THE EFFECT OF CREDIT RISK MANAGEMENT ON THE FINANCIAL PERFORMANCE OF BANKS- CASE STUDY ON PRIVATE COMMERCIAL BANKS OF ETHIOPIA

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Statement of Declaration

I, Abel Melaku, hereby declare that this thesis entitled "The Effect of Credit Risk Management on the Financial Performance of Banks- Case Study on Private Commercial Banks in Ethiopia" submitted by me for the award of the degree of Master of Accounting and Finance of Addis Ababa University at Addis Ababa, Ethiopia, is original work and it has never been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution. All sources and materials used for this thesis have been duly acknowledged.

Abel Melaku

Signature_____

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This is to certify that the thesis prepared by Abel Melaku, entitled: The Effect of Credit Risk Management on the Financial Performance of Banks- Case Study on Private Commercial Banks in Ethiopia and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

Banks are the largest financial institutions that mobilizes deposit and lends to those in shortage of it to enhance profitability and economic growth. Those Loans and advances are the dominant asset which generate the largest share of revenue and represent greater risk of credit which is the most significant risk faced by banks. Hence, the management of credit risk which is a must affects the performance of banks.

The general objective of the study is to investigate the effect of credit risk management on the financial performance of private commercial banks of Ethiopia. In line with this, the effect of Bank specific, Industry Specific and Macroeconomic variables on the performance of private commercial banks in Ethiopia are studied. The research collects data from the annual reports of banks, NBE, MoFED and CSA for all the sixteen private banks from 2013 to 2019. Multiple regression analysis with a random effect model are analyzed through Eviews 9 software.

The finding of the regression results reveals that, bank specific factors like NPL ratio, CAR and TLTD and industry specific factor like IS have impact on the performance of private commercial banks in Ethiopia, while macroeconomic variables have insignificant impact. Generally, there found a positive relationship between credit risk management and banks performance.

Keywords: Credit Risk Management, Financial Performance, Bank Specific, Industry Specific, Macroeconomic variables, Commercial Banks.

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Acronyms and Abbreviations

NBE: - National Bank of Ethiopia

MoFED- Ministry of Finance and Economic Development.

CSA- Central Statistics Agency

NPL: - Non Performing loan

ROA: - Return on Asset

ROE:- Return on Equity

NIM:- Net Interest Margin

LLP:- Loan loss Provision

AIB:-Awash International Bank

DB: - Dashen Bank

BOA: - Bank of Abyssinia

WB: - Wegagen Bank

UB: - United Bank

NIB: - Nib International Bank

CBO: - Cooperative Bank of Oromia

LIB: - Lion International Bank

ZB: - Zemen Bank

OIB: - Oromia International Bank

BIB: - Bunna International Bank

BiB: - Birehan International Bank

AB: - Abay Bank

ADIB: - Addis International Bank

DGB: - Debub Gloabal Bank

EB: - Enat Bank

DBE:-Development Bank of Ethiopia

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Banks are financial institutions that have an intermediary role between surplus fund holder and those who need funds. It mobilizes deposit from those who have surplus fund and lends to those in shortage of funds. (Eken et al., 2012; Ongore, 2013). According to Diana Zavadska (2018) Banks through their intermediary role are manifested in increased business activity, the ability to influence the growth of money supply in circulation, the promotion of economy and the recovery of crisis in a country.

Loans and advances are the leading asset in most banks as it represents 50 to 75 percent of the total asset, which generate the largest share of banks income and as well signify the banks greater risk exposure (Mac Donald & Koch, 2006). Banks contribute to the growth of economies by providing loan to different sectors of borrowers. One of the indicators of financial sectors health are loan qualities. Though lending is one of the principal business activities for most commercial banks, it is also one of the greatest sources of risk to banks.

Among the risk found in banks, credit risk is one of biggest risk that can easily and most likely prompts bank failure. Credit risk is by far the most significant risk faced by banks. (Gieseche, 2004). Credit risk is the potential that a contractual party will fail to meet its obligations in accordance with the agreed terms. Credit risk is also referred to as default risk, performance risk or counterparty risk (Ken & Peter, 2014).

Credit risk means that payments may be delayed or ultimately not paid at all, which can in turn cause cash flow problems and affect a bank's liquidity. Despite innovation in the financial services sector, credit risk is still the major single cause of bank failures.

An overall credit risk management review will include an evaluation of the credit risk management policies and practices of a bank. This evaluation will determine the adequacy of financial information received from a borrower or the issuer of a financial instrument, which has been used by a bank as the basis for investing in such financial

instruments or the extension of credit; and the periodic assessment of its inherently changing risk. (Greuning & Bratanovic, 2003).

Management of credit risk is the process of controlling the potential consequences of credit risk (Ken & Peter, 2014). Assessing the determinants of credit risk is the cornerstone for the effectiveness of risk management system and practice (Atakelt & Veni, 2015). Improper credit risk management reduce the bank profitability, affects the quality of its assets and increase loan losses and non-performing loan which may eventually lead to financial distress (Chinwe, 2015). Regarding factors leading to nonperforming loans with particular reference to banking sectors Bercoff, Julian, Giovanni & Franque (2002) identified the following: Depressed economic conditions, high real interest rate, inflation, lenient terms of credit and credit orientation, high credit growth and risk appetite and poor monitoring and follow up are among others. And the thesis will attempt to assess the effect of credit risk management practice on the performance of selected private bank of Ethiopia.

1.2. Background of Private Banks in Ethiopia

Before the year 1994, banking industry in Ethiopia was dominated by the public owned commercial banks which are Commercial Bank of Ethiopia and Development Bank of Ethiopia. The sector was opened for private investors since the 90s after the monetary and banking proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 laid down the legal basis for investment in the banking sector. Consequently, the first private bank, Awash International Bank was established in 1994 followed by Dashen Bank and Bank of Abysinia in 1995, Wegagen Bank in 1997, and United Bank in 1998, Nib International Bank in 1999. Currently in Ethiopia there are 16 private banks and one public owed commercial bank excluding Development bank of Ethiopia (NBE, n.d.)

The biggest change in the banking industry is witnessed at a pace not observed for the past 20 years. Currently, 11 banks are under pipe line for establishment which comprised of full-fledged investment, mortgage, Islamic, and conventional banks. (Samson Birhane. 2019). The emergence of too many banks may leads to high

competition on resources and profit making actives like lending. This competition may lead to high risk on the return of the banks due to credit risk, interest rate risk, liquidity risk and the like. The study will try to reveal on the impact of one risk category called credit risk & its management on the profitability of banks.

1.3. Statement of the problem

Banks are established to provide financial intermediation services while at the same time endeavor to maximize profit and shareholders' value. According to Saunders & Cornett “the very nature of the banking business is so sensitive because more than 85% of their liability is found from depositors” (2005). Banks use these deposits to generate credit which is a revenue generating activity for most banks and high default risk as well which might lead to financial distress and bankruptcy. Beside other services, banks must create credit for their clients to generate some revenue, grow and survive stiff competition at the market place. Credit risk is considered as the most dangerous risk type as bad debts would impair banks profit and depositor money.

As per NBE directives SBB/69/2018 loans and advances are regularly reviewed and classified in a manner consistent with regulatory standards. Loans and advances which are not performing in accordance with contractual repayment terms are recognized and reported as past due. Accrued but not uncollected interest on loans or advances is accounted for in accordance with international accounting and regulatory standards; and timely and adequate provisions are made to the provisions for loan losses account in order to accurately reflect the risk inherent in lending activities and to ensure that disclosed capital and earnings performance are accurately reflected.

The risk that money owed is not repaid or credit risk has been prevalent in banking history. The importance of credit risk management throughout history accelerated due to the numerous small and large failures, combined with the corresponding economic and social impact. Credit risk is a principal and perhaps the most important risk type that has been present in finance, commerce and trade transactions from ancient cultures till today. (Gestel & Baesens, 2009). As per the author’s compilation, the amount of loan provision is increasing from year to year which affects the bank’s profitability.

From the year 1997 to 2019 the loan provision increased from 2.3 million to 3.496 billion birr in private commercial banks of Ethiopia.

In order to improve the profitability of banks and build healthy balance sheet, effective credit risk management is a must. Regarding the matter, different empirical studies are conducted. The following are some of them that are conducted in Ethiopia:- Girma (2011) conducted on credit risk management and its impact on performance of Ethiopian Commercial Banks which focuses on how banks use credit risk evaluation and assessment tools to mitigate their credit risk exposure, relationship between the theories, concepts and models of credit risk management , assess the banks credit administration process and the challenge that faced by the financial institution in credit risk management. Tibebu (2011) on credit risk management and profitability of Commercial Banks in Ethiopia, Sahilemichael (2009) on ascertaining and measuring the extent of banks credit risk management, existence of tools or techniques in the current performance supported by proper credit risk management policies and strategies, Engedawork (2014) on impact of credit risk in the performance of Commercial Banks in Ethiopia and assesses if there is an impact relationship between loan to total asset and loan loss provisions, credit administration (cost per loan) and Bank size (Economies of scale) on the performance of commercial banks, and Misker (2015) examine the impact of bank specific, industry specific and macroeconomic factors on banks profitability in Ethiopia .

Most of the researchers are focused on part of the credit risk management techniques of banks and on bank specific factors. The latter two study focuses on the impact of credit risk management on profitability in which Engdawork (2014) uses Bank specific on ROA while Misker (2015) uses Bank Specific, Industry specific (Interest spread rate) and Macroeconomic factors (Inflation and GDP) as an independent variable with ROE as dependent variable.

Finally, to make the research comprehensive and detail I will use multiple independent and dependent variables like ROA, ROE and NIM as dependent variables while bank specific (NPL, Liquidity Ratio, CAR, TLTD and Bank size) industry specific (Interest rate spread) and macroeconomic factors (GDP, Inflation and Unemployment rate) as an

independent variable. Using multiple variables is advantageous as it leads to better prediction from multiple predictors and better conclusion drawn as well. This research adds value in relation to others by including both ROA, ROE and NIM as additional dependent variable while unemployment rate as additional independent variable. To the knowledge of the researcher, no one in Ethiopia has done a research by considering the multiple dependent variables (ROA, ROE and NIM) and bank specific (NPL, LLP, CAR, Bank size, and TL/TD) industry specific (Interest spread rate) and macroeconomic factors (GDP, Unemployment rate and Inflation) as an independent variable.

1.4. Research Questions

The following specific research questions are formulated to address the research problems.

- ✓ To what extent does credit risk management affects banks profitability?
- ✓ What impact does Macroeconomic factors have on banks performance?
- ✓ What impacts do bank's NPLR, Liquidity Ratio, CAR, Loan to Deposit ratio (Bank Specific factors) have on the performance of banks?
- ✓ What impact does industry specific factors have on the banks performance?

1.5. Objectives of the study

1.5.1. Main objective

The general objective of the study is to investigate the effect of credit risk management on financial performance of private commercial banks of Ethiopia. In line with the general objective, the research paper will assess the following specific objectives.

1.5.2. Specific Objectives

- ✓ Establish and know the effect of NPLR, Liquidity Ratio, CAR, Loan to Deposit ratio, Bank Size (Bank Specific factors) on performance of commercial banks in Ethiopia.
- ✓ Know the effect of macroeconomic and industry specific factors on performance of commercial banks in Ethiopia.

1.6. Research Hypothesis

The theory of hypothesis testing is concerned with developing rules or procedures for deciding whether to reject or not reject the null hypothesis. There are two *mutually complementary* approaches for devising such rules, namely, confidence interval and test of significance. Both these approaches predicate that the variable under consideration has some probability distribution and that hypothesis testing involves making statements or assertions about the value of the parameter of such distribution. (Damodar N. Gujarati and Dawn C. Porter, 2009).

In the language of statistics, the stated hypothesis is known as the null hypothesis and is denoted by the symbol *Ho*. The null hypothesis is usually tested against an alternative hypothesis (also known as maintained hypothesis) denoted by H_1. The decision to accept or reject *Ho* is made on the basis of the value of the test statistic obtained from the data at hand. (Damodar N. Gujarati and Dawn C. Porter, 2009).

In order to address the stated objectives of the research and verify the truth or falsity of a null hypothesis, the study developed the below null hypothesis.

Null Hypothesis:

H1: Non Performing Loan Ratio has no significant impact on financial performance of banks in Ethiopia.

H2: Liquidity Ratio has no significant impact on financial performance of banks in Ethiopia.

H3: Capital adequacy ratio has no significant impact on financial performance of banks in Ethiopia.

H4: Loan and advance to deposit ratio has no significant impact on financial performance of banks in Ethiopia.

H5: Bank Size has no significant impact on financial performance of banks in Ethiopia.

H6: Interest Spread Rate has no significant impact on financial performance of banks in Ethiopia.

H7: Gross domestic product has no significant impact on financial performance of banks in Ethiopia.

H8: Inflation has no significant impact on financial performance of banks in Ethiopia.

H9: Unemployment rate has no significant impact on financial performance of banks in Ethiopia.

1.7. Significance of the study

The research will identify the relationship of credit risk management and performance of the bank in which it will have immense value to the financial institutions. The finding of this study gives insight to the Management, Credit officers, Credit follow-up divisions of the banks and the governing body regulatory officials to come up with policies aimed at improving the quality of credit risk management hence increase profitability. Moreover, the study will support the existing literatures by providing evidence on the credit risk management of Ethiopian private commercial banks. Finally, the study will play a significant role as a literature base for further studies on the area.

1.8. Scope and delimitation of the study

The research includes sixteen licensed private commercial banks which were registered on the National Bank of Ethiopia. The study incorporated seven years' data from 2013/14 to 2018/19 and the research will be conducted by using secondary data from published annual reports of banks and compiled data of the National bank of Ethiopia. As a scope, the research included Ethiopian private commercial banks that are started

their operation since 2013 onwards, which are all the sixteen private commercial banks of Ethiopia.

As a limitation, all government owned banks are not incorporated due to time, financial & data constraints and biasedness of data like existence of outliers. In addition, the research uses only seven years' data as the last entrant private banks in to the banking industry are established in 2013 and has seven years' data only.

1.9. Organization of the Study

The structure of the study will be organized into five chapters. Chapter one will incorporate introduction, backgrounds of the study, statements of the problem, research question, objective of the study, significance of the study, and scope of the study.

Chapter two will have related literature review. Chapter three will include the research design and methodology part. Then, chapter four will present data analysis and interpretation while the final chapter, chapter five will embrace summaries of major findings, conclusions and possible recommendations.

CHAPTER TWO
LITERATURE REVIEW

Through time, banks and banking activities have progressed significantly. With the introduction of money, financial services like deposit taking, lending money, currency exchange and money transfers became important. Banks act as brokers between supply and demand of securities, have an important role in the economy as they transform short-term deposits into medium- and long-term credits (Gestel & Baesens, 2009).

Borrowers demand a loan that will be used to reinvest in their businesses to earn a return. At the same time, lenders like banks provide credit to earn an interest when these companies borrow. This process for extending credit has a multiplier effect on the global money supply, so this is why credit is a powerful driver of our economy. Credit is the use of goods & services without immediate payment. This enables a producer or manufacturer to bridge the gap of production and sale of goods. Almost all exchange in manufacturing, industry and services is conducted by credit." (JoEtta Colquitt, 2007)

Credit is all about trust. The word credit emerged from the Latin word "credere", which literally means trust. (Burt, 2004) Credit is purchasing power not derived from income, but by financial institutions either as an offset to idle by depositors in the banks, or as a net addition to the total amount of purchasing power. In fact, today no economy can function without credit. As it is the very life blood of modern business all economic transactions are settled by means of credit instruments.

Kent, (2008) defines credit as the right to receive payments or the obligation to make payment on demand at some future time on account of the immediate transfer of goods.

2.1. What is Risk

Risk is a condition in which possibility of an adverse deviation expected from the desired outcome hoped for (E.J.Vaughan, 1992). Ehrhardt and Brigham (2011) defined risk as the chance of unfavorable event occurrence or happening be it financial and/or physical.

Generally, risk is a potential variation in outcomes and becomes an important problem when there is uncertainty about the occurrence of a loss. Banks involve in businesses of taking and managing risks.

2.2. Risk in Banks

The core business of banking is to mobilize funds and invest it as a loan. Investing cannot be made without risk. Banks need to take risk to maintain their margins and to fulfill their role in the economy. A bank or business that takes excessive risk, may run into difficulty, unable to meet undue its obligations and become insolvent. (Gestel & Baesens, 2009).

Banks face different types of risk that required to be identified, understood, measured, analyzed and managed. The Basel II of Capital Accord identifies three main sources of risk: named credit, market and operational risks. Each of these risks might generate negative influence to the financial institution's market value, liabilities and shareholder's equity.

Market (Systematic) risk is the risk of asset value change associated with systematic factors. By its nature, this risk cannot be diversified completely though it will be hedged. In fact, it can be regarded as un-diversifiable risk.

Classical sources of market risk occur due to the movements in equity prices, foreign exchange rate price, commodity prices and interest rates. The equity risk on the portfolio is the possible downward price movements of the equity. Currency risk or foreign exchange risk arises from changes of price from one currency against another. It occurs when making cross-border investments with different currencies. Commodity risk arises from uncertain future market price changes on commodities. The interest rate risk, risk of increasing or decreasing in interest rate, is specifically important for interest-related products of the trading book. Not only has the level of the interest rate induced risk, but also changes of interest rates between various products. (Gestel & Baesens, 2009).

According to Hull (2012), operational risk comes as a result of inadequate or failed internal or external processes, people and systems. Therefore, Operational risks appear at different levels of human errors, processes, technical and information technology.

Credit risk is the risk that a borrower defaults, when he is unable to pay or cannot pay on time and does not honor its obligation to service debt. Credit risk, in terms of potential losses is typically the largest type of risk. The default of a small number of customers may result in a very large loss for the bank. (Gestel & Baesens, 2009).

From the above-mentioned types of risk, the researcher focuses on credit risk of banks since credit risk has significant and considerable impact on banks performance.

2.3. Credit risk

Within the financial markets, credit risk is considered as the oldest form of risk. If credit can be defined as the expectation of a sum of money within some limited time, credit risk is will be the chance that this expectation will not be met. Credit risk, which is as old as lending itself, unchanged from ancient Egyptian times, dates back as far as 1800 BCE. Now as before, there is always an element of uncertainty or risk as to whether a given borrower will repay a particular loan or not. (John b. Caouette, Edward I. Altman, Paul Narayanan, Robert Nimmo, 2008.)

As the name implies, credit risk management is founded on the existence of risk. Credit risk arises whenever a lender is exposed to loss from a borrower, or when an obligor fails to pay their debt as per agreed term and contract. For lenders who extend credit in the form of loans, trading activities, or the capital markets, credit risk is inherent in all their business activities. (JoEtta Colquitt, 2007)

Credit or counterparty risk, a risk that a debtor will not be able to pay interest and principal according to the agreed terms specified in the loan contract is an inherent part of the banking industry. Credit risk in which payments may be delayed or ultimately not paid at all, affects the cash flow problems and liquidity of the bank. Credit loss can occur due to a failure to acknowledge the value of the debt obligation from the borrower's side. (JoEtta Colquitt, 2007)

2.4. Credit risk management

Risk managements primary concern is the reduction of earnings volatility and avoidance of large losses. Credit risk management is a process that involves the identification of potential risks, measurement, appropriate treatment and actual implementation of risk models. (Gestel & Baesens, 2009).

Managing the risks that are contained in providing debt services requires a systematic framework to be established throughout the relevant credit areas; this is known as the credit process. (JoEtta Colquitt, 2007)

Managing credit in a proper way not only has positive effect on the banks performance but also on the borrower firms and a country as a whole. Failure to manage loans, which make up the largest share of banks assets, would likely lead to non - performing loans, resulting in a decline of profit. If a financial sectors show high level of NPLs within a country, it leads to high credit risk which has high bankruptcy risk that puts the depositors, shareholder and the country in difficulty.

Under the classical or traditional credit process, the concept of credit risk management had always been to ensure that adequate capital was available for loan funding and that reserves were provisioned according to the borrower's credit assessment. (JoEtta Colquitt, 2007)

There are four techniques of risk management (Gestel & Baesens, 2009). These are: Risk avoidance, risk reduction, risk retention/acceptance and transfer of risk to the third party.

A simple way to treat risk is to avoid risk. Risk avoidance means that one does not invest in investments that are too risky or not well understood. Risk reduction deals with methods that reduce the severity of the loss and reduce the possibility of actual loss. Risk retention involves knowingly accepting the loss when it happens. Risk acceptance/retention applied for low- risk assets. Risk transfer is the process of sharing another party such as banks, insurance or companies to accept the risk;

In the process of providing financial services, commercial banks assume various kinds of financial risks. Whenever credit risk arises, there should be a credit risk management to undertake the credit risk.

According to Greuning & Bratanovic (2009) credit risk management includes management function such as identification, measurement, aggregation, control and continuous monitoring of credit risk. It is a structured approach of uncertainty management through risk assessment, development of strategies to manage it and mitigation of risk using managerial resources. The strategies of credit risk management involve transferring risks to other parties, avoiding risks, reducing the negative influence of risk and accepting some or all of the consequences of a particular risk (Afriyie & Akotey, 2012).

According to Atakelt & Veni, (2015) credit risk management practice define as the process of analyzing and renewing credit risk management documents and apply constantly in actual credit granting process, credit administration, loan monitoring and risk controlling process with suitable credit risk environment. By establishing suitable credit risk environment, acceptable level of credit limit, best credit granting process, proper monitoring and controlling credit risk and optimizing risk return of a bank credit risk management develop credit performance.

The Basel committees are the primary global standard setters for banks and financial institutions. They set prudential regulation and provides a forum of cooperation on banking supervisory matters. BCBS (Basel Committee of Banking Supervision) has issued three accords named Basel 1, Basel 2 and Basel 3.

According to Basel committee (September 2000), credit risk is most simply defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. Credit risk management helps financial institutions to maximize the risk-adjusted rate of return by maintaining credit risk exposure within acceptable limits of the bank. Eeffective risk management is essential to the long-term success of any banking organization. Hence, banks should be eager to identify, measure, monitor and control credit risk.

The credit process requires lenders to establish sound credit granting practices and procedures so as to place a sound and ssystematic operational processes. Because credit risk is inherent throughout the entire process, the nature and sources of risks have to be identified and measured to prevent losses. Although organizations will tailor their credit processes to their individual operations, the effectiveness of these practices is contingent on how the institution defines its credit philosophy and credit risk strategy. As risks have become more integrated and global, many institutions are incorporating a Corporate Risk Management function. The function helps to oversee and manage the combination of risk exposures across business and product lines. It also designs a process which improves monitoring and credit administration controls as well as the credit granting practices. (JoEtta Colquitt, 2007)

According to Gestel & Baesens, 2009, credit risk is managed in various ways. Practices to manage credit risk are as noted below:

A good selection of the counterparts and products, is a good credit risk management kickoff. Good risk assessment models and qualified credit officers are key requirements for a good selection strategy. Important credit decisions are made at credit committees. Limitation restricts the exposure of the bank to a given counterpart, sector, individual. If it is not to the practice of limitation or single borrower limit cap, a limited number of losses may endanger the bank's solvency. Diversification of the risk across borrowers of different types, industry sectors and geographies will help minimize the risk. Credit enhancement is buying credit protection in the form of guarantees from financial guarantors or via credit derivative products when a financial institution feels it is too exposed to a certain category of risks. Through the protection or guarantee, the credit quality of the guaranteed assets is enhanced. This is also known as credit risk mitigation.

2.5. Credit Risk Assessment

Lending successfully through the method of assessing a borrower's creditworthiness accurately has always been the primary function of banking. The required method of analysis varies in function and from borrower to borrower. Credit analysis supports the

work of decision makers by evaluating the company's repayment ability and monitoring the existing relationships before lending. (Andrew Fight, 2004)

The credit assessment process which is grounded in fundamental credit analysis to identify and control risks by determining the borrower's probability of repaying the debt is a holdover from traditional credit risk management. Through credit analysis, an assessment of the borrower's income, balance sheet and cash flow statements along with character, capacity, and capital adequacy is made. All the information is dependent upon data that are provided by the obligor. The second goal of credit assessment is to identify a borrower's capacity. That is understanding the primary source of debt repayment by the loanee. Similarly, the third goal of credit assessment is to evaluate the probability that a secondary repayment source will be available in the event that the primary source becomes unavailable. (JoEtta Colquitt, 2007)

Credit analysis includes both and interrelated financial and non-financial factors. These factors include the environment, the industry, competitive position, financial risks, management risks, loan structure, and documentation issues. (Andrew Fight, 2004)

Saunders and Allen (2002) noted that the expert analyzes five key factors, subjectively weights them, and reaches a credit decision:

Character is a measure of the firm reputation, repayment history and willingness to repay the loan granted. It refers to the borrower's personal qualities, like trustworthiness, eagerness and responsibility to pay debt. Borrowers who are responsibe to reimburse their obligations in due time are viewed as qualified for credit. Machiraju (2004). Capital are viewed as good predictors of bankruptcy probability. It is the equity contribution of owners and its ratio to debt which implies high leverage as a greater probability of bankruptcy.

Capacity is the ability and fitness to repay the loan provided. Borrowers who showed fruitful business and repayment history over the past periods are viewed as ideal for credit facility (Machiraju 2004). Collateral is a resources that are provided to the financial institution as collateral for the loan granted. Examples of collateral are buildings, vehicles, machineries, inventory and account receivables. Borrowers with a great deal of assets to pledge as collateral are considered as favorable for credit facility

(Machiraju 2004). Cycle (Conditions**)** refers to the financial circumstance or condition winning at the credit's season application. Especially for cycle dependent industries, the state of the business cycle is an important element in determining credit risk exposure.

In order to ensure an effective and efficient credit management appropriate credit process framework shall be implemented. And it requires properly identify and verify the applicant, properly define the borrower's credit needs, ensure that the credit to be offered by the bank matches those need, verify the source of payment, financial status is adequate to repay the debt as agreed and structure the credit to meet the borrower's needs in the way that summarizes the bank's risk. Undertaking of the above processes uniformly and consistently ensures prevalence of prudent credit lending

2.6. Credit risk measurement

Credit assessment relies on the borrower's provided information. On the other hand, credit risk measurement, relies on the lender's analytics and risk measurement tools. Credit risk measurement has three goals, in which the first of which is to limit the credit risk exposure that the lenders accept when extending the debt. The debt facility can be better structured and managed by determining the probability of a loss and the loss exposure amount over a period of time.

A second goal of credit risk measurement is to ensure that adequate compensation is earned for the risk undertaken. It is concerned with the income earned on the credit products and services that lenders provide. Finally, the third goal of credit risk measurement is to mitigate the credit risk exposure by structuring transactions to protect against loss as well as into asset classes that can be marketed to third-party investors. (JoEtta Colquitt, 2007)

2.7. Profitability of Commercial Bank

According to Fan Li & Yijun Zou (2014), Profitability is an indicator of banks' capacity to carry risk and/or increase their capital. It indicates banks' competitiveness and

measures the quality of management. (Fan Li & Yijun Zou (2014) Profitability is the goal of all business ventures. Without it, a business line established as for profit will not be survived. Profitability is measured with income and expenses. Income is money generated from the services, activities and investments in the assets. (Anas Ali Al-Qudah, 2016)

The determinants of commercial banks' profitability can be concluded into two categories, namely those that are management controllable (internal determinants) and those are beyond the control of management (external determinants) The internal determinants is all about management policy and decision concerning sources and uses of funds, capital and liquidity management and expenses management. The external factors are like firm-specific and environment factors. (Fan Li & Yijun Zou (2014)

A variety of Profitability Ratios can be used to assess the financial health of a business in which, these ratios can be created from the financial statement. In this study Profitability will be measured by Return on Equity (ROE), Return on Assets (ROA) & Net Interest Margin (NIM).

Return on Equity (ROE)

Return on equity (ROE) is the amount of net income returned as a percentage of shareholder's investment. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested. (Anas Ali Al-Qudah, 2016)

ROE= Net income after tax/Total Equity

Return on Asset (ROA)

Return on assets (ROA) is an indicator of how profitable a company is in relation to its total assets and to how efficient the management is at using its assets to generate earnings. Sometimes return on asset is referred as "return on investment" (Anas Ali Al-Qudah, 2016)

ROA= Net Profit/Total Asset

Higher ROA value is higher return on investment rate which indicates better company performance. The value reflects the company's return on all assets provided to the company. (Rosikah et.al, 2018)

Net Interest Margin (NIM)

Net interest margin (NIM) which is the ratio of net interest income to the average earning assets (interest earning assets) or net interest profitability. Compared to returns on assets (ROA) and returns on equity (ROE), NIM is less frequently encountered in reports and statistics. However, it does summarize the effectiveness of banks' interest bearing assets. The larger the net interest margin, the more successfully does the bank manage its' interest bearing assets. (Svetlana Saksonova, 2014)

NIM=Interest Income-Interest Expense

2.8. Empirical review

Various researchers have examined the impact of credit risk with diverse aspects of banks. This part of the literature provides related empirical findings on the subject matter.

Various empirical findings, both from developed and developing countries have recorded mixed results. Some researchers have noted a negative relationship between credit risk management and profitability of commercial banks; while some found a positive relationship.

Fabrice Tchakounte Kegninkeu (2018) assessed the impact of credit risk management on the performance of commercial banks in Cameroon. The study used a descriptive research design, by gathering secondary data from BICEC's financial statements for the period (2007-2011) and other related documents. The data collected on loans, deposits, total assets, NPL and profits over the period of study were analyzed using inferential

statistics and used to compute credit risk management ratios and correlation between those ratios and percentage changes in the bank's profitability values for the period.

The findings of the study indicated that the Non-Performing loans (NPL) to total loans ratio which is one of the risk management indicators is a major predicator and is significantly related to bank financial performance, followed by the loan to total deposit ratio and loans to total assets ratios that have an inverse impact (affect financial performance negatively) on financial performance of banks. It concluded that, credit risk management is very crucial to the bank performance since it has a significant relationship with bank performance.

Hosna, et al, (2009), in the assessment of the effect of credit risk management and profitability in commercial banks in Sweden. The study conducted in four banks and the data is collected from the sample banks annual reports (2000-2008) and capital adequacy and risk management reports (2007-2008). The model defined ROE as profitability indicator while NPLR and CAR as credit risk management indicators. The findings and analysis reveal that credit risk management has effect on profitability in all 4 banks. Among the two credit risk management indicators, NPLR has a significant effect than CAR on profitability (ROE).

Róbert Hurka (2017) investigated the impact of credit risk management on profitability of Nordic commercial banks. Two determinants of credit risk are chosen according to relevant literature, namely loan loss provision ratio and capital adequacy ratio. Thirteen banks in total are then investigated across the 16-year time frame from 2000-2015. The results seek to to capture the relation between credit risk management and profitability of Nordic commercial banks in the full data sample. Loan loss provision ratio is found to have negative effect on the performance of banks, while capital adequacy ratio presents mixed results.

Jacob Akomeah, Raymond Agumeh and Siaw Frimpong (2020) done a study on Credit Risk Management and Financial Performance of Listed Banks in Ghana. The purpose of the study was to examine the effect of credit risk management on the performance of selected listed commercial banks in Ghana. The study used secondary data collected from seven (7) banks listed on the Ghana Stock Exchange for a period of ten (10) years covering 2007-2016 with a total of seventy (70) observations. The credit risk management variables (independent variables) used were non-performing loans, loan loss provision, capital adequacy, with bank size (as controlling variable) whiles the financial performance of commercial banks (as dependent variable) was measured using return on asset. The data was examined using standard descriptive statistics and fixed effect model for hypothesis testing. Based on the test conducted on the data collected and the analyses of the results, this study found a significant relationship between the credit risk management variables (NPL, CAR and SIZE) and the profitability of listed banks in Ghana. NPL has a statistically significant negative impact on ROA, Loan loss provision portray a statistically insignificant negative relationship with ROA while capital adequacy ratio (CAR) has a positive significant relationship with profitability (ROA). Again, bank size has a positive and statistically significant relationship with ROA.

Abu Hanifa etal (2015) conduct a study which aims to find the effect of credit risk on profitability of the banking sectors of Bangladesh. The study uses an unbalanced panel data and 172 observations from 18 private commercial banks from 2003 to 2013. The study uses NPLGL, LLRGL, LLRNPL and CAR as credit risk indicators and ROAA and ROAE and NIM as profitability indicators. Using OLS random effect model, the study finds a robust negative and significant effect of NPLGL, LLRGL on all profitability indicators. The analysis also finds a negative and significant effect of CAR on ROAE. As an additional analysis, the results reveal that the effect of the implementation of Basel II is significantly positive on NIM but significantly negative on ROAE.

Ambrose Ntangeki Nshala (2017) studied the effect of credit risk management on the financial performance of commercial banks in Tanzania. The purpose of the study was to determine the effect of credit risk management on the profitability of commercial banks in Tanzania. Secondary panel data was collected from published financial statements of a sample of 19 commercial banks covering a period of 11 years, from 2005 to 2015 and used for the analysis. Financial profitability of the banks was proxied by Return on both assets and equity ratios. Independent variables included, nonperforming loan ratio, capital adequacy ratio, total loans to total deposits ratio and loan loss provision to nonperforming loan ratio. Panel data regression analysis were used to run the estimation model, specifically pooled regression model. Results reveal that there was a significant negative relationship between the NPL/TL ratio and ROE, between the LLP/NPL ratio with both ROE and ROA. It was also revealed that CAR had an insignificant positive relationship with ROE but significant positive relationship with ROA. However, TL/TD ratio had negative but insignificant relationship with both ROE and ROA.

E. Chuke Nwude and Chinedu Okeke (2018) analyzed the impact of credit risk management on the performance of deposit money banks in Nigeria using five banks that had highest asset base. In line with this, the specific objectives of the study are to ascertain the impact of credit risk management on (i) total loans and advances (ii) return on assets (ROAs) (iii) return on equity (ROE) of the selected deposit money banks in Nigeria. Ex-post facto research design was adopted using dataset for the period 2000–2014 collated from the annual reports and financial statement of the selected deposit money banks. Three hypotheses were proposed and tested using ordinary least square regression model. The findings reveal that credit risk management had a positive and non-significant impact on total loans and advances, the return on asset and return on equity of the deposit money banks.

Rrustem Asllanaj (2018) in his question Does Credit Risk Management affect the Financial Performance of Commercial Banks in Kosovo? analyzed the impact of credit

risk management on financial performance of commercial banks in Kosovo by comparing the relationship between the determinants of credit risk management and financial performance by using CAMEL indicators. Panel data of 85 observations from 2008 to 2012 of ten commercial banks was analyzed using multiple regression model.

As a dependent variable the financial performance of commercial banks in Kosovo, expressed through a Return on Average Equity (ROAE) and as an independent variables CAMEL indicators: Capital Adequacy Ratio (CAR), the quality of assets expressed through Return on Average Assets (ROAA), Management efficiency (% increase of total assets), Net interest margin (NIM) and Liquidity (Liquid assets/ Deposits) are used. The result reveals that Capital adequacy has a strong relationship with the financial performance of commercial banks in Kosovo. The correlation coefficient between asset quality and financial performance is positive, meaning that there is an average relationship between the asset quality and financial performance. The efficiency of management on the other side has low correlation with financial performance. A positive correlation was established between Net interest margin (NIM) and financial performance and between liquidity and financial performance. The study concludes that CAMEL indicators has a strong impact on financial performance of commercial banks in Kosovo.

Fan Li & Yijun Zou (2014) carried a study on the impact of credit risk management on profitability of commercial banks: a study of Europe. The main purpose of the research is to investigate if there is a relationship between credit risk management and profitability of commercial banks in Europe. It also aims to investigate if the relationship is stable or fluctuating. In the research model, ROE and ROA are defined as proxies of profitability while NPLR and CAR are defined as proxies of credit risk management. The research collects data from the largest 47 commercial banks in Europe from 2007 to 2012 and formulates four hypotheses which are related to the research question. A series of statistical tests are performed in order to test if the relationship exists.

The findings reveal that credit risk management does have positive effects on profitability of commercial banks. Between the two proxies of credit risk management, NPLR has a significant effect on the both ROE and ROA while CAR has an insignificant effect on both ROE and ROA.

Joyce Wangari (2015**)** studies the effects of credit risk management on the financial performance of Commercial Banks in Kenya. The study attempted to establish if there exists any relationship between the credit risk management determinants by use of CAMEL indicators and financial performance of commercial banks in Kenya. The research design used in this study was descriptive research design since the study involved an in depth study of credit risk management and the relationship between the two variables i.e. credit risk management and the financial performance of commercial banks. This was facilitated by the use of secondary data from 43 licensed commercial banks which was obtained from the Central Bank of Kenya publications on banking sector survey in the period 2010 to 2014. The study used multiple regression analysis of data. The study found out that there is a strong impact between the CAMEL components on the financial performance of commercial banks. The study also established that capital adequacy management efficiency and liquidity had a strong relationship with financial performance (ROA). It also established that credit risk had a weak and negative relationship with financial performance (ROA). The study concludes that CAMEL model can be used as a proxy for credit risk management when measuring the financial performance.

Ogilo Fredrick (2012) studied the Impact of Credit Risk Management on Financial Performance of Commercial Banks in Kenya and establish if there exists any relationship between the credit risk management determinants by use of CAMEL indicators and financial performance of commercial banks in Kenya. A causal research design was undertaken in this study and this was facilitated by the use of secondary data which was obtained from the Central Bank of Kenya publications on banking sector survey. The study used multiple regression analysis in the analysis of data. The study found out that there is a strong impact between the CAMEL components on the

financial performance of commercial banks. The study also established that capital adequacy, asset quality, management efficiency and liquidity had weak relationship with financial performance (ROE) whereas earnings had a strong relationship with financial performance. This study concludes that CAMEL model can be used as a proxy for credit risk management.

Daniel Ambaw (2017) investigated Credit Risk management and its impact on performance in Six Ethiopian Banks. The research objective was formulated in order to gain a better understanding of credit risk management and its impact on performance using descriptive statistics to depict pattern and robust standard errors OLS regression to estimate significant influence between banks' risk management practices and their financial performance. The study used both primary and secondary data sources. A panel data of a 10-year financial data of banks under the study from 2007-2017, to examine the relationship between return on asset (ROA) which is performance indicator and loan loses NPL/TL, loan provision to total loan LP/TL, loan provision to non-performing loan LP/NPL and loan provision to total asset LP/TA. The finding leads the researcher to conclude that banks with good credit risk management policies have a lower loan default rate and relatively higher return on asset.

Tibebu Tefera (2011) examines credit risk management and profitability of commercial banks in Ethiopia. To examine its impact level, the researcher uses multiple regression models by taking 10 years ROE (dependent variable), NPLR and CAR (independent variables) from seven bank purposively that have ten years and above life span in Ethiopia. As a result, the researcher found out that both nonperforming loan ratio and capital adequacy ratio has a negative impact on profitability of commercial banks in Ethiopia.

Sahlemichael Mekonnen (2009) investigated the Credit Risk Management System of Ethiopian Commercial Banks (Case of some public and private banks). The principal

concern of the study was to ascertain to what extent banks (i.e. CBE, CBB, AW, DB, UB and NIB) can manage their credit risks, what tools or techniques are at their disposal and to what extent their current performance is supported by proper credit risk management policies and strategies. He used both primary and secondary data on six banks for the period of 10 years from 1999-2009 EC. The study shows that there is a significant relationship between bank performance (in terms of profitability) and credit risk management (in terms of loan performance). Better credit risk management results in better bank performance.

Misker Bizuayehu (2015) done a study aimed at examining the impact of credit risk management on profitability of banks in Ethiopia. The main objectives are to determine bank specific, Industry specific and macroeconomic factors that affect banks financial performance. The study used a secondary data obtained from banks annual report, National Bank annual report and MoFED on eight banks which stayed in the industry more than eleven years in Ethiopia banking industry. The study used correlation and multiple regression analysis with random effect model and EView software. Return on equity was dependent variable while nonperforming loan, capital adequacy, bank size, loan and advance to deposit ratio, inflation and GDP have taken as an independent variable. As a result, the study concluded that the credit risk which is measured by nonperforming loan ratio had a significant inverse impact on banks financial performance and capital adequacy. In addition, loan to deposit ratio and bank size have a positive significant impact on banks financial performance. In general, bank specific factors have a significant impact on banks profitability while external factors like GDP, inflation and interest rate spread had no significant impact on banks profitability.

Girma Mekasha (2011) assessed credit risk management and its impact on performance on Ethiopian commercial banks. The paper used both primary and secondary data sources. The secondary data was collected from the financial statements of the six selected banks for a period of 10 years and the primary data was obtained by questionnaire. It examine the relationship between return on asset (ROA) which is

performance indicators and loan losses (NPL/TL), loan provision to total loan (LP/TL), loan provision to non-performing loan (LP/NPL), and loan provision to total asset (LP/TA). The study shows that there is a significant relationship between bank performance (in terms of return on asset) and credit risk management (in terms of loan performance). Furthermore, the study shows that there is a direct but inverse relationship between return on asset (ROA) and the ratio of non-performing loans to total loan (NPL\TL) and loan provision to total loan.

Engidawork Tadesse (2014) studies the impact of credit risk on the performance of commercial banks in Ethiopia considering variables related to lending activities, over the period of 5 years (2008-2012) in eight banks. The data are sourced from the annual reports of the eight banks which account for over eighty percent of the total loan and advance in the industry. The empirical investigation uses Return on Assets (ROA), which is the dependent variable and the provision to total loans, loan to total asset, credit administration (cost to total loans) and natural logarithm of total asset (Economies of scale) as independent variables on the performance of the banking sector. To this end multiple linear regression model is used to measure the relative weighting of the independent variables on a dependent variable. The study finds that the selected variables: the provision to total loans, loan to total asset, credit administration (cost to total loans) and Size (Economies of scale) have significant effect on the performance of banks.

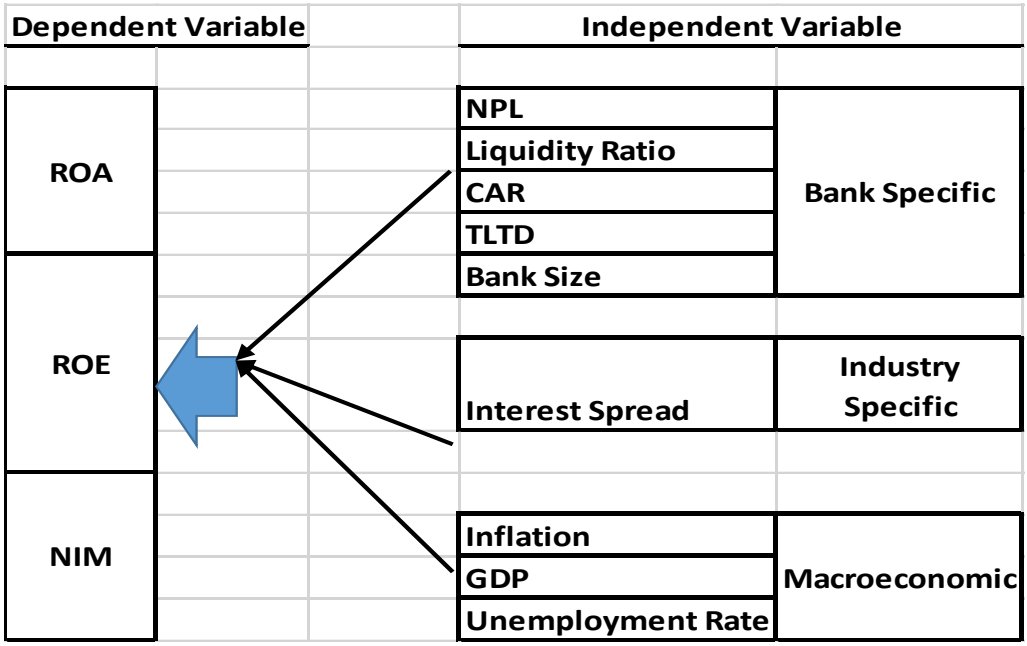
2.9. Knowledge Gap and Conceptual Framework

Several works inspired this research as spotted in the empirical review. Among such works are Misker Bizuayehu (2015), Engidawork Tadesse (2014), Ogilo Fredrick (2012), Fan Li & Yijun Zou (2014), Róbert Hurka (2017), Girma Mekasha (2011), Rrustem Asllanaj (2018), Fabrice Tchakounte Kegninkeu (2018), Joyce Wangari (2015**)** and the like stated above. The regression analysis found significant relationship between credit risk management and profitability of banks. They mainly employed either ROE or ROA as measures of bank performance and bank specific factors like NPL ratio,

CAR, LLP as proxy for credit risk management. Exceptionally Misker Bizuayehu (2015), included industry specific (Interest spread rate) and Macroeconomic specifics (Inflation and GDP) as an independent variable with ROE as dependent variable. Some uses ROE as proxies to profitability and others ROA. The result and interpretation brought different conclusions. In researches made in Ethiopian banks same is witnessed except Sahlemichael Mekonnen (2009) who uses both.

Therefore, the researcher interests to use multiple independent and dependent variables as the previous researches have gaps on same. As dependent variables ROA, ROE and NIM will be used while as an independent variable bank specific (NPLR, LLPR, CAR, TL/TD and Bank size) industry specific (Interest rate spread) and macroeconomic factors (GDP, Inflation and Unemployment rate) will be employed. This research differs from others by using both ROA, ROE and NIM as additional dependent variables and LLP and unemployment rate as additional independent variable.

Figure 1-Conceptual Framework



CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

This chapter sets the presentation and discussion of the research method used in this research. The chapter includes research design, research methodology, population and sampling, data collection technique, method of data analysis and definition of variables. Besides describing the methods that will be employed during the research it also try to justify why the specific methods are preferred over the alternatives.

3.1. Research design

The research used explanatory research design method by using pooled financial data of each sixteen banks for seven years over the period of 2013 to 2019.

According to Saunders et al., 2016, a research can be designed to fulfil either an exploratory, descriptive, explanatory, evaluative purpose or some combination of these.

An exploratory study is particularly useful if the researcher wishes to clarify his/her understanding of an issue, problem or phenomenon in a new or under researched topics while the purpose of descriptive research is to gain an accurate profile of events, persons or situations when the researcher wants to describe individuals, groups and events. On the other hand, the emphasis in explanatory research is to study a situation or a problem in order to explain the relationships between variables. (Saunders *et al.*2016).

The research design used for the study is explanatory type of research design method, because explanatory research is an interpretive research (Haseeb Zaman & Gul Zeb, 2011), it explains causes and effects, correlations, or why things are the way they are (Patricia Leavy, 2007) which is the intention of the researcher to know the relationships between variables and explain the causes and effects of correlations. That is to say, the aim is to find causes and effects mentioned as in Fan Li & Yijun Zou (2014).

Time horizon of research plays an important role as it shows credibility and quality of the research observations for both authors of the research and readers. According to Saunders *et al.*2016 time horizon of the research can be divided into two types; cross-sectional

research and longitudinal research. The research used Panel (longitudinal data) as it combines both cross-sectional and time series data, which collects multiple subjects at multiple instances.

Panel data involves the pooling of observations on the cross-sectional over several time periods. As Brook (2008) stated the advantages of using panel data set; is as it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time series or pure cross- sectional data alone.

3.2. Research Approach

According to Ngwa Eveline, citing Kent (Kent, 2007), there are two main research methods; qualitative and quantitative. Qualitative is geared primarily to the construction of qualitative data which consist mainly of depth interviewing or focus groups. Quantitative on the other hand is geared primarily to the construction of quantitative data and consist of the usage of formal questionnaires techniques at some stage, or it may involve various forms of experimental or quasi- experimental research (Ngwa Eveline, 2010).

The researcher uses the quantitative research method which is aligned with the purpose and design of the research, because it helps to examines relationships between variables, which are measured numerically and analyzed using a range of statistical and graphical techniques (Saunders et al., 2016), values breadth, statistical descriptions, generalizability are most commonly used in explanatory research investigating causal relationships, associations, and correlations. (Patricia Leavy, 2007)

3.3. Population and sampling techniques

3.3.1. Population

The sample selected is related to the population that is highlighted in the research question and objectives. (Saunders et al., 2016) The objective is to investigate the effect of credit risk management on financial performance of private commercial banks of

Ethiopia. There are 16 private banks in Ethiopia. Private banks are selected due to unavailability of data on Government owned banks and to control outliers figure in case of DBE which has highest NPL history and the service provided differs to that of the private banks.

The target population of this study are sixteen private commercial banks in Ethiopia. In order to include all the private banks, seven years' data from fiscal year 2013/14 to 2018/19 are used and collected as the last entrant, Enat and Debub Global Bank data are available only for seven years.

3.4. Sample size and techniques

The objective of the study is to empirically examine the quantitative effect of credit risk management on the performance of private banks in Ethiopia over the period of seven years from 2013/14 to 2018/19 fiscal year. The sixteen private commercial banks operating in the country classified by the NBE as peer 1 peer 2 and peer 3 based on their time of entry. Peer 1 consists (AIB, DB, BOA, WB, UB, and NIB), peer 2 consists (CBO, LIB, ZB, OIB, BIB, and BiB) and peer 3consists (AB, ADIB, DGB, and EB).

Occasionally, it may be possible to collect and analyze data from every possible case or group member; which is termed as a **census**. However, for many research questions and objectives it will be impossible either to collect or to analyze all the potential data available owing to restrictions of time, money and often access. (Saunders et al., 2016)

It can be presumed that in census inquiry, when all items are covered, no element of chance is left and highest accuracy is obtained. (C.R. Kothari, 2004) Margin of error decreases as the sample size increases and/or the number of response alternatives increases. (Scott w. Vanderstoep and Deirdre d. Johnston, 2009).

Accordingly, to decrease the margin of error and obtain the highest accuracy, I use census data, that is all private banks found under peer 1, 2 and 3 which are operating in Ethiopia. A seven-year data will be used as peer 3 banks data is only found above the year 2012/13 due to their recent entry in to the industry.

3.5. Data source and collection techniques

Data will be collected from secondary sources. Secondary data means data that are already available i.e., they refer to the data which have already been collected and analyzed by someone else. When the researcher utilizes secondary data, then he has to look into various sources from where he can obtain them. (C.R. Kothari, 2004)

The secondary data will be collected from the bank's annual financial reports, National Bank of Ethiopia repository, World Bank website, Central Statistics Agency of Ethiopia, Ministry of Finance and Economic Development and other source document which are relevant for the study.

3.6. Model specification

The panel regression model was employed to estimate the effect of credit risk management indicators (NPLR, Liquidity Risk, CAR, TLTD, Bank size, Interest rate spread, GDP, Inflation and Unemployment rate) on the banks' financial performance.

The model adopted for this study is underpinned to the model of Ambrose (2017), Fan Li & Yijun Zou (2014), Engidawork (2014) which studied the effect of credit risk and commercial bank performance.

The models which represent the effect of credit risk management on financial performance are as follows:

$$X_1 = \beta_0 + \beta_1 Y_1 + \beta_2 Y_2 + \beta_3 Y_3 + \beta_4 Y_4 + \ldots + \beta_9 Y_9 + \mu_t \quad (1)$$

$$X_2 = \beta_0 + \beta_1 Y_1 + \beta_2 Y_2 + \beta_3 Y_3 + \beta_4 Y_4 + \ldots + \beta_9 Y_9 + \mu_t \quad (2)$$

$$X_3 = \beta_0 + \beta_1 Y_1 + \beta_2 Y_2 + \beta_3 Y_3 + \beta_4 Y_4 + \ldots + \beta_9 Y_9 + \mu_t \quad (3)$$

Where,

X_1, X_2 and X_3 are the dependent variables

Y_1-Y9 are the independent variables

β_0 is the intercept

β_1-β_9 are the slopes;

μ_t is the residuals.

3.7. Methods of data analysis

The researcher will use quantitative methodology with secondary source - panel data which consists of both the cross sectional information that captures individual variability and the time series information which captures dynamic adjustment. The collected panel data were analyzed using descriptive statistics and multiple linear regression analysis. The descriptive statistics (Mean, maximum and minimum values and standard deviations) was used to analyze the general trends of the data from 2012/13 to 2018/19.

After clearly identifying the dependent and the independent variables, multiple regression model will be used to show the relationship between the dependent and independent variables. The multiple linear regressions model was conducted by the ordinary listing square (OLS) method using Eviews 9 software. Before running the regression analysis, the assumptions were tested to see the applicability of the regression models developed in order to test the relationship between banks credit risk and its impact on financial performance. Hence, diagnostic tests for heteroscedasticity, autocorrelation, multicollinearity and normality was performed to ensure whether the assumptions of the Classical Linear Regression Model (CLRM) are not violated.

The Classical Linear Regression Model (CLRM) Assumptions.

According to A. H. Studenmund (2017), there are 7 assumptions to make for OLS estimators to be best available:

- The regression model is linear, is correctly specified, and has an additive error term.
- The error term has a zero population mean.

- All explanatory variables are uncorrelated with the error term.
- Observations of the error term are uncorrelated with each other (No serial correlation).
- The error term has a constant variance (No heteroskedasticity).
- No explanatory variable is perfect linear function of any other explanatory variables (No perfect multicollinearity).
- The error term is normally distributed. (Optional)

Normality: The Classical Linear Regression Model (CLRM) assumes that the error term is normally distributed. One of the most commonly applied tests for normality is the Bera—Jarque test. BJ uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments -- the mean and the variance. The standardized third and fourth moments of a distribution are known as its *skewness* and *kurtosis*. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. A normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. (Brooks, 2008)

The hypothesis for the normality test was formulated as follow:

H0: Error term is normally distributed

H1: Error term is not normally distributed

a = 0.05

Decision Rule: Reject H0 if P value of JB less than significant level 0.05. Otherwise, do not reject H0

Multicollinearity:

One of the assumptions of the *classical linear regression model* (CLRM) is that there is no **multicollinearity** among the regressors included in the regression model. The term *multicollinearity* is due to Ragnar Frisch. Originally it meant the existence of a

"perfect," or exact, linear relationship among some or all explanatory variables of a regression model. Damodar N. Gujarati and Dawn C. Porter (2009).

Perfect *collinearity or multicollinearity* between independent variables implies that they are really the same variable, or that one is a multiple of the other, and/or that a constant has been added to one of the variables. That is, the relative movements of one explanatory variable will be matched exactly by the relative movements of the other even though the absolute size of the movements might differ. Because every movement of one of the variables is matched exactly by a relative movement in the other, the OLS estimation procedure will be incapable of distinguishing one variable from the other. A. H. Studenmund (2017)

Perfect multicollinearity violates Classical Assumption which states that observations of the error term are uncorrelated with each other (No serial correlation), which specifies that no explanatory variable is a perfect linear function of any other explanatory variable. The word *perfect* in this context implies that the variation in one explanatory variable can be *completely* explained by movements in another explanatory variable. Many instances of perfect collinearity (or *multicollinearity* if more than two independent variables are involved) are the result of the researcher not accounting for identities (definitional equivalences) among the independent variables. This problem can be corrected easily by dropping one of the perfectly collinear variables. With perfect multicollinearity, OLS will be unable to estimate the coefficients of the collinear variables. A. H. Studenmund (2017)

In cases of near or high multicollinearity, one is likely to encounter the following consequences:

1. Although BLUE, the OLS estimators have large variances and covariances, making precise estimation difficult.

2. Because of consequence 1, the confidence intervals tend to be much wider, leading to the acceptance of the "zero null hypothesis" (i.e., the true population coefficient is zero) more readily.

3. Also because of consequence 1, the *t* ratio of one or more coefficients tends to be statistically insignificant.

4. Although the *t* ratio of one or more coefficients is statistically insignificant, *R2*, the overall measure of goodness of fit, can be very high.

5. The OLS estimators and their standard errors can be sensitive to small changes in the data. Damodar N. Gujarati and Dawn C. Porter (2009).

Dawit Belete (2017) by quoted Hair (2006) noted that correlation coefficient below 0.9 may not cause serious multicollinearity problem.

Heteroscedasticity: occurs when Classical Assumption which assumes that the variance of the error term is constant, is violated in a correctly specified equation. A. H. Studenmund (2017)

According to (Brooks, 2008), Heteroscedasticity means that error terms do not have a constant variance. If heteroscedasticity occur, the estimators of the ordinary least square method are inefficient and hypothesis testing is no longer reliable or valid as it will underestimate the variances and standard errors.

The hypothesis for the normality test was formulated as follow:

H0: There is no Heteroscedasticity problem in the model.

H1: There is Heteroscedasticity problem in the model.

Decision Rule: Reject H0 if p-value greater than significance level. Otherwise, do not reject H0.

Autocorrelation: When the error term for any observation is related to the error term of other observation, it indicates that autocorrelation problem exist in this model. Brooks (2008). Assumption that is made of the CLRMs disturbance terms is that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it

would be stated that they are “auto correlated” or that they are “serially correlated”. To test the presence of autocorrelation, the researcher will apply Breusch-Godfrey Serial Correlation LM test.

The hypothesis for the model specification test was formulated as follow;
H0: There is no autocorrelation problem.
H1: There is autocorrelation problem.
a = 0.05
Decision Rule: Reject H0 if P value of JB less than significant level 0.05. Otherwise, do not reject H0

3.8. Definition of Variables

In this study, the researcher used three dependent variable ROA, ROE and NIM and explanatory variables such as; NPLR, CAR, TL/TD, Liquidity Ratio and Bank size as bank specific; Interest rate spread as an industry specific and GDP, Inflation and Unemployment rate as macroeconomic factors.

In the following subsection the dependent variables as proxy for banks’ performance and independent variables as proxy of credit risk management are presented.

3.8.1. Dependent variable

According to Peter Mutua Mutava et al (2016) the financial performance of banks are expressed in terms of profitability and the profitability has no meaning except in the sense of an increase of net asset. Profitability is a company’s ability to earn a reasonable profit on the owner’s investment (Warren & Buffett, 2005). Most organizations exist to earn profit and profitability ratios show a company’s overall efficiency and performance. Bank performance is usually measured by three alternative measures ROA, ROE or NIM. Studies conducted on the determinants of banks performance use one or a combination of these ratios as a measure of performance in their analysis (Tamirat Lambebo, 2015).

Return on Asset

According to Anas Ali Al-Qudah (2016) Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings. Calculated by dividing a company's annual earnings by its total assets, ROA is displayed as a percentage.

ROA= Net Income/Average Total Asset

Higher ROA of a company performance will lead to more effective company. So that it can be seen as a positive sign for any investors to invest their stock in the company that will affect on the increased company stock in capital market. (Rosikah, etal 2018)

Return on Equity

Return on equity (ROE) is the amount of net income returned as a percentage of shareholders' equity. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested. (Anas Ali Al-Qudah (2016)). Return on equity (ROE) is the profitability ratio to measure the company ability to generate profit based on share capital owned by the company. Return on equity can be calculated as follow. Sartono, (2001).

ROE= Net income/Average Total Equity

It is further explained by Joyce (2015) that ROE is the ratio of Net Income after Taxes divided by Total Equity Capital. It reflects how effectively a bank management is using shareholders' funds. Thus, it can be presumed that the better the ROE the more effective the management in utilizing the shareholders' capital.

Net Interest Margin

Net Interest Margin (NIM) is the ratio of net interest income to the average earning assets (interest earning assets) or net interest profitability. This indicator is less frequently encountered in reports and statistics compared to returns on assets (ROA) or returns on equity (ROE). However, it does succinctly summarize the effectiveness of banks' interest bearing assets. The larger the net interest margin, the more successfully does the bank manage its' interest bearing assets. (Svetlana Saksonova, 2014)

The NIM variable is defined as the net interest income divided by total earnings assets (Gul et al., 2011). Net interest margin measures the gap between the interest income the bank receives on loans and securities and interest cost of its borrowed funds. It reflects the cost of bank intermediation services and the efficiency of the bank. The higher the net interest margin, the higher the bank's profit and the more stable the bank is. Thus, it is one of the key measures of bank profitability. (Joyce Wangari Githaiga, 2015).

NIM = (Interest Income-Interest Expense)/Earning Asset

3.8.2. Independent Variable

3.8.2.1. NPLs Ratio

Saunders and Cornett (2005) stated that the pervasive incidence of non-performing loan is one of the prime causes of failure in the banking system. The very nature of the banking business is so sensitive because more than 85% of their liability is deposits from depositors.

NPLs ratio (NPLR) is an indicator that measures credit risk management. NPLs can be defined as a sum of borrowed money upon which the debtor has not made his or her scheduled payments for at least 90 days. A nonperforming loan is either in default or close to being in default. E. Chuke Nwude and Chinedu Okeke (2018)

According to Onang'o Omurwa Nyabicha (2017), poor credit risk management and plain bad luck in form of external independent factors are the main reason for NPL. The

inflation, deregulation and special market conditions can lead to poor credit lending decision which in turn leads to NPLs.

NBE directive number SBB/43/2008 defines none performing loan as "*a loan whose credit quality has deteriorated and the full collection of principal and/or interest as per the contractual repayment terms of the loan and advances are in question"*

NPLR = Total NPLs and advances / Total Loans and advances.

According to NBE directive number SBB/43/2008 a loan id none performing when the credit quality has deteriorated and the full collection of principal and/or interest as per the contractual repayment terms of the loan and advances are in question.

3.8.2.2. Liquidity Ratio

Liquidity management is a key banking function and an integral part of the asset liability management process. Most banking activity depends on a bank's ability to provide liquidity to its customers. Most financial transactions or commitments have implications for a bank's liquidity. Banks are particularly vulnerable to liquidity problems, on an institution-specific level and from a systemic/market viewpoint. Liquidity is necessary for banks to compensate for expected and unexpected balance sheet fluctuations and to provide funds for growth. It represents a bank's ability to efficiently accommodate the redemption of deposits and other liabilities and to cover funding increases in the loan and investment portfolio. Greuning, H.V and Bratanovic, S.B. (2009).

Liquidity is the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Bank for International Settlements/BIS (2008)

As per the NBE Directive SBB/45/2008 the minimum liquid asset of the bank is set not to be less that 15% of the banks net current liability. In addition, the NBE Directives No.SBB/9/95 obliged banks to deposit 5% of their deposit at NBE as a reserve. This

implies that somewhat the liquidity risk is managed by the regulatory body as liquidity risk entails default risk.

Liquidity Ratio = Liquid Asset/Total Deposit

3.8.2.3. Capital Adequacy Ratio (CAR)

Capital is the amount of own fund available to support the bank's business and act as a buffer in case of adverse situation. The adequacy of capital is judged on the basis of capital adequacy ratio (CAR). Capital adequacy ratio shows the internal strength of the bank to withstand losses during crisis. (Joyce Wangari Githaiga, 2015).

As Misker (2015) noted, Capital Adequacy Ratio (CAR) is basically the proportion of the bank's tier 1& tier 2 equity (Qualifying Capital or Equity) as a proportion of its risk weighted assets (loans). It is the proportion of a bank's own equity in relation to its risk exposure.

CAR helps regulators to protect depositors from banks who lend aggressively and in doing so they may not get back most of the money they lent. This is because when a bank makes large loan losses that wipe out its total equity, it may lead to an immediate bankruptcy thus making depositors lose their money.

According to NBE directive number SBB/50/2011, all licensed banks shall at a minimum maintain capital to risk weighted assets ratio of 8% at all times. Capital adequacy is the level of capital required by the banks to enable them withstand the risks such as credit, market and operational risks they are exposed to in order to absorb the potential loses and protect the bank's debtors and helps to establish a new bank so that the newly established bank can compete successfully with existing banks. The formula used to compute CAR is

CAR = Total Capital / Total Asset

3.8.2.4. Total Loan to Total Deposit

Loan to deposit ratio indicates the ability of the bank place a loan from the deposit mobilized. According to Misiker (2015) Loan-deposit ratio, also known as the LTD ratio, is a ratio between the banks total loans and total deposits. If the ratio is lower than 1, the bank relied on its own deposits to make loans to its customers, without any outside borrowing. If, on the other hand, the ratio is greater than 1, the bank borrowed money which it relined at higher rates, rather than relying entirely on its own deposits. Banks may not be earning an optimal return if the ratio is too low. If the ratio is too high, the banks might not have enough liquidity to cover any unforeseen funding requirements or economic crises. It is a commonly used statistic for assessing a bank's liquidity.

TL/TD indicates the credit risk appetite of the bank that exposes it to probable losses. It is measured as a ratio of total loans (TL) to the total amount of deposits (TD) (Ambrose Ntangeki Nshala, (2017)

Other variables constant, the more deposits are transformed into loans, the higher the interest margin and profits. High ratios may be an indicative of better bank performance because of possible increases in interest income. However, very high ratios could also reduce liquidity and increase the number of marginal borrowers that default. (Nega Andegzer, 2015)

Loan to Deposit Ratio= Total Loan/Total Deposit

3.8.2.5. Bank Size

Tamirat Lambebo (2015) by referring Onaolapo and Kajol (2010) and King and Santor (2008) stated that firm size is a control variable which measure by natural logarithm of total assets. In most previous studies, firm size is expressed by the logarithm of total assets. This indicator is the most suitable measure of a firm's size. Large Banks are expected to have low credit risk that emanate from their capacity to establish sound credit risk management framework

Bank Size = natural logarithm of total asset

3.8.2.6. Interest Rate Spread

According to Misker (2015) quoting Hamis 2010, narrated that as banks lend, they charge interest and for attracting deposits, they offer interest on deposit as compensation for their clients' thriftiness and the difference between the two rates forms the spread. Interest spread is the difference between the average lending rate and the average borrowing rate for a bank or other financial institution.

IS= (interest income ÷interest earning assets) - (interest expense ÷interest bearing liabilities)

3.8.2.7. Inflation

Inflation is a quantitative measure of the rate at which the average price level of a basket of selected goods and services in an economy increases over some period of time. As Pauline Lito Talaso (2015) pointed out inflation is an important determinant of banking performance. High inflation rates are related with high loan interest rates and incomes. The effect of inflation on banking performance depends on whether inflation is predicted or unexpected. If inflation is fully anticipated and interest rates are adjusted accordingly, a positive impact on profitability will result. On the other hand, unanticipated raises in inflation cause cash flow difficulties for borrowers which can lead to premature termination of loan planning and loan losses.

Inflation affects companies pricing behavior. Banks limit the Inflation and avoid deflation, to keep the economy running smoothly. If the companies expect future inflation will be higher, they hope that they can raise their prices without effecting the demand for their production. (Qaisar Maqbool etal, 2015)

3.8.2.8. Gross Domestic Product

GDP is the standard measure of the value added created through the production of goods and services in a country during a certain period. Gross Domestic Product is

performing indicator of an economy and it is defined as Gross National Income less net income factor from abroad (that is the value of imported commodities from foreign countries). Chandra (2008), observes GDP as final goods and services in the economy during a specified period usually a year. (Pauline 2015)

3.8.2.9. Unemployment rate

The unemployed are people of working age who are without work, are available for work, and have taken specific steps to find work. The unemployment rate may provide additional information regarding the impact of economic conditions. An increase in the unemployment rate should influence negatively the cash flow streams of households and increase the debt burden. With regards to firms, increases in unemployment may signal a decrease in production as a consequence of a drop in effective demand. This may lead to a decrease in revenues and a fragile debt condition.

Empirical studies have confirmed this link between the phase of the cycle and credit risk/defaults in some countries at several disaggregated levels. Therefore, we expect that a decrease in the growth rate of GDP or an increase in the unemployment rate will lead to an increase in the banking credit risk. (Vítor Castro, 2012)

Table 1-Variables, Measurement & Expected sign

No.	Variables		Measurement	Expected Sign
1	NPLR	Non-performing loan Ratio	Total NPLs / Total Loans	-
2	CAR	Capital Adequacy Ratio	Total Capital / Total Asset	-
3	TLTD	Total loan to total asset	Total Loan / Total Asset	+
4	BS	Bank Size	Natural Log of Total Asset	+
5	IS	Interest Spread	(Interest income ÷interest earning assets) - (interest expense ÷interest bearing liabilities)	+

6	LIQUIDITY RATIO	Liquidity Ratio	Liquid Asset / Total Deposit	-
7	INF	Inflation	Inflation Rate	-
8	GDP	Gross Domestic Product	Real GDP Growth Rate	+
9	UER	Unemployment Rate	Unemployment Rate	-

CHAPTER FOUR
FINDINGS AND DISCUSSIONS

In this section, the findings are presented into two parts. Part one discusses the descriptive statistics of the research including the CLRM test results with interpretation. As part two, the result of the regression model which shows how the independent variables affect the dependent variable is presented. Finally, the result of the model is discussed in line with the empirical results found from different researches.

4.1. Descriptive Statistics

In the descriptive statistics which provide important overview of the data there are 112 observations. The table below (Table 2) presents the descriptive statistics (mean, median, maximum, minimum and standard deviation) of the variables for the sixteen private banks from year 2013-2019.

Table 2-Panel Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	0.0233	0.0217	0.0433	0.0072	0.0079	112
ROE	0.1451	0.1390	0.2521	0.0500	0.0391	112
NIM	0.0431	0.0452	0.0612	0.0155	0.0111	112
CAR	0.1527	0.1428	0.2595	0.0787	0.0395	112
INF	0.1043	0.0970	0.1370	0.0720	0.0271	112
IS	0.0307	0.0314	0.0543	0.0075	0.0087	112
LIQUIDITY_R	0.2987	0.2792	0.5967	0.1317	0.0997	112
LOG_BS	16.0540	16.2007	18.1281	13.0020	1.0406	112
NPL	0.0304	0.0295	0.0513	0.0116	0.0099	112
GDP_GROWTH_RATE	0.0934	0.0990	0.1040	0.0770	0.0104	112
TLTD	0.6376	0.6458	0.8564	0.4207	0.0759	112
UER	0.1783	0.1794	0.1910	0.1680	0.0081	112

Source: own computation through Eviews 9

The dependent variables measure the profitability of the banks while the independent depicts the credit risk aspect. As shown in table 2 ROA has a minimum and maximum value of 0.07 and 4.3 respectively, which implies a bank maximum earing in its asset investment is 4.3 while the lowest earning is 0.07. ROA indicates the efficiency of the management of a company in generating income from all the resources of the company, hence, the higher ROA shows that the company is more efficient in using its resources. The ROA has a mean value of 2.33 which indicates that the private banks earn birr 2.33 per one birr of investment in asset. The standard deviation statistics for ROA was 0.0079 which indicates that the profitability variation in terms of ROA between the selected banks was very small.

By the same discourse, ROE shows a minimum of 5 and maximum of 25.21. The industry's maximum earing on its share investment is 25.21. The mean value of ROE is 14.51 which implies that, the private banks earn birr 14.51 per one birr of investment in equity. The standard deviation of ROE which is 3.91 is relatively the lowest deviation from its mean value.

According to Misiker (2015) quoting Richard (2015), Return on equity between 15% and 20% are considered desirable. The mean value of the industry is 14.51% which is almost 15% return on equity tells the effectiveness of the management in utilizing the shareholders' capital as ROE figure shows how affectively a bank management in using shareholders' funds.

NIM implies the banks interest margin in lending and deposit mobilization. It has a minimum of 1.55 earning and maximum 6.12 while the mean value is 4.31. The deviation among the banks is 1.1% which indicates the dispersion level from the mean value of NIM in the case of private commercial banks in Ethiopia which is small. The sample banks on average earned 4.31 percent net interest income of the total loan and advances. It measures how well a bank manages its assets and liabilities, which is affected by the spread between the interest earned on the bank's assets and interest costs on its liabilities. Since NIM reflects the cost of bank's intermediation services and the efficiency of the bank, the higher the NIM shows the higher the bank's profit and stability.

CAR has a mean value close to 15.27% which is above the minimum requirement of NBE which is 8%. The minimum is around 8% which is equal to the standard requirement of NBE and the maximum is 26%. The standard deviations show that, there was 3.95% dispersion of capital adequacy ratio from its mean value for the private commercial banks in Ethiopia. The mean result is above the NBE requirement and same as to the findings of Berehanu Berihun (2015), Misiker Bizuayehu (2015), Dawit Fekadu (2016), Dawit Belete (2017).

Among the bank specific independent variables, NPLs ratio measured by Nonperforming loans divided by total loan ranges from 1.16 percent to 5.13 percent. The mean value of NPL shows that 3% of the loan is non-performing across the industry. This is below the standard of 5% set by the National Bank of Ethiopia which implies the strict regulation of NBE on controlling the industry. The standard deviation for NPL was 0.0099 revealing the level of dispersion towards the mean among private banks in Ethiopia, which is too small. The result found by Misiker Bizuayehu (2015) and Adanech Shifa (2017) is same as mine which is below the standards of NBE requirement of 5%.

Among the bank specific variables, TLTD is one of the variables that has a mean value of 63.76% which implies 63.76% of deposits were given out as loans. The minimum is 42%, the maximum is 85.64% and standard deviation shows 7.5% a relatively lower deviation from the mean value. According to Berhanu Berihun (2015) quoting CBRC 2012, the international standard for TLTD ratio is 75%. If the ratio is too high, it means that banks might not have enough liquidity to cover any unforeseen fund requirements; if the ratio is too low, banks may not be earning as much as they could be. The mean value which is 63.76% implies that the banks are somewhat liquid and did not grant the deposit as loan to the maximum. The below standard is same as previous studies like, Berehanu Berihun (2015), Misiker Bizuayehu (2015)

Liquidity ratio which implies the banks liquidity position to repay liabilities shows an average of 29.87%. The standard deviation, minimum and maximum value of liquidity ratio are 9.97%, 13.17% and 59.67% respectively. The standard deviations show that,

there was 9.97% dispersion of liquid assets to total assets ratio from its mean value for the private commercial banks in Ethiopia. The mean value is far above the NBE requirement of 15% under directive No.SBB/57/2014 Minimum Regulatory Liquidity Requirement, which shows the existence of liquidity among the banks. Same above the requirement results are obtained by previous stidies of Berehanu Berihun (2015), Dawit Fekadu (2016), Dawit Belete (2017). The severe controlling of NBE is the possible reason for having such a higher liquidity.

Among the bank specific variable, the average value of Bank Size shows 16.05 billion. The minimum and maximum Bank Size is 13 and 18.12 respectively. The standard deviation which measures the dispersion towards the mean among private banks in Ethiopia is 1.04, which is the maximum to that of all the used variables. It implies the existence of big difference between the smaller and bigger bank in terms of asset size. Large banks are expected to have low credit risk that emanate from their capacity to establish sound credit risk management framework. Tamirat Lambebo (2015)

Among the industry specific variable, the average value of Interest spread is 3%. The minimum and maximum IS across private banks for the stated years is 0.75% and 5.43% respectively. The standard deviations from the mean value is 0.87%. The mean value implies that on average a bank earns 3% interest spreads from the average lending rate and average borrowing rate.

In the Macroeconomic variable category real GDP growth, Inflation rate and Unemployment rate are included. They have a mean value of 9.3%, 10.43% and 17.83% respectively. During the seven years of the study period the real GDP growth rate of Ethiopia is 9.3%, while inflation and unemployment rate are around 10.43% and 17.83% respectively. The minimum and maximum for GDP growth rate is 7% and 10.4%, for inflation rate 7% and 13.7% and for unemployment rate 16.8% and 19%. This implies that, during the period of 2013-2019 the growth of GDP in Ethiopia is less to that of inflation and unemployment rate. Regarding the standard deviation, table 2 also presents a small standard deviation for GDP growth rate of 0.0104; this implies that economic growth in Ethiopia during the period of 2013 to 2019 remains reasonable stable. Inflation has somewhat a higher standard deviation of 0.0271 compared to GDP;

this implies that inflation rate in Ethiopia during the study period remains somewhat unstable. The standard deviation of unemployment rate is 0.0081 which is minimal among the macroeconomic variable, which indicated a minimal/very small change in unemployment rate during the study periods. Same kind of result are witnessed for GDP and inflation in the study of Dawit Belete (2017) and Misiker Bizuayehu (2015)

4.2. Correlation Analysis

Correlation measures the degree of linear association between variables. By the correlation analysis we can determine the relationship among variables. Values of the correlation coefficient are always ranged between +1 and -1. A correlation coefficient of +1 indicates that the existence of a perfect positive association between the two variables, while a correlation coefficient of -1 indicates perfect negative association. A correlation coefficient of zero, on the other hand, indicates the absence of relationship between two variables (Brook, 2008). The table below shows the correlation matrix among dependent and independent variables.

Table 3-Correlation matrix

	ROA	ROE	NIM	CAR	INF	IS	LIQUIDITY	LOG_BS	NPL	REAL_GDP	TLTD	UER
ROA	1	0.899239	0.703923	-0.41461	0.104494	0.814701	-0.08675	0.371249	-0.65931	-0.04541	0.001876	0.04908
ROE	0.899239	1	0.690798	-0.55168	0.121375	0.838952	-0.09718	0.483497	-0.62678	-0.0734	-0.0126	0.090107
NIM	0.703923	0.690798	1	-0.26883	0.020291	0.74774	-0.06347	0.239963	-0.62867	0.046146	0.049957	0.031193
CAR	-0.41461	-0.55168	-0.26883	1	-0.09024	-0.28087	0.563046	-0.7585	0.270961	0.128791	0.038167	-0.16569
INF	0.104494	0.121375	0.020291	-0.09024	1	0.094191	-0.17043	0.18024	-0.13011	-0.52783	0.077223	0.68841
IS	0.814701	0.838952	0.74774	-0.28087	0.094191	1	0.097179	0.249585	-0.57161	0.030696	-0.1059	0.048368
LIQUIDITY_R	-0.08675	-0.09718	-0.06347	0.563046	-0.17043	0.097179	1	-0.71849	0.052597	0.285491	-0.41173	-0.22271
LOG_BS	0.371249	0.483497	0.239963	-0.7585	0.18024	0.249585	-0.71849	1	-0.29391	-0.30398	0.276618	0.357473
NPL	-0.65931	-0.62678	-0.62867	0.270961	-0.13011	-0.57161	0.052597	-0.29391	1	0.049254	0.008853	-0.06798
REAL_GDP_GROWTH_R	-0.04541	-0.0734	0.046146	0.128791	-0.52783	0.030696	0.285491	-0.30398	0.049254	1	-0.25011	-0.4175
TLTD	0.001876	-0.0126	0.049957	0.038167	0.077223	-0.1059	-0.41173	0.276618	0.008853	-0.25011	1	0.173955
UER	0.04908	0.090107	0.031193	-0.16569	0.68841	0.048368	-0.22271	0.357473	-0.06798	-0.4175	0.173955	1

Source: own computation through Eviews 9

According to table 3 CAR, Liquidity Ratio and NPL Ratio, are inversely related to all the dependent variables while Real GDP Growth Rate and TLTD are negatively related

to the ROA and ROE only. Except CAR, Liquidity Ratio and NPL Ratio all the variables are positively related to the NIM.

Inflation, Interest Spread and Bank size are positively related to all the dependent variables. Compared to the others IS and NPL are relatively correlated while the rest are less correlated among themselves.

Tests for the Classical Linear Regression Model (CLRM) assumptions

This section presents the test for the assumptions of classical linear regression model (CLRM). It includes Normality, hetroskedasity, autocorrelation, and multicollinearity tests. The linearity of the parameter is assumed since the model applies linear ordinary least square (OLS). As noted by Brooks (2008), when these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there will be data that left out of the model.

Hence, the below sections discuss results of the diagnostic tests that were conducted to ensure whether the data fits the basic assumptions of classical linear regression model or not.

4.3. Normality Test

Brooks (2008) stated that the normality assumption is required in order to conduct single or joint hypothesis tests about the model parameters. Normality assumption, which is for the given X's, the mean value of the residual e is zero, is extremely important for the purposes of hypothesis testing and predict ion (Gujarat i, 2004). One of the most commonly applied tests for normality is the Jarque-Bera(JB) test.

The hypothesis for the normality test was formulated as follow:

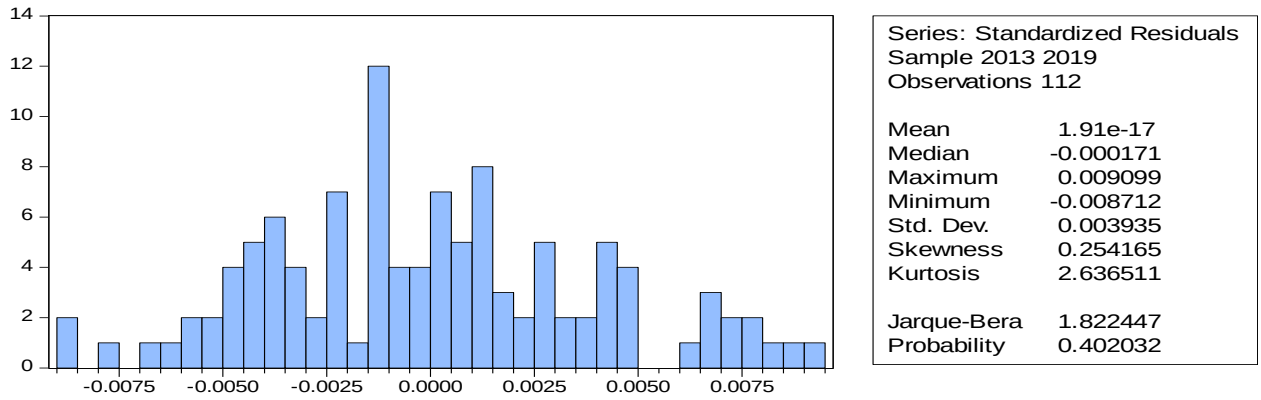
H0: Error term is normally distributed

H1: Error term is not normally distributed

$\alpha = 0.05$

Decision Rule: Reject H0 if P value of JB less than significant level 0.05. Otherwise, do not reject H0.

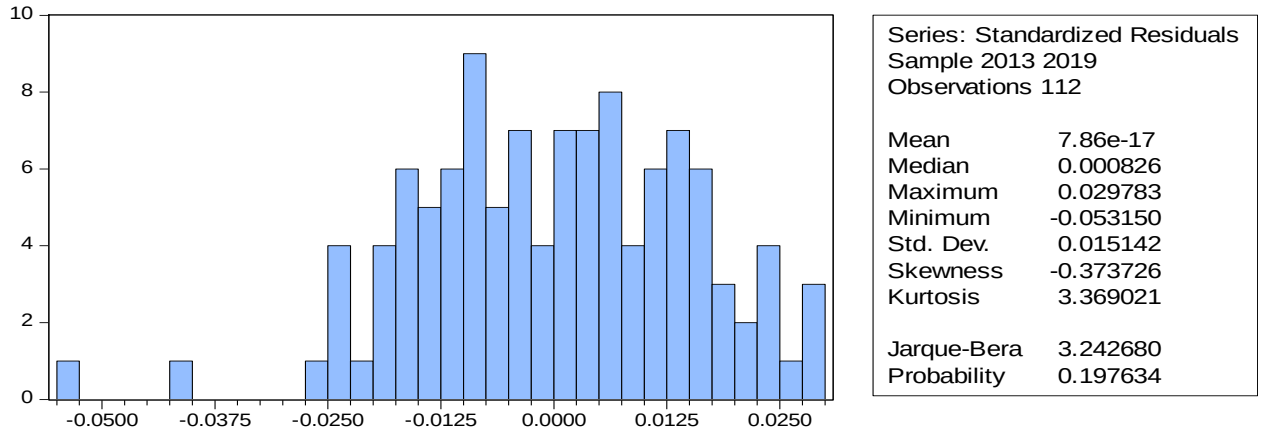
Figure 2-Normality Test for ROA



Source: own computation through Eviews 9

As shown in Figure 2 the histogram is bell shaped, the kurtosis is around 3 and skewness is around 0. The Jarque-Bera statistic has a P-value of 0.40 which is greater than 0.05. This shows that there was no evidence for the presence of abnormality in the data. Thus, the null hypothesis that the data is normally distributed should not be rejected and the error term follows the normal distribution.

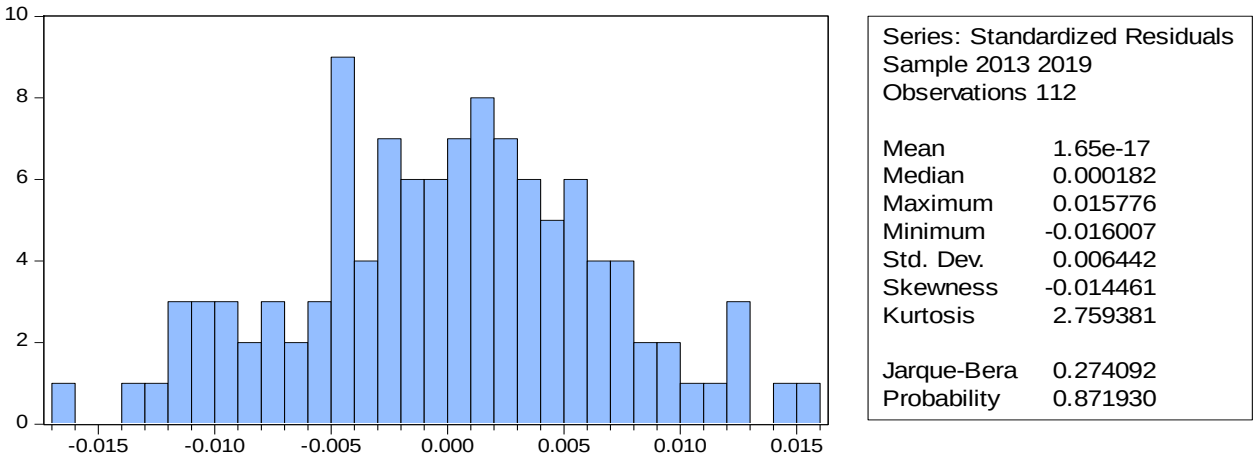
Figure 3-Normality Test for ROE



Source: own computation through Eviews 9

As shown in Figure 3 the histogram is bell shaped, the kurtosis is around 3 (3.369021). The Jarque-Bera statistic has a P-value of 0.19 which is greater than 0.05. This shows that there was no evidence for the presence of abnormality in the data. Thus, the null hypothesis that the data is normally distributed should not be rejected and the error term follows the normal distribution. It can be concluded that there is no problem of Normality on ROE model.

Figure 4-Normality Test for NIM



Source: own computation through Eviews 9

As shown in Figure 4 the histogram is bell shaped, the kurtosis is around 3 (2.7593) and skewness around 0 (-0.01446). The Jarque-Bera statistic has a P-value of 0.871930 which is greater than 0.05, hence, the null hypothesis that the data is normally distributed cannot be rejected. It can be concluded that there is no problem of Normality on NIM model.

4.4. Multicollinearity Test

Multicollinearity will occur if some or all of the independent variables are highly correlated with one another. (Brooks, 2008). If multicollinearity is perfect, the regression coefficients of the explanatory variables are indeterminate and their standard

errors are infinite. If multicollinearity is less than perfect, the regression coefficients, although determinate, possess large standard errors, which means the coefficients cannot be estimated with great precision or accuracy. (Damodar N. Gujarati and Dawn C. Porter (2009).

According to Adanech (2017) quoting Guajarati (2004), if the correlation coefficient is higher than 0.8, it is considered as the model consists a serious multicollinearity problem.

Table 4-Result of Multicolliniarity Test

	CAR	INF	IS	LIQUIDITY_R	LOG_BS	NPL	REAL_GDP_G.R	TLTD	UER
CAR	1	-0.09024	-0.28087	0.563046	-0.7585	0.270961	0.128791	0.038167	-0.16569
INF	-0.09024	1	0.094191	-0.17043	0.18024	-0.13011	-0.52783	0.077223	0.68841
IS	-0.28087	0.094191	1	0.097179	0.249585	-0.57161	0.030696	-0.1059	0.048368
LIQUIDITY	0.563046	-0.17043	0.097179	1	-0.71849	0.052597	0.285491	-0.41173	-0.22271
LOG_BS	-0.7585	0.18024	0.249585	-0.71849	1	-0.29391	-0.30398	0.276618	0.357473
NPL	0.270961	-0.13011	-0.57161	0.052597	-0.29391	1	0.049254	0.008853	-0.06793
REAL_GDP G.R	0.128791	-0.52783	0.030696	0.285491	-0.30398	0.049254	1	-0.25011	-0.4175
TLTD	0.038167	0.077223	-0.1059	-0.41173	0.276618	0.008853	-0.25011	1	0.173955
UER	-0.16569	0.68841	0.048368	-0.22271	0.357473	-0.06793	-0.4175	0.173955	1

Source: own computation through Eviews 9

From table 4, we can observe that a correlation between LOG_BS and CAR is the highest correlation among all the variables which is -.7585. Considering that -0.7585 is below to that of 0.80, we can conclude that there is no problem of multicollinearity among the variables.

Additionally, according to Gujarati (2004), if the result of variance inflation factor (VIF) is below the 10 and Tolerance near to zero suggest no multicollinearity. As pointed in Annex IV, VIF results of the variables in the model ranges from 1.51 to 4.68. The tolerance factor is reasonably good which implies the absence of multicollinearity among the variables of the model.

4.5. Hetroscedastic Test

One of the assumptions of multiple linear regressions is that the variance of the error terms is constant over time. According to Brooks (2008), Heteroscedasticity means that error terms do not have a constant variance. According to Adanech (2017) Heteroscedasticity test is very important because if the model consists of heteroskedasticity problem, the OLS estimators are no longer BEST and error variances are incorrect, therefore the hypothesis testing, standard error and confident level will be invalid.

In this study Breusch-Pagan test was employed to test for existence of heteroscedasticity across the range of explanatory variables.

The hypothesis for the heteroskedasticit y test is;

Ho: there is no Heteroscedasticity problem.

H1: There is Heteroscedasticity problem.

a = 0.05

Decision Rule: Reject H0 if P value of Breusch-Pagan test less than significant level 0.05. Otherwise, do not reject H0

Table 5-Heteroskedasticity Test for ROA

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.394343	Prob. F(9,102)	0.2004
Obs*R-squared	12.26983	Prob. Chi-Square(9)	0.1985
Scaled explained SS	8.322153	Prob. Chi-Square(9)	0.5020

Source: own computation through Eviews 9

Table 6-Heteroskedasticity Test for ROE

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.883378	Prob. F(9,102)	0.5428
Obs*R-squared	8.098608	Prob. Chi-Square(9)	0.5242
Scaled explained SS	7.956344	Prob. Chi-Square(9)	0.5386

Source: own computation through Eviews 9

Table 7-Heteroskedasticity Test for NIM

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.907262	Prob. F(9,102)	0.0590
Obs*R-squared	16.13322	Prob. Chi-Square(9)	0.0642
Scaled explained SS	11.77105	Prob. Chi-Square(9)	0.2265

Source: own computation through Eviews 9

Accordingly, table 5, 6 and 7 shows that all the tests give the same conclusion that there is no significant evidence for the presence of Heteroskedasticity in ROA, ROE and NIM models. Since the p-values in all of the cases were above 0.05, the null hypothesis will not be rejected.

4.6. Autocorrelation Test

According to (Brooks, 2008), when the error term for any observation is related to the error term of other observation, it indicates that autocorrelation problem exist in this model.

Brooks (2008) noted that the test for the existence of autocorrelation is made using the Durbin-Watson (DW) test and Breusch-Godfrey test.

In this study, Durbin-Watson (DW) and BreuschGodfrey Serial Correlation LM Test is used to carry out the autocorrelation test. If the p-value is more than 5% significant level, it implies that there is no autocorrelation problem in the model.

The hypothesis for the model specification test was formulated as follow;

H0: There is no autocorrelation problem.

H1: There is autocorrelation problem.

a = 0.05

Decision Rule: Reject H0 if P value of JB less than significant level 0.05. Otherwise, do not reject H0

Table 8-Serial Correlation LM Test for ROA

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.232394	Prob. F(2,100)	0.7931
Obs*R-squared	0.518155	Prob. Chi-Square(2)	0.7718

Source: own computation through Eviews 9

Table 9-Serial Correlation LM Test for ROE

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.751684	Prob. F(2,100)	0.4742
Obs*R-squared	1.658833	Prob. Chi-Square(2)	0.4363

Source: own computation through Eviews 9

Table 10. Serial Correlation LM Test for NIM

Table 10-Serial Correlation LM Test for NIM

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.456699	Prob. F(2,100)	0.2379
Obs*R-squared	3.170632	Prob. Chi-Square(2)	0.2049

Source: own computation through Eviews 9

From the result obtained as shown in table 8,9 and 10, it can be concluded that null hypothesis (H0), will not be rejected since the p values for ROA, ROE and NIM models are greater than significance level of 0.05.

According to Andy Field (2009) quoted by Dereje Turi (2015), the acceptable Durbin Watson range is between 1.5 and 2.5. As Table 14, 15 and 16 shows the Durbin – Watson values ranges for ROA, ROE and NIM are 2.04, 2 and 1.61 respectively which are in between the ranges and close to 2. This shows that in all the three models the Durbin Watson is in between the acceptable ranges indicating that there is no auto correlation problem.

4.7. Choosing Random effect (RE) versus fixed effect (FE) models

According to Brooks (2008), there are two types of panel estimator approaches that can be employed, namely: fixed effects models (FEM) and random effects models (REM). The appropriate test used to decide whether fixed effect or random effect model was Hausman Specification Test.

The hypothesis for the model choice test are

H0: Random Effect Model is appropriate.

H1: Fixed Effect Model is appropriate.

a = 0.05

Decision Rule: Reject Ho if p-value less than significance level 5%. Otherwise, do not reject Ho.

Table 11-Hausman Test for ROA

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.558688	9	0.1038

Source: own computation through Eviews 9

Table 12-Hausman Test for ROE

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.792007	9	0.5552

Source: own computation through Eviews 9

Table 13-Hausman Test for NIM

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.659158	9	0.9324

Source: own computation through Eviews 9

As per the result from table 11,12 and 13, all the p-values are above 0.05 which accepts the null hypothesis. Hence the model adopted is a random effects model.

4.8. Regression Result and Discussion

This section describes the result on the effect of credit risk management on the performance of private commercial banks in Ethiopia. It uses a random effect model based on a balanced panel data, where a time series period from 2013 to 2019 and a cross section segment which includes all the sixteen private commercial banks are used. The overall results of the regression analysis are presented by using separate table for each model. In this study ROA, ROE and NIM was used as proxy for performance measure while NPL, TLTD, CAR, BS, Liquidity Ratio, IS, Real GDP Growth Rate, Inflation and Unemployment Rate are used as an independent variable. The regression result was made by using Eviews 9 software.

The regression result indicates the output of banks profitability which is measured by ROA, ROE and NIM. The R-squared and Adjusted R-Squared values which measures the explanatory power of the model are 0.752853 & 0.731046 for ROA, 0.833579 and 0.818895 for ROE and 0.650451 and 0.619608 for NIM. This implies that the explanatory power of the model which is around 73%, 82% and 62% of variations in return on asset, return on equity and net interest margin respectively of Ethiopian private commercial banks were explained by independent variables included in the model. However, the remaining 27%, 18% and 38% changes in ROA, ROE and NIM in that order are explained by other factors which are not included in this study model.

The F-statistic which is 34.52 for ROA, 56.76 for ROE and 21.08 for NIM is significant for the model, which enhanced the reliability and validity of the model. Furthermore, the null hypothesis which states that there is no statistically significant relationship between the dependent variable and the independent variables, has a probability value of 0.000000. This implies that the overall model is highly significant at 1%, and it supports that, all the independent variables are jointly important factors in determining the profitability of private commercial banks in Ethiopia

Table 14-Regression result Summary

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Dep Var.
CAR	-0.04456	0.017065	-2.61118	0.0104	ROA
	-0.35374	0.071439	-4.95155	0	ROE
	-0.01427	0.031214	-0.45731	0.6484	NIM
INF	0.012752	0.021603	0.590273	0.5563	ROA
	0.073889	0.084413	0.875333	0.3834	ROE
	-0.05724	0.037023	-1.54605	0.1252	NIM
IS	0.551726	0.05739	9.61368	0	ROA
	2.812489	0.227671	12.35331	0	ROE
	0.822011	0.099779	8.238338	0	NIM
LIQUIDITY_R	0.008645	0.00654	1.321835	0.1892	ROA
	0.068762	0.026175	2.62699	0.0099	ROE
	-0.02577	0.011466	-2.24744	0.0268	NIM
LOG_BS	0.000338	0.000801	0.421815	0.674	ROA
	0.004473	0.003333	1.342232	0.1825	ROE
	-0.0026	0.001457	-1.78717	0.0769	NIM
NPL	-0.19887	0.047467	-4.18957	0.0001	ROA
	-0.51821	0.188895	-2.74339	0.0072	ROE
	-0.34927	0.082773	-4.2196	0.0001	NIM
REAL_GDP_GROWTH_RATE	-0.01899	0.044861	-0.42322	0.673	ROA
	-0.1182	0.175674	-0.67286	0.5026	ROE
	0.034083	0.077039	0.442407	0.6591	NIM
TLTD	0.012257	0.00613	1.999475	0.0482	ROA
	0.060647	0.024594	2.465912	0.0153	ROE
	0.014173	0.010772	1.31569	0.1912	NIM
UER	-0.08436	0.070396	-1.19829	0.2336	ROA
	-0.391	0.277655	-1.40822	0.1621	ROE
	0.135888	0.121708	1.116509	0.2668	NIM

- **Nonperforming Loan Ratio (NPLR)**

According to the summary Table 14, Non-performing loan ratio which is measured by Non-performing loan to total loan has a significant (at 1% level of significance level) impact on the performance of the private banks proxied by ROA, ROE and NIM. The relationship is negative as the coefficient are negative for all the dependent variables. This implies, holding other independent variables constant, when NPL Ratio increased by one unit, ROA, ROE and NIM will be decreased by 0.20, 0.52 and 0.35 units

respectively. This enables the researcher to reject the null hypothesis of no significant impact on performance and accept the alternative. The relationships for all are negative as expected by the researcher.

The negative relationship is due to the fact that increase in non-performing loan deteriorate the loan, increase default rate, in which interest income will be compromised (not paid by the loanee); hence decrease the profitability. The finding is consistent with the studies of Jacob Akomeah etal (2020), Abu Hanifa etal (2015), Ambrose Ntangeki Nshala (2017), Sahlemichael Mekonnen (2009), Girma Mekasha (2011), Daniel Ambaw (2017), Hosna et.al (2009), Ogilo Fredrick (2012), Tibebu Tefera (2011) Misker Bizuayehu (2015), and Fan Li & Yijun Zou (2014).

- **Capital Adequacy Ratio (CAR)**

CAR has a negative and strong relationship with the profitability indicator ROA and ROE while weak relationship to that of NIM. It has a coefficient of -0.044561and a p value of 0.0104 for ROA, while -0.353736 and 0.0000 for ROE which reveals that it is statistically significant at 5% and 1% level of significance respectively. The finding supports the researcher to reject the null hypothesis and accept the alternative.

Regarding NIM, CAR has a coefficient of -0.014274and the p value of 0.6484 which reveals that it is statistically insignificant at 1%, 5% and 10% level of significance. The finding in NIM does not supports the researcher to reject the null hypothesis and to accept the alternate. Holding other independent variables constant a 1unit increase in CAR, decreases the ROA, ROE and NIM on the private commercial banks of Ethiopia by 0.044, 0.35 and 0.014 respectively.

According to Million Gizaw (2015), quoting Ezike and Oke (2013) mentioned that holding capital beyond the optimal level would inversely affect the efficiency and profitability of commercial banks. Though the minimum CAR requirement of commercial banks in Ethiopia is 8%, the result on the average CAR of banks under study are 15.27%, which is higher than the minimum requirement. As per the argument

above banks hold more reserve than the necessary amount to handle unexpected risk it may encounter, leads to the prevailing of a negative relationship.

The result is in accordance with some of the previous researches including research conducted by Fan Li & Yijun Zou (2014), Rrustem Asllanaj (2018) Hosna et.al (2009), Abu Hanifa etal (2015), Ogilo Fredrick (2012), Tibebu Tefera (2011), Misker Bizuayehu.(2015), Dawit Fekadu (2016). Million Gizaw (2015)

- **Total Loan Total Deposit (TLTD)**

The regression result indicates that total loan to total deposit ratio has positive and significant relationship at 5% level of significance on the performance indicator proxied by ROA & ROE while it is insignificant for NIM. The coefficients for ROA, ROE and NIM in that order are 0.012257, 0.060647 & 0.014173 also the p-value are 0.0482, 0.0153 and 0.1912.

The coefficient sign is similar to the expectation of the researcher. The regression result helps the researcher to reject the null hypothesis and accept the alternate for ROA and ROE whereas it is the opposite for NIM. Holding other independent variables constant a 1unit increase in TLTD, increases the ROA, ROE and NIM by 0.012, 0.06 & 0.014 units.

The positive relationship is due to the result of the interest rate difference between what the banks charges on loan and what they actually payes on the deposits. Misker Bizuayehu (2015). As the interest gap and the ratio increases the profitability increase as well, hence positive relationship of profitability and TL/TD ratio.

Same result also pointed out by previous researcher like Dhanuskodi Rengasamy (2014), Pamuji Gesang Raharjo et.al (2014) and Misker Bizuayehu (2015).

- **Bank Size (Log TA)**

The random effect model result table 14 reveals that banks size as measured by logarithm of total asset has an insignificant positive relation with ROA and ROE while negative to NIM. The results sign is to the exact expectation of the researcher for ROA and ROE.

The coefficient and p - value for ROA is 0.000338 and 0.674; for ROE 0.004473 and 0.1825 for NIM -0.002603 and 0.0769 respectively. An increase of one unit in the Logarithm of total assets Increases ROA, ROE by 0.0003 and 0.004 while it increases NIM by 0.002603. It is statistically insignificant for ROA and ROE while significant at 10% level of significance for NIM. As the results are statistically insignificant, the researcher is not in the position to reject the null hypothesis except for NIM.

As noted by Dawit Fikadu (2016), the possible reason for the positive relationship could be that, large bank size performs better than the smaller banks due to the existence of economies of scale though statistically it is insignificant.

Same positive relation was found out for ROA and ROE by previous researchers like Engidawork Tadesse (2014), Addisu Anagaw (2017), Dawit Fikadu (2016), Endawek Mitku (2015), Eneyew Lake (2013), Lamia Jamel and Sihem Mansour (2018), Sehrish Gul, Faiza Irshad and Khalid Zaman (2011), Misker Bizuayehu (2015) Dawit Fikadu (2016) and Ramazan Ekinci and Gulden Poyraz (2019) also found same positive relations with ROE.

Regarding NIM, same negative relation was found out by previous researchers like Yong Aaron and Christos Floros (2012), Mohammed Imad Albarbari and Lukas Kipper (2020).

As Misker Bizuayehu (2015) noted by quoting Eichengreen and Gibson (2001), which suggest that the effect of a growing bank's size on profitability may be positive up to a certain limit. Beyond this point the effect of size could be negative due to bureaucratic and other reasons. Same reason is noted by Yong Aaron and Christos Floros (2012), Mohammed Imad Albarbari and Lukas Kipper (2020).

In addition, Dawit Fikadu (2016), quoting Dietrich & Wanzenried (2009) and Ezra (2013) which are found negative relationship between bank size and performance, suggested that the smaller the bank, the more efficient the bank will be. This may be noted as a reason for the negative result in relation to NIM

- **Liquidity Ratio**

Table 14 depicts that, the coefficient of liquidity ratio measured by liquid assets to total deposits shows a positive result for ROA and ROE while it is negative for NIM. ROA, ROE and NIM has a coefficient value of 0.005906, 0.068762 and-0.025769. Their P-value respectively are 0.3669, 0.0099 and 0.0268. ROE and NIM are statistically significant in which the researcher is in the position to reject the null hypothesis while ROA is not. Holding other independent variables constant, when liquidity ratio increased by one unit, NIM of Ethiopian private commercial banks would be decreased by 0.025 while ROA and ROE of Ethiopian private commercial banks would increase by0.5906 and 0.068 units.

The result of ROA & ROE is in accordance with the findings of Dawit Belete (2017), Kihara Duke Wambari &. Mirie Mwangi (2017), Tesfaye Boru (2014) and Ogilo Fredrick (2012). The positive result is may be due to the fact that, the higher the Liquidity ratio the higher availability of loanable funds. The fund either invested or provided as loan which entails profitability. Regarding NIM the findings is same as of Pamuji Gesang Raharjo et.al (2014) which concludes liquidity negatively correlates with NIM.

The basic reason of the difference is suspected to be, not providing of a loan as liquidity increases which results in decline of profits. That is why the NIM decreases when Liquidity ratio increases.

But, contextually regarding commercial banks in Ethiopia, liquidity decreases as loanable fund increases every time which entails positive relationship.

- **Interest Spread (IS)**

According to table 14, IS has a positive and significant result in all dependent variables at 1% significance level which helps the researcher to reject the null hypothesis and accept the alternative. It implies that the one unit change in IS will have the positive effect of change on ROA, ROE and NIM by 0.55, 2.81 and 0.82. Both the result as well as the sign is in line with the researcher's expectation.

Researchers like Alhassan Musah et.al. (2018) and Alhassan M., Fred K. A. & Erasmus D. G. (2018) also found same result.

The results could also be interpreted from the context of the loanable funds theory which suggest that interest rate spread will be high if demand for loanable funds exceed supply of loanable funds. This means there is more demand for loans than the supply of loans which is making banks keep the interest rate of lending at a higher rate. Alhassan Musah et.al. (2018)

- **Macroeconomic Variables**

As per table 14 result; Inflation, Real GDP growth rate and Unemployment Rate has a coefficient value of 0.012752, -0.018986 & -0.084355 respectively. Their probability values are 0.5563, 0.673 and 0.2336 which shows that they are insignificant at 1%, 5% and 10% significant levels, which implies that macroeconomic variables are not the major factors that determine the profitability of private banks in Ethiopia. Hence, the researcher is not in a position to reject the null hypothesis for all the three macroeconomic variables.

Real GDP growth rate and Unemployment rate have a negative impact on ROA and ROE while it has a positive effect to NIM. The result of unemployment rate is similar to the study of Tewodros Gebreyes (2019) regarding ROA and ROE which implies increase of unemployment rate affects the bank's profitability negatively though it is insignificant.

The Real GDP growth rate result for ROA and ROE are negative like the findings of Dawit Belete (2017), Adama Combey & Apélété Togbenou (2017), Ramazan Ekinci and Gulden Poyraz (2019), Mohammed Imad Albarbari and Lukas Kipper (2020).

According to Adama Combey & Apélété Togbenou (2017), this result pointed out the debate about banking sector in Sub-Saharan baking sector capacities to manage loans losses and loans originate in GDP expansion period.

On the other hand, the Real GDP growth rate result for NIM is positive and consistent with the study conducted by Mohammed Imad Albarbari and Lukas Kipper (2020), Srđan Marinković & Ognjen Radović (2014)

According to Adama Combey & Apélété Togbenou (2017) quoting (Jiménez et al., 2009; Bolt et al., 2012; Calza et al., 2006). in theory, real GDP growth affects positively banking performance through three mains channels: net interest income, loan losses improving, and operating costs. Firm's profitability increases during economic expansion, and declines in recession's period. Thus, a higher GDP growth causes firms loans and deposits to increase and make bank's net interest income and loans losses to improve which is witnessed in NIM.

On the other hand, Inflation has a positive impact on ROA and ROE while it is negative for NIM. The positive sign of inflation is similar to the study conducted by Dawit Belete (2017), Samuel Alemu (2015), Yong Aaron and Christos Floros (2012), Tesfaye Boru (2014), Maysa'a Munir Milhem & Ibrahim Abed Alhaleem Abadeh (2018) and Sehrish Gul, Faiza Irshad and Khalid Zaman (2011)

As noted by Dawit Belete (2017), the positive result of inflation is due to the fact that, commercial banks are given discretion to set their lending interest rate freely and when they anticipate a high inflation they adjust their lending interest rate which increase profitability.

High inflation rates are generally associated with high loan interest rates, and therefore, high incomes, Lamia Jamel and Sihem Mansour (2018). Yong Aaron and Christos Floros (2012) during their study also noted that inflation is anticipated which gives banks the opportunity to adjust the interest rates accordingly, resulting in revenues that increase faster than costs, with a positive impact on profitability.

But studies conducted by Joyce Wangari (2015), Mohammad Ali Aghaeea and Morteza Kazempourb (2013), Maysa'a Munir Milhem & Ibrahim Abed Alhaleem Abadeh (2018), Ramazan Ekinci and Gulden Poyraz (2019) found a negative result of inflation which is similar to the NIM found in this study.

Perry (1992) argues that the effects of inflation on bank interest depend on whether inflation is anticipated or unanticipated. If inflation is anticipated, then the banks adjust interest rate accordingly, thereby increasing the interest rate margins. On the other hand,

if inflation is not anticipated, then banks may be slow in adjusting their interest rates and so may affect the interest margin negatively because of increased costs occasion by inflation. Contextual to our country, the negative result defies the logic as every bank has the authority to adjust the interest rate if inflation increases though there is a time gap between adjustments.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

This chapter deals with the overall conclusion and possible recommendations that will be provided based on the findings of the previous chapter. First the summarized conclusion on the empirical findings will be noted. Then, according to the findings, some possible recommendations will be given to respective stakeholders.

5.1. Conclusion

The study examines the effect of credit risk management on the profitability of private commercial banks in Ethiopia using bank specific, industry specific and macroeconomic variables. It is conducted based on panel data using annual figures for the period from 2013 to 2019 for all sixteen private banks exist in the period. The data was analyzed using multiple regression model through random effect model by the help of Eviews 9 software. Before the regression analysis, the diagnostic tests for the classical linear regression model were conducted. Accordingly, the result found free from multicollinearity, hetroscadacity; and autocorrelation. The data found be normally distributed and fit for the regression.

As the results of the regression shows NPL ratio has a negative and statistically significant impact on the performance of private banks in Ethiopia by all profitability measures (ROA, ROE and NIM).

On the other hand, IS has a significant positive relationship in all the performance indicators on private commercial banks of Ethiopia.

In addition, CAR and TLTD has significant impact on ROA and ROE. Their impact is negative for CAR and positive for TLTD while it is insignificant for NIM.

However, the results of the regression model revealed that macroeconomic variables have weak relationship with all the dependent variables, in which it has an insignificant effect on the performance of private commercial banks in Ethiopia.
The effect of Liquidity ratio and Log BS on ROA and ROE is very minimal in spite of negative and significant result on NIM.

From the results of the regression, it can be concluded that bank specific factors like NPL ratio, IS, CAR and TLTD have impact on the performance of private commercial banks in Ethiopia, while industry and macroeconomic variable have insignificant impact. That is to mean, the better the credit risk management, the higher the profitability of banks, as there shows a positive relationship between credit risk management and banks performance.

5.2. Recommendations

Based on the findings of the regression analysis and conclusions taken from above the below possible recommendations are forwarded.

- ✓ As better credit risk management result more profitability, managers shall provide attention on prudent credit risk management process, especially in credit processing and minimizing of NPL.
- ✓ The banks which mobilize deposit shall provide the loan for different portfolios hand on hand so as to manage the cost of fund. In addition, they shall investigate and update their customer handling procedures for a better customer's value experience, which impact on profitability.
- ✓ As the macroeconomic factors influence is minimal on the profitability of banks, more attention shall be given on the management of bank specific factors than those external factors.
- ✓ A continuous study shall be conducted by the banks, governing body or any other stakeholders on the impacts of different variables in the stability and profitability of banks.
- ✓ Finally, I suggest and propose that it could be better to include more and new indicators of credit risk management, more areas to cover like east Africa, whole Africa in the studies of credit risk impact on profitability of banks.

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Appendices

Appendix I-Multiple Variables Regression Model (ROA)

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 01/19/21 Time: 19:45
Sample: 2013 2019
Periods included: 7
Cross-sections included: 16
Total panel (balanced) observations: 112
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	-0.044561	0.017065	-2.611179	0.0104
INF	0.012752	0.021603	0.590273	0.5563
IS	0.551726	0.057390	9.613680	0.0000
LIQUIDITY_R	0.008645	0.006540	1.321835	0.1892
LOG_BS	0.000338	0.000801	0.421815	0.6740
NPL	-0.198868	0.047467	-4.189570	0.0001
REAL_GDP_GROWTH_RATE	-0.018986	0.044861	-0.423224	0.6730
TLTD	0.012257	0.006130	1.999475	0.0482
UER	-0.084355	0.070396	-1.198292	0.2336
C	0.018972	0.016696	1.136345	0.2585

Effects Specification		
	S.D.	Rho
Cross-section random	0.000599	0.0230
Idiosyncratic random	0.003905	0.9770

Weighted Statistics			
R-squared	0.752853	Mean dependent var	0.021669
Adjusted R-squared	0.731046	S.D. dependent var	0.007803
S.E. of regression	0.004047	Sum squared resid	0.001671
F-statistic	34.52336	Durbin-Watson stat	2.049101
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.759682	Mean dependent var	0.023388
Sum squared resid	0.001718	Durbin-Watson stat	1.992037

Appendix II-Multiple Variables Regression Model (ROE)

Dependent Variable: ROE

Method: Panel EGLS (Cross-section random effects)
Date: 01/14/21 Time: 04:01
Sample: 2013 2019
Periods included: 7
Cross-sections included: 16
Total panel (balanced) observations: 112
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	-0.353736	0.071439	-4.951550	0.0000
INF	0.073889	0.084413	0.875333	0.3834
IS	2.812489	0.227671	12.35331	0.0000
LIQUIDITY_R	0.068762	0.026175	2.626990	0.0099
LOG_BS	0.004473	0.003333	1.342232	0.1825
NPL	-0.518212	0.188895	-2.743392	0.0072
REAL_GDP_GROWTH_RATE	-0.118203	0.175674	-0.672857	0.5026
TLTD	0.060647	0.024594	2.465912	0.0153
UER	-0.390999	0.277655	-1.408220	0.1621
C	0.070592	0.067011	1.053438	0.2946

Effects Specification	S.D.	Rho
Cross-section random	0.004355	0.0762
Idiosyncratic random	0.015164	0.9238

Weighted Statistics

R-squared	0.833579	Mean dependent var	0.115522
Adjusted R-squared	0.818895	S.D. dependent var	0.035770
S.E. of regression	0.015223	Sum squared resid	0.023636
F-statistic	56.76714	Durbin-Watson stat	2.000237
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.849752	Mean dependent var	0.145086
Sum squared resid	0.025523	Durbin-Watson stat	1.852383

Appendix III-Multiple Variables Regression Model (NIM)

Dependent Variable: NIM
Method: Panel EGLS (Cross-section random effects)
Date: 01/14/21 Time: 05:29
Sample: 2013 2019
Periods included: 7
Cross-sections included: 16
Total panel (balanced) observations: 112
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.

CAR	-0.014274	0.031214	-0.457309	0.6484
INF	-0.057239	0.037023	-1.546047	0.1252
IS	0.822011	0.099779	8.238338	0.0000
LIQUIDITY_R	-0.025769	0.011466	-2.247437	0.0268
LOG_BS	-0.002603	0.001457	-1.787167	0.0769
NPL	-0.349268	0.082773	-4.219604	0.0001
REAL_GDP_GROWTH_RATE	0.034083	0.077039	0.442407	0.6591
TLTD	0.014173	0.010772	1.315690	0.1912
UER	0.135888	0.121708	1.116509	0.2668
C	0.049678	0.029347	1.692768	0.0936

Effects Specification	S.D.	Rho
Cross-section random	0.001864	0.0728
Idiosyncratic random	0.006653	0.9272

Weighted Statistics

R-squared	0.650451	Mean dependent var	0.034628
Adjusted R-squared	0.619608	S.D. dependent var	0.010609
S.E. of regression	0.006543	Sum squared resid	0.004367
F-statistic	21.08936	Durbin-Watson stat	1.612887
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.664207	Mean dependent var	0.043107
Sum squared resid	0.004613	Durbin-Watson stat	1.526770

Appendix IV- Heteroskedasticity Test: Breusch-Pagan-Godfrey-ROA

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.394343	Prob. F(9,102)	0.2004
Obs*R-squared	12.26983	Prob. Chi-Square(9)	0.1985
Scaled explained SS	8.322153	Prob. Chi-Square(9)	0.5020

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/19/21 Time: 19:44
Sample: 1 112
Included observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.05E-05	8.15E-05	0.619986	0.5366
CAR	-0.000108	8.14E-05	-1.330022	0.1865
INF	-7.53E-05	0.000107	-0.704450	0.4828
IS	6.35E-05	0.000281	0.225804	0.8218
LIQUIDITY_R	-2.65E-05	3.19E-05	-0.831695	0.4075
LOG_BS	-2.90E-06	3.83E-06	-0.758126	0.4501

NPL	-3.55E-05	0.000232	-0.153009	0.8787
REAL_GDP_GROWTH_RATE	0.000331	0.000222	1.490188	0.1393
TLTD	-3.69E-05	2.99E-05	-1.236512	0.2191
UER	0.000199	0.000347	0.574133	0.5671

R-squared	0.109552	Mean dependent var	1.53E-05
Adjusted R-squared	0.030983	S.D. dependent var	1.97E-05
S.E. of regression	1.94E-05	Akaike info criterion	-18.77856
Sum squared resid	3.84E-08	Schwarz criterion	-18.53583
Log likelihood	1061.599	Hannan-Quinn criter.	-18.68008
F-statistic	1.394343	Durbin-Watson stat	2.146848
Prob(F-statistic)	0.200449		

Appendix V- Heteroskedasticity Test: Breusch-Pagan-Godfrey-ROE

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.883378	Prob. F(9,102)	0.5428
Obs*R-squared	8.098608	Prob. Chi-Square(9)	0.5242
Scaled explained SS	7.956344	Prob. Chi-Square(9)	0.5386

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/05/21 Time: 05:53
Sample: 1 112
Included observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000489	0.001483	0.329760	0.7423
CAR	0.001376	0.001481	0.929296	0.3549
INF	0.001464	0.001947	0.751907	0.4538
IS	0.004676	0.005123	0.912802	0.3635
LIQUIDITY_R	-0.000840	0.000581	-1.446031	0.1512
LOG_BS	-2.25E-05	6.97E-05	-0.323146	0.7472
NPL	0.003996	0.004228	0.945012	0.3469
REAL_GDP_GROWTH_RATE	0.005023	0.004039	1.243559	0.2165
TLTD	-0.000859	0.000544	-1.579624	0.1173
UER	-0.001114	0.006317	-0.176310	0.8604

R-squared	0.072309	Mean dependent var	0.000227
Adjusted R-squared	-0.009546	S.D. dependent var	0.000351
S.E. of regression	0.000353	Akaike info criterion	-12.97525
Sum squared resid	1.27E-05	Schwarz criterion	-12.73252
Log likelihood	736.6138	Hannan-Quinn criter.	-12.87677
F-statistic	0.883378	Durbin-Watson stat	1.906463
Prob(F-statistic)	0.542781		

Appendix VI- Heteroskedasticity Test: Breusch-Pagan-Godfrey-NIM

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.907262	Prob. F(9,102)	0.0590
Obs*R-squared	16.13322	Prob. Chi-Square(9)	0.0642
Scaled explained SS	11.77105	Prob. Chi-Square(9)	0.2265

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/14/21 Time: 05:26
Sample: 1 112
Included observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.07E-05	0.000222	-0.138364	0.8902
CAR	0.000148	0.000222	0.666352	0.5067
INF	0.000256	0.000292	0.878774	0.3816
IS	-0.002263	0.000768	-2.948759	0.0040
LIQUIDITY_R	-3.70E-05	8.70E-05	-0.424703	0.6719
LOG_BS	1.68E-05	1.04E-05	1.612627	0.1099
NPL	-0.000586	0.000633	-0.925095	0.3571
REAL_GDP_GROWTH_RATE	0.000121	0.000605	0.199278	0.8424
TLTD	-7.96E-05	8.14E-05	-0.976851	0.3310
UER	-0.000617	0.000946	-0.652135	0.5158

R-squared	0.144047	Mean dependent var	4.11E-05
Adjusted R-squared	0.068521	S.D. dependent var	5.48E-05
S.E. of regression	5.29E-05	Akaike info criterion	-16.77200
Sum squared resid	2.85E-07	Schwarz criterion	-16.52928
Log likelihood	949.2322	Hannan-Quinn criter.	-16.67352
F-statistic	1.907262	Durbin-Watson stat	1.879956
Prob(F-statistic)	0.059029		

Appendix VII- Variance Inflation Factors

Variance Inflation Factors
Date: 01/19/21 Time: 19:45
Sample: 1 112
Included observations: 112

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
CAR	0.000296	49.01613	3.045343
INF	0.000512	39.54095	2.484174
IS	0.003547	23.99631	1.783637

LIQUIDITY_R	4.56E-05	30.05967	2.989538
LOG_BS	6.57E-07	1130.428	4.687768
NPL	0.002416	16.39784	1.564442
REAL_GDP_GROWTH_RATE	0.002204	129.5202	1.573842
TLTD	3.99E-05	109.4926	1.516888
UER	0.005392	1143.084	2.316636
C	0.000297	1976.771	NA

Appendix VIII- Raw Data

Year	Banks	ROE	ROA	NIM	NPL	Real GDP growth R	INF	UER	TLTD	LOG_BS	Liquidity R	IS	CAR
2013	Abay	0.0956	0.0117	0.0268	0.0417	0.0990	0.1350	0.1794	0.5785	14.4839	0.3865	0.0232	0.1732
2014	Abay	0.1083	0.0212	0.0460	0.0277	0.1030	0.0800	0.1740	0.5929	14.9777	0.3417	0.0326	0.1414
2015	Abay	0.1489	0.0233	0.0450	0.0412	0.1020	0.0780	0.1680	0.6459	15.3377	0.2461	0.0300	0.1563
2016	Abay	0.1296	0.0201	0.0538	0.0343	0.0800	0.0970	0.1690	0.6452	15.6379	0.2334	0.0279	0.1553
2017	Abay	0.1216	0.0187	0.0448	0.0416	0.1010	0.0720	0.1800	0.6344	15.9701	0.2693	0.0334	0.1540
2018	Abay	0.1494	0.0186	0.0415	0.0390	0.0770	0.1310	0.1910	0.6341	16.3271	0.3084	0.0271	0.1463
2019	Abay	0.1735	0.0282	0.0514	0.0230	0.0900	0.1370	0.1870	0.6649	16.5306	0.2813	0.0448	0.1627
2013	Abyssinia	0.1707	0.0282	0.0492	0.0275	0.0990	0.1350	0.1794	0.5534	16.1309	0.2320	0.0391	0.1063
2014	Abyssinia	0.1529	0.0207	0.0506	0.0337	0.1030	0.0800	0.1740	0.5564	16.2382	0.3019	0.0318	0.1356
2015	Abyssinia	0.1351	0.0179	0.0494	0.0270	0.1040	0.0780	0.1680	0.5311	16.4305	0.2595	0.0315	0.1325
2016	Abyssinia	0.1500	0.0189	0.0415	0.0419	0.0800	0.0970	0.1690	0.5876	16.6386	0.2276	0.0316	0.1262
2017	Abyssinia	0.1300	0.0168	0.0415	0.0430	0.1010	0.0720	0.1800	0.6728	17.0691	0.1662	0.0323	0.1290
2018	Abyssinia	0.1127	0.0196	0.0317	0.0291	0.0770	0.1310	0.1910	0.6890	17.2807	0.1740	0.0193	0.1327
2019	Abyssinia	0.1334	0.0168	0.0527	0.0299	0.0900	0.1370	0.1870	0.7286	17.4866	0.1391	0.0321	0.1260
2013	Addis	0.1028	0.0125	0.0285	0.0450	0.0990	0.1350	0.1794	0.5836	13.7280	0.5967	0.0215	0.2456
2014	Addis	0.1203	0.0230	0.0384	0.0425	0.1030	0.0800	0.1740	0.6444	14.0488	0.5439	0.0315	0.2498
2015	Addis												

		0.1120	0.0219	0.0408	0.0261	0.1040	0.0780	0.1680	0.6954	14.3549	0.4412	0.0316	0.2595
2016	Addis	0.1140	0.0213	0.0460	0.0270	0.0800	0.0970	0.1690	0.6804	14.7166	0.4911	0.0319	0.2585
2017	Addis	0.1035	0.0123	0.0318	0.0451	0.1010	0.0720	0.1800	0.6946	15.0436	0.4065	0.0229	0.2219
2018	Addis	0.1063	0.0228	0.0475	0.0186	0.0770	0.1310	0.1910	0.6925	15.2544	0.3489	0.0297	0.2141
2019	Addis	0.1218	0.0245	0.0418	0.0416	0.0900	0.1370	0.1870	0.6786	15.5230	0.3361	0.0324	0.2016
2013	Awash	0.1804	0.0271	0.0515	0.0229	0.0990	0.1350	0.1794	0.6146	16.6938	0.2847	0.0393	0.1162
2014	Awash	0.2024	0.0324	0.0519	0.0316	0.1030	0.0800	0.1740	0.6101	16.9114	0.3365	0.0416	0.1175
2015	Awash	0.1722	0.0322	0.0533	0.0215	0.1040	0.0780	0.1680	0.6740	17.0428	0.2096	0.0389	0.1263
2016	Awash	0.1607	0.0320	0.0505	0.0159	0.0800	0.0970	0.1690	0.6767	17.2543	0.2537	0.0280	0.1263
2017	Awash	0.1773	0.0270	0.0522	0.0157	0.1010	0.0720	0.1800	0.7380	17.5526	0.2288	0.0400	0.1146
2018	Awash	0.1953	0.0353	0.0517	0.0300	0.0770	0.1310	0.1910	0.7204	17.8277	0.2677	0.0366	0.1175
2019	Awash	0.2145	0.0377	0.0594	0.0161	0.0900	0.1370	0.1870	0.7928	18.1281	0.1907	0.0382	0.1291
2013	Berhan	0.1165	0.0202	0.0371	0.0238	0.0990	0.1350	0.1794	0.6128	14.6027	0.4644	0.0286	0.1736
2014	Berhan	0.1369	0.0217	0.0308	0.0361	0.1030	0.0800	0.1740	0.5889	14.8502	0.4879	0.0234	0.1970
2015	Berhan	0.1223	0.0213	0.0414	0.0232	0.1040	0.0780	0.1680	0.6199	15.2439	0.4052	0.0268	0.1742
2016	Berhan	0.2086	0.0271	0.0567	0.0249	0.0800	0.0970	0.1690	0.7094	15.7891	0.2939	0.0385	0.1473
2017	Berhan	0.1572	0.0283	0.0516	0.0208	0.1010	0.0720	0.1800	0.7022	16.1658	0.3161	0.0316	0.1797
2018	Berhan	0.1266	0.0198	0.0526	0.0248	0.0770	0.1310	0.1910	0.6604	16.4594	0.2458	0.0251	0.1565
2019	Berhan	0.1392	0.0203	0.0383	0.0355	0.0900	0.1370	0.1870	0.6819	16.7690	0.2041	0.0244	0.1458
2013	Bunna	0.1048	0.0118	0.0310	0.0425	0.0990	0.1350	0.1794	0.6135	14.5709	0.3754	0.0247	0.1761
2014	Bunna	0.1315	0.0226	0.0476	0.0270	0.1030	0.0800	0.1740	0.6325	14.9181	0.4153	0.0313	0.1716
2015	Bunna	0.1687	0.0254	0.0612	0.0214	0.1040	0.0780	0.1680	0.6987	15.3195	0.2341	0.0371	0.1506
2016	Bunna	0.1654	0.0331	0.0518	0.0352	0.0800	0.0970	0.1690	0.6737	15.7355	0.2327	0.0391	0.1409
2017	Bunna	0.1265	0.0174	0.0548	0.0285	0.1010	0.0720	0.1800	0.7073	16.0999	0.2758	0.0282	0.1378
2018	Bunna	0.1351	0.0206	0.0366	0.0353	0.0770	0.1310	0.1910	0.6979	16.3821	0.2684	0.0275	0.1523
2019	Bunna	0.1527	0.0217	0.0370	0.0319	0.0900	0.1370	0.1870	0.7822	16.4893	0.2158	0.0326	0.1772

2013	CBO	0.2493	0.0366	0.0594	0.0122	0.0990	0.1350	0.1794	0.4284	15.6933	0.4052	0.0542	0.1066
2014	CBO	0.1580	0.0320	0.0451	0.0311	0.1030	0.0800	0.1740	0.6282	15.8103	0.3185	0.0342	0.1483
2015	CBO	0.1882	0.0317	0.0542	0.0289	0.1040	0.0780	0.1680	0.8564	16.2546	0.3178	0.0430	0.1231
2016	CBO	0.0731	0.0103	0.0237	0.0500	0.0800	0.0970	0.1690	0.6970	16.1846	0.2471	0.0104	0.1142
2017	CBO	0.1164	0.0200	0.0348	0.0504	0.1010	0.0720	0.1800	0.6886	16.6904	0.2517	0.0242	0.0856
2018	CBO	0.1873	0.0315	0.0516	0.0292	0.0770	0.1310	0.1910	0.5933	17.2130	0.3023	0.0362	0.0795
2019	CBO	0.1700	0.0338	0.0515	0.0277	0.0900	0.1370	0.1870	0.6182	17.5482	0.2000	0.0374	0.0787
2013	Dashen	0.2521	0.0432	0.0562	0.0122	0.0990	0.1350	0.1794	0.5591	16.7985	0.3824	0.0543	0.1036
2014	Dashen	0.2331	0.0376	0.0551	0.0123	0.1030	0.0800	0.1740	0.5333	16.9048	0.3700	0.0475	0.1183
2015	Dashen	0.2120	0.0433	0.0592	0.0122	0.1040	0.0780	0.1680	0.5818	17.0249	0.2791	0.0432	0.1181
2016	Dashen	0.1840	0.0272	0.0517	0.0209	0.0800	0.0970	0.1690	0.5578	17.1681	0.3019	0.0392	0.1175
2017	Dashen	0.1610	0.0319	0.0403	0.0280	0.1010	0.0720	0.1800	0.6509	17.3601	0.1891	0.0323	0.1153
2018	Dashen	0.1346	0.0174	0.0324	0.0284	0.0770	0.1310	0.1910	0.6471	17.6316	0.1957	0.0227	0.1291
2019	Dashen	0.1262	0.0154	0.0251	0.0272	0.0900	0.1370	0.1870	0.7284	17.8448	0.1362	0.0187	0.1218
2013	Debub	0.0500	0.0100	0.0246	0.0500	0.0990	0.1350	0.1794	0.6335	13.0020	0.2215	0.0075	0.2000
2014	Debub	0.0728	0.0072	0.0217	0.0464	0.1030	0.0800	0.1740	0.5331	13.4787	0.5880	0.0133	0.2541
2015	Debub	0.0668	0.0128	0.0155	0.0367	0.1040	0.0780	0.1680	0.4207	13.9497	0.4107	0.0130	0.1914
2016	Debub	0.1364	0.0240	0.0488	0.0249	0.0800	0.0970	0.1690	0.6875	14.0717	0.2865	0.0315	0.2493
2017	Debub	0.1022	0.0121	0.0438	0.0387	0.1010	0.0720	0.1800	0.5454	14.5396	0.4771	0.0291	0.2050
2018	Debub	0.1329	0.0218	0.0432	0.0316	0.0770	0.1310	0.1910	0.7342	14.9975	0.3831	0.0294	0.2092
2019	Debub	0.1801	0.0326	0.0460	0.0164	0.0900	0.1370	0.1870	0.6958	15.5180	0.4492	0.0416	0.1812
2013	Enat	0.0500	0.0100	0.0257	0.0500	0.0990	0.1350	0.1794	0.5000	16.0800	0.2215	0.0308	0.2048
2014	Enat	0.0850	0.0117	0.0322	0.0352	0.1030	0.0800	0.1740	0.5449	14.1643	0.4619	0.0248	0.2045
2015	Enat	0.1007	0.0120	0.0346	0.0415	0.1040	0.0780	0.1680	0.7242	14.6083	0.3208	0.0248	0.2013
2016	Enat	0.1007	0.0121	0.0434	0.0415	0.0800	0.0970	0.1690	0.6775	14.9936	0.2793	0.0218	0.2052
2017	Enat	0.0933	0.0117	0.0324	0.0513	0.1010	0.0720	0.1800	0.6631	15.3941	0.2949	0.0209	0.1875

2018	Enat	0.1138	0.0208	0.0354	0.0161	0.0770	0.1310	0.1910	0.6701	15.6846	0.2628	0.0269	0.1831
2019	Enat	0.1116	0.0186	0.0433	0.0212	0.0900	0.1370	0.1870	0.7211	16.0349	0.2381	0.0217	0.1668
2013	Lion	0.1747	0.0322	0.0536	0.0210	0.0990	0.1350	0.1794	0.6259	14.8947	0.4670	0.0448	0.1842
2014	Lion	0.1308	0.0227	0.0517	0.0201	0.1030	0.0800	0.1740	0.5813	15.1001	0.4205	0.0349	0.1738
2015	Lion	0.2076	0.0391	0.0577	0.0122	0.1040	0.0780	0.1680	0.6457	15.5835	0.3445	0.0369	0.1403
2016	Lion	0.2078	0.0374	0.0551	0.0122	0.0800	0.0970	0.1690	0.6902	15.9097	0.2900	0.0427	0.1318
2017	Lion	0.1575	0.0291	0.0526	0.0337	0.1010	0.0720	0.1800	0.6349	16.2112	0.3044	0.0259	0.1320
2018	Lion	0.1836	0.0273	0.0518	0.0314	0.0770	0.1310	0.1910	0.6496	16.4771	0.2593	0.0374	0.1263
2019	Lion	0.1790	0.0272	0.0612	0.0318	0.0900	0.1370	0.1870	0.7229	16.8306	0.2201	0.0426	0.1255
2013	NIB	0.1461	0.0227	0.0415	0.0379	0.0990	0.1350	0.1794	0.6826	16.0287	0.3388	0.0324	0.1822
2014	NIB	0.1358	0.0248	0.0516	0.0308	0.1030	0.0800	0.1740	0.6971	16.1902	0.2418	0.0321	0.1828
2015	NIB	0.1316	0.0216	0.0538	0.0313	0.1040	0.0780	0.1680	0.7161	16.4000	0.1839	0.0262	0.1642
2016	NIB	0.1204	0.0192	0.0259	0.0395	0.0800	0.0970	0.1690	0.6186	16.5774	0.2397	0.0237	0.1591
2017	NIB	0.1421	0.0200	0.0257	0.0290	0.1010	0.0720	0.1800	0.6598	16.8610	0.1999	0.0247	0.1405
2018	NIB	0.1295	0.0164	0.0252	0.0300	0.0770	0.1310	0.1910	0.6339	17.0998	0.1797	0.0216	0.1267
2019	NIB	0.1389	0.0182	0.0260	0.0321	0.0900	0.1370	0.1870	0.7027	17.3335	0.1421	0.0225	0.1308
2013	OIB	0.1039	0.0145	0.0434	0.0354	0.0990	0.1350	0.1794	0.5315	15.1794	0.3938	0.0187	0.1400
2014	OIB	0.1747	0.0321	0.0543	0.0218	0.1030	0.0800	0.1740	0.5126	15.6322	0.3726	0.0352	0.1217
2015	OIB	0.1215	0.0193	0.0353	0.0216	0.1040	0.0780	0.1680	0.6539	16.0705	0.2297	0.0189	0.1107
2016	OIB	0.1001	0.0117	0.0267	0.0417	0.0800	0.0970	0.1690	0.6170	16.2387	0.2298	0.0168	0.1168
2017	OIB	0.1472	0.0150	0.0488	0.0319	0.1010	0.0720	0.1800	0.5249	16.6062	0.2474	0.0321	0.1022
2018	OIB	0.2387	0.0422	0.0607	0.0116	0.0770	0.1310	0.1910	0.5003	16.9851	0.2915	0.0537	0.1089
2019	OIB	0.1708	0.0299	0.0546	0.0267	0.0900	0.1370	0.1870	0.5763	17.2743	0.1926	0.0262	0.1168
2013	United	0.1995	0.0342	0.0482	0.0262	0.0990	0.1350	0.1794	0.5842	16.1159	0.2557	0.0429	0.1204
2014	United	0.1501	0.0199	0.0453	0.0173	0.1030	0.0800	0.1740	0.5693	16.2901	0.3800	0.0324	0.1326
2015	United	0.1418	0.0167	0.0325	0.0322	0.1040	0.0780	0.1680	0.5811	16.4800	0.2307	0.0202	0.1174

2016	United	0.1390	0.0167	0.0251	0.0317	0.0800	0.0970	0.1690	0.6546	16.6645	0.2239	0.0208	0.1200
2017	United	0.1290	0.0165	0.0251	0.0381	0.1010	0.0720	0.1800	0.7268	16.9021	0.1931	0.0180	0.1149
2018	United	0.1651	0.0317	0.0516	0.0198	0.0770	0.1310	0.1910	0.6528	17.1488	0.1961	0.0363	0.1054
2019	United	0.1657	0.0279	0.0507	0.0281	0.0900	0.1370	0.1870	0.7470	17.3917	0.1317	0.0272	0.1080
2013	Wegagen	0.1594	0.0281	0.0506	0.0270	0.0990	0.1350	0.1794	0.6072	16.1567	0.3675	0.0316	0.1761
2014	Wegagen	0.1225	0.0235	0.0502	0.0263	0.1030	0.0800	0.1740	0.5400	16.2169	0.2134	0.0303	0.1916
2015	Wegagen	0.1241	0.0218	0.0415	0.0399	0.1040	0.0780	0.1680	0.6250	16.4337	0.2479	0.0281	0.1761
2016	Wegagen	0.1138	0.0197	0.0252	0.0267	0.0800	0.0970	0.1690	0.6887	16.5999	0.2796	0.0241	0.1733
2017	Wegagen	0.1348	0.0216	0.0495	0.0321	0.1010	0.0720	0.1800	0.7403	16.8576	0.2785	0.0255	0.1602
2018	Wegagen	0.1763	0.0275	0.0416	0.0367	0.0770	0.1310	0.1910	0.7338	17.1257	0.1974	0.0362	0.1397
2019	Wegagen	0.1229	0.0177	0.0264	0.0263	0.0900	0.1370	0.1870	0.6987	17.2090	0.1818	0.0225	0.1442
2013	Zemen	0.1622	0.0325	0.0522	0.0213	0.0990	0.1350	0.1794	0.5477	14.9937	0.3138	0.0294	0.1519
2014	Zemen	0.1661	0.0278	0.0507	0.0215	0.1030	0.0800	0.1740	0.4718	15.1828	0.4928	0.0419	0.1674
2015	Zemen	0.1503	0.0217	0.0251	0.0455	0.1040	0.0780	0.1680	0.5971	15.3995	0.3019	0.0294	0.1569
2016	Zemen	0.1720	0.0323	0.0253	0.0476	0.0800	0.0970	0.1690	0.6205	15.8135	0.4026	0.0353	0.1359
2017	Zemen	0.1720	0.0293	0.0343	0.0458	0.1010	0.0720	0.1800	0.5681	16.0844	0.4341	0.0333	0.1360
2018	Zemen	0.1358	0.0185	0.0348	0.0378	0.0770	0.1310	0.1910	0.5106	16.3363	0.3968	0.0296	0.1364
2019	Zemen	0.1763	0.0280	0.0542	0.0278	0.0900	0.1370	0.1870	0.6546	16.5026	0.2174	0.0376	0.1588