	0.07 43	6.3 0	20. 2	39.016 3
2021 /22	5	0.83 93	0.02 63	0.16 92	16.46 07	0.19 00	0.01 52	0.2503	0.11 08	6.1 0	33. 8	48.567 3
2022 /23	5	0.91 59	0.03 69	0.23 57	16.75 22	0.15 00	0.03 09	0.3388	0.09 04	7.2 0	32. 5	53.283
2023 /24	5	0.80 94	0.03 13	0.21 21	17.00 14	0.16 00	0.00 80	0.3015	0.11 41	8.1 0	26. 6	55.962 3
2018 /19	6	0.59 18	0.01 84	0.23 32	17.54 82	0.08 43	0.03 51	0.4015	0.10 28	9.0 0	12. 6	28.054 3
2019 /20	6	0.64 45	0.02 71	0.27 84	17.77 61	0.11 22	0.03 69	0.2583	0.10 79	6.1 0	19. 9	31.342 7
2020 /21	6	0.64 34	0.02 09	0.23 90	18.21 39	0.09 28	0.02 65	0.5636	0.08 97	6.3 0	20. 2	39.016 3
2021 /22	6	0.71 65	0.02 48	0.25 13	18.55 70	0.10 13	0.02 46	0.3599	0.08 87	6.1 0	33. 8	48.567 3
2022	6	0.69	0.02	0.22	18.75	0.11				7.2	32.	53.283

/23		90	41	78	95	78	0.0408	0.2342	0.1127	0	5	
2023/24	6	0.6848	0.0180	0.1577	18.7550	0.1127	0.1076	0.0019	0.1263	8.10	26.6	55.9623
2018/19	7	0.6550	0.0452	0.2779	16.5306	0.1894	0.0304	0.2124	0.1049	9.00	12.6	28.0543
2019/20	7	0.7214	0.0317	0.2073	16.8214	0.1634	0.0195	0.3880	0.0945	6.10	19.9	31.3427
2020/21	7	0.8308	0.0384	0.2727	17.2167	0.1252	0.0902	0.4854	0.0902	6.30	20.2	39.0163
2021/22	7	0.8209	0.0320	0.2221	17.5216	0.1345	0.0285	0.3548	0.0985	6.10	33.8	48.5673
2022/23	7	0.8732	0.0386	0.2810	17.8239	0.1234	0.0423	0.2893	0.1145	7.20	32.5	53.283
2023/24	7	0.7812	0.0293	0.2085	18.0115	0.1499	0.0294	0.2599	0.1224	8.10	26.6	55.9623
2018/19	8	0.7432	0.0274	0.2539	17.3917	0.1230	0.0226	0.2607	0.0951	9.00	12.6	28.0543
2019/20	8	0.7847	0.0262	0.2107	17.5767	0.1296	0.0209	0.1957	0.1022	6.10	19.9	31.3427
2020/21	8	0.8111	0.0266	0.2218	17.8062	0.1174	0.0265	0.2604	0.0930	6.30	20.2	39.0163
2021/22	8	0.8373	0.0279	0.2592	18.0263	0.1104	0.0287	0.2278	0.1053	6.10	33.8	48.5673
2022/23	8	0.9121	0.0370	0.3264	18.2293	0.1001	0.0605	0.1995	0.0986	7.20	32.5	53.283
2023/24	8	0.9029	0.0319	0.2437	18.3859	0.1251	0.0678	0.1566	0.1069	8.10	26.6	55.9623

Appendix 2 -Average liquidity ratio of studied banks



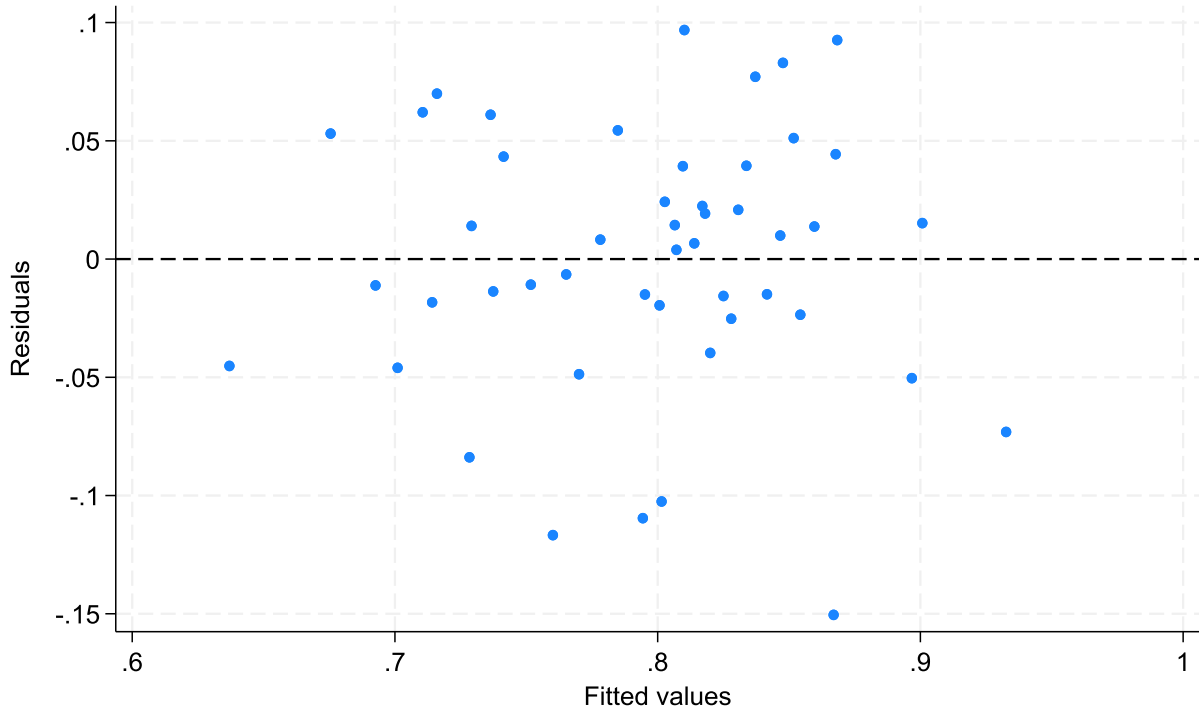
	BOA	NIB	AB	DB	GB	COOP	ABY	HB
2018/19	0.7286	0.6959	0.7859	0.7237	0.6815	0.5918	0.6550	0.7432
2019/20	0.7726	0.7587	0.7974	0.7864	0.8464	0.6445	0.7214	0.7847
2020/21	0.8489	0.7802	0.8394	0.8269	0.9306	0.6434	0.8308	0.8111
2021/22	0.9142	0.7803	0.8566	0.8206	0.8393	0.7165	0.8209	0.8373
2022/23	0.9070	0.8595	0.8734	0.8267	0.9159	0.6990	0.8732	0.9121
2023/2024	0.8515	0.9610	0.8028	0.7409	0.8094	0.6848	0.7812	0.9029

■ 2018/19 ■ 2019/20 ■ 2020/21 ■ 2021/22 ■ 2022/23 ■ 2023/2024

Appendix 3- Summary of Stata output descriptive statistics of independent variables

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	48	0.2372	0.0651	0.0374	0.3557
LBZ	48	17.9136	0.8892	15.5180	19.4589
CAR	48	0.1383	0.0454	0.0843	0.3500
LGR	48	0.3634	0.2195	-0.0901	1.0504
NPLR	48	0.0316	0.0197	0.0050	0.1076
DGR	48	0.3078	0.1675	-0.1861	0.8662
IRM	48	0.0999	0.0141	0.0698	0.1344
GDP	48	7.1333	1.1111	6.1000	9.0000
CPI	48	24.2667	7.5606	12.6000	33.8000
FRX	48	42.7043	10.7535	28.0543	55.9623

Appendix 4-test for heteroscedasticity



Appendix 5-test for autocorrelation

. estat bgodfrey

Breusch-Godfrey LM test for autocorrelation

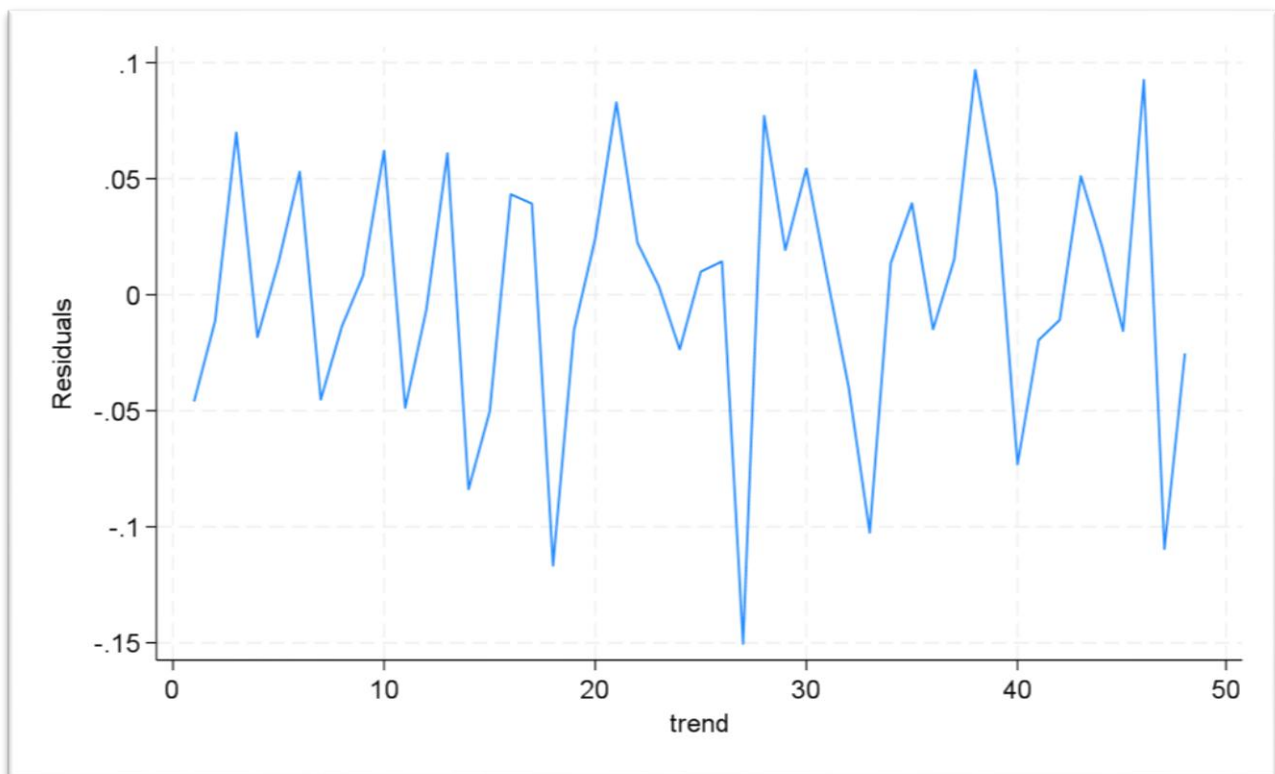
lags(p)	chi2	df	Prob > chi2
1	1.438	1	0.2304

H0: no serial correlation

tions

Appendix-6 test for multicollinearity Stata output for independent variables serial correlation

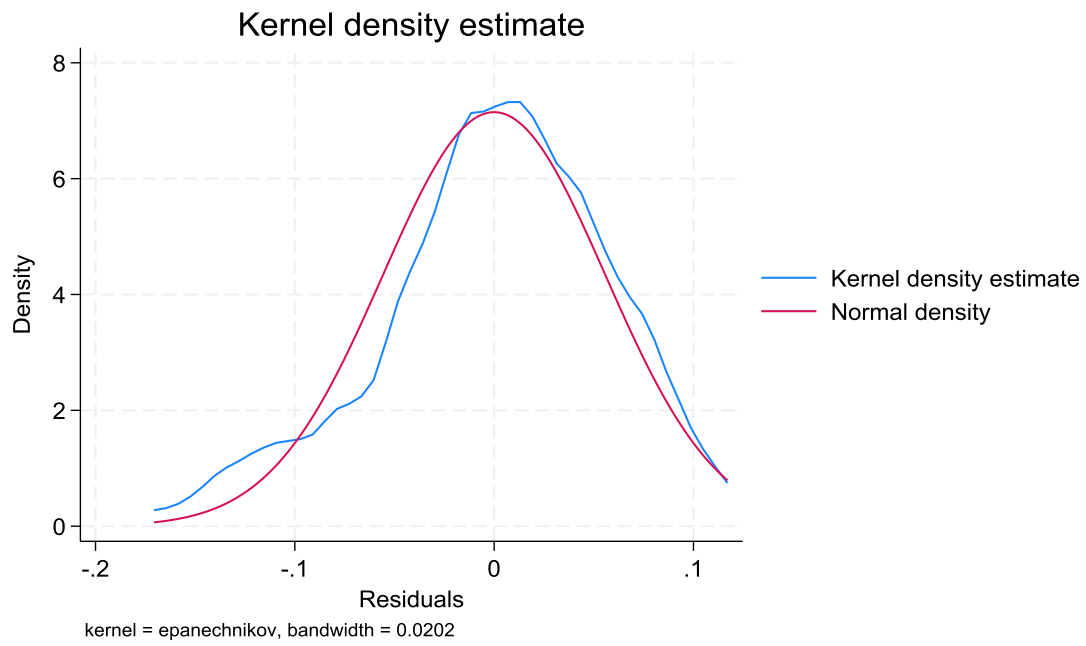
Variable	VIF	1/VIF
CPI	9.9576	0.1044
LGR	9.9065	0.1009
FRX	8.9765	0.1114
DGR	6.79	0.1472
IRM	4.78	0.2092
LBZ	3.43	0.2915
GDP	3.18	0.3144
CAR	2.43	0.4115
ROE	1.98	0.5050
NPLR	1.78	0.5617
Mean VIF	5.321	



pwcorr LR LBZ CAR LGR NPLR DGR IRM GDP CPI FRX

	LR	LBZ	CAR	LGR	NPLR	DGR	IRM
LR	1.000 0						
LBZ	0.161 9	1.000 0					
CAR	0.089 9	0.717 2	1.000 0				
LGR	0.001 8	0.349 1	0.096 9	1.000 0			
NPLR	0.005 3	0.347 4	0.254 8	0.431 3	1.000 0		
DGR	0.048 8	0.266 6	0.115 5	0.694 6	0.421 7	1.000 0	
IRM	0.131 7	0.252 5	0.060 3	0.598 0	0.530 8	0.698 1	1.000 0
GDP	0.298 0	0.074 8	0.200 0	0.259 3	0.223 2	0.234 4	0.367 8
CPI	0.535 4	0.431 2	0.320 8	0.350 3	0.219 0	0.246 3	0.187 2
FRX	0.524 8	0.506 0	0.296 1	0.496 7	0.409 5	0.330 8	0.429 1
	GDP	CPI	FRX				
GDP	1.000 0						
CPI	0.423 9	1.000 0					
FRX	0.072 2	0.572 0	1.000 0				

Appendix 7-test for normality



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
E	48	0.9688 3	1.419	0.745	0.2280

Appendix 8- Summary of Stata software output operational pooled panel regression model

source	SS	Df	MS	Number of obs =48	
model	0.5732	10	0.0573	F(10,37)	= 4.70
residual	0.1463	37	0.0039	prob >F	=0.0000
Total	0.7195	47	0.0612	R-squared	=0.8243
				Adjusted R ²	= 0.8043

LR	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]
ROE	0.0877	0.1983	0.4 4	0.661	-0.3140 0.4896
LBZ	-0.0032	0.0191	0.1 7	0.866	-0.0419 0.0354
CAR	0.2959	0.3147	0.9 4	0.353	-0.3418 0.9336
LGR	0.2969	0.1438	2.0 6	0.047	0.0044 0.5875
NPLR	-0.5421	0.6219	0.8 7	0.389	-1.8023 0.7181
DGR	-0.4049	0.1427	2.8 4	0.007	-0.6941 -0.1157
IRM	-1.9431	0.9622	1.3 7	0.18	-4.8254 0.9397
GDP	-0.0207	0.0147	1.4 1	0.167	-0.0505 0.0090
CPI	-0.0046	0.0041	1.1 2	0.269	-0.0131 0.0037
FRX	0.0096	0.0028	3.3 5	0.002	0.0038 0.0155
_cons	0.8702	0.4456	1.9 5	0.058	-0.0327 1.7732