

***DETERMINANTS OF NON PERFORMING LOANS OF  
COMMERCIAL BANKS: EVIDENCE FROM ETHIOPIA***

*A Thesis Submitted to the School of Graduate Studies of Jimma University in  
Partial Fulfillment of the Requirements for the Award of the Degree of  
Master of Science(MSC)in Banking and Finance*

**BY:**

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**JIMMA UNIVERSITY  
COLLEGE OF BUSINESS & ECONOMICS  
MSC PROGRAM**

**JUNE 14, 2021**

**JIMMA, ETHIOPIA**

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Under the Guidance of

Dr. Demis Haile Gebreal

And

Miss. Gadise Gezu



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## CERTIFICATE

This is to certify that the thesis entitles “*Determinants of non performing loans of commercial banks: evidence from ethiopia*”, submitted to Jimma University for the award of the Degree of Master of science(MSC) and is a record of bonafide research work carried out by Mr. Dawit *Mekonnin Gonfa*, under our guidance and supervision.

*Therefore, we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.*

*Main Adviser’s Name*

*Date*

*Signature*

*Co-Advisor’s Name*

*Date*

*Signature*

## DECLARATION

I hereby declare that this thesis entitled “*Determinants of non performing loans of commercial banks: evidence from ethiopia*”, has been carried out by me under the guidance and supervision of Dr. Demis Haile Gebreal and Miss Gadise Gezu.

The thesis is original and has not been submitted for the award of any degree or diploma to any university or institutions.

Researcher's Name

Date

Signature

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## ABSTRACT

*This study examined the determinants of non-performing loans of commercial banks evidence from Ethiopia. The study adopted an explanatory research design and quantitative research approach with secondary panel data utilized over the study period 2010-2019. The study used data collected from the National Bank of Ethiopia, the Central Statistical Agency, and the financial statement of thirteen commercial banks. More specifically, descriptive and random effect multiple regression analysis are employed to analyze the balanced panel data. Findings of the study revealed that return on asset, return on equity, loan to deposit ratio and bank size have a negative and significant impact on NPLs. Whereas, capital adequacy ratio, effective tax rate, and gross domestic product have a positive and significant effect on NPLs. On the other hand, the Inflation rate has a positive and insignificant effect on NPLs of commercial banks of Ethiopia. Furthermore, the study recommended as banks management should focus on strategies that increase non-interest income which in turn increase ROA and ROE. Besides, to reduce or minimize the level of NPLs in the Ethiopian banking industry, the government should implement policies that will create an enabling environment to improve the country's real GDP.*

**Keywords:** *Bank-specific factors, commercial bank of Ethiopia, macroeconomic factors, Nonperforming loans*

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## **LIST OF ACRONYM & ABBREVIATIONS**

AIB	Addis International Bank
AB	Abay Bank
AIB:	Awash International Bank
BOA:	Bank of Abyssinia
BLUE:	Best Linear Unbiased Estimators
BS	Bank size
CAR:	Capital Adequacy Ratio
CBE:	Commercial Bank of Ethiopia
CEMAC:	Central African Economic and Monetary Community
CEEC:	Central Eastern European Countries
CESEE:	Central Eastern and South-Eastern European
CIT:	Corporate Income Tax
CLRM:	Classical Linear Regression Model
CPI:	Consumer Price Index
CSA:	Center of Statistical Agency
CBE	Commercial Bank of Ethiopia
DB:	Dashen Bank
DGB	Debab Global Bank
DW:	Durbin–Watson
EB	Enat Bank
ETB:	Ethiopian Commercial Bank

ETR:	Effective Tax Rate
ESS	Explained sum of square
GDP:	Gross Domestic Product
GMM	Generalized method of moments
IMF:	International Monetary Fund
INFR:	Inflation Rate
LM	Lagrangian Multiplier
LTD:	Loan to Deposit ratio
NBE:	National Bank of Ethiopia
NIB:	Nib International Bank
NPL:	Nonperforming Loan
NPP	Normal probability plot
OLS:	Ordinary Least Square
ROA:	Returns on Asset
ROE:	Return on Equity
UB:	United Bank
VIF:	Variance Inflation Factor
WB:	Wegagen Bank
REER	Real effective exchange rate
TSS	Total sum of square
KYC	Know your customer

# CHAPTER ONE

## 1. INTRODUCTION

*This chapter begins with discussing the background of the study that gives some insight on the issues of nonperforming loans (NPLs) followed by the statement of the problem that shows the direction of the study and justifies the reason to conduct this study. Following the statement of the problem, both general and specific objectives of the study and the research hypothesis that was tested against the econometric results are presented. Finally, the subsequent section presents the significance of the study, the scope of the study, limitation of the study, ethical issues, and structure of the thesis respectively.*

### 1.1. Background of the Study

Banking sector is an important financial service sector supporting development plans through channelizing funds for productive purposes. Efficient banking industry is necessary for the steadiness and growth of an economy. The stability of the banking industry is essential for economic progression and resilience against financial crises. The primary function of the bank is mobilizing deposits from surplus units to deficit units in the form of loans and advances to various sectors like agricultural, industry, personal, and governments (Tiwari et al., 2013). According to Campbell (2007) as cited in Abiola&Olausi (2014), a commercial bank is an establishment that provides financial services such as receiving deposits from the public and lending out money to them.

Lending represents the heart of the banking industry. Loans are the dominant asset and represent fifty to seventy-five percent of the total amount at most banks generate the largest share of operating income and represent the bank's greater risk exposure (Koch and MacDonald, 2014). Moreover, its contribution to the growth of any country is large in that they are the main intermediaries between depositors and those in need of funds for their viable projects (creditors) thereby make sure that the money available in the economy is always put to good use. Therefore, managing loans in a proper way not only has a positive effect on the bank's performance but also on the borrower firms and the country as a whole. On the other hand, failure to manage loans,

which make up the largest share of banks assets, would likely lead to the episode of a high level of non -performing loans (Geletta ,2012)

According to the International Monetary Fund (IMF, 2009), a non- performing loan is any loan in which interest and principal payments are more than 90 days overdue; or more than 90 days' worth of interest has been refinanced. Besides, According to the Ethiopian banking business directive, non-performing loans are defined as “loans or advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment terms of the loan or advances in question” National Bank of Ethiopia (NBE, 2008). Since nonperforming loans had an adverse effect on the banking sectors' survival, the cause for NPLs should be given due consideration. Its causes are different in different countries that might be due to situational factors such as the level of economic condition, political situation, and bank-level factors. Accordingly, this issue attracted the interest of various researchers in several countries. Hence, many studies was performed on the determinants of NPLs of financial sectors across the Globe. For example- Saba et al. (2012), conducted a study on the determinants of NPLs in US Banking sector and found as lending rates had negative while inflation and Real GDP per capital had a positive and significant effect on NPLs. Similarly, Tomak (2013), conducted a study on the “Determinants of Bank's Lending Behavior of commercial banks in Turkish” for a sample of eighteen from 25 banks and found as bank size, access to the long term loan and rate of inflation have a significant positive impact on the bank's lending behavior. However, interest rates and GDP are insignificant effect on NPLs.

According to the Ethiopian context, the Banks in the country are required to maintain the ratio of their nonperforming loan below five percent (NBE, 2008). Despite this national industry average ratio set by the national bank of Ethiopia as a benchmark, it has been observed that there is a significant deviation in the provision for doubtful loans of those banks which in turn signifies the variation in the ratio of non-performing loans between banks. For example in 2006-2009, the NPLs ratio of Dashen bank was 6.72%, 6.21%, 5.95%, and 5.89 % respectively. Similarly, the ratio of NPLs of Awash international banks in 2006-2009 was 12.02%, 9.56%, 7.36%, and 8.66% respectively. Besides, NPLs ratio of Nib international bank in 2005-2008 was 11.22%, 8.47%, 5.56% and 6.73% respectively (Geletta, 2012). From the ratio of those banks, it can be understandable that the ratio of NPLs of Ethiopian private commercial banks became decreasing

from year to year. But even if the ratio of those banks decreases from year to year, still their ratio was above the average ratio set by the national bank of Ethiopia as a benchmark which five percent of their total loans provided. Consequently, the ratio of NPLs of public commercial bank are greater than that of private commercial banks. For example, the ratio of NPLs of Commercial banks of Ethiopia in 2006-2009 was 27.52%, 22.45%, 14.52%, and 5.33% respectively (Geletta , 2012). This is may be even if both of them are collateral-based at the time they are giving the loan to their customers, sometimes commercial banks of Ethiopia provide loans without collateral based and as a result public commercial banks exposed to non-performing loans by higher percentage than private commercial banks of Ethiopia. Also, from these ratio of Commercial bank of Ethiopia, it can be understood that; the ratio of NPLs of public commercial bank was decreasing from time to time. Similarly, the ratio of NPLs to total loans was above the average value set by the National bank of Ethiopia.

Therefore, given the unique features of banking sector and environment in which they operate and also rapid expansion of banking institutions in Ethiopia, there are strong wishes to conduct a separate study on the determinants of NPLs of banking sector in Ethiopia. Hence, this study focused on the main determinants of non-performing loans in the context of Ethiopian commercial banks. In doing so, a number of bank-specific and macro-economic variables were reviewed from different pieces of literature and included in the study in order to identify the most determinants of non-performing loans in commercial banks evidenced from Ethiopia.

## **1.2. Statement of the Problem**

One of the most important functions of a bank is giving a loan. Because loans have the capacity of affecting the whole financial sector. Thus, issues of Nonperforming Loans (NPLs) gained increasing attention in the past few decades. It is a basic issue for each bank to manage bad loans. If the loan is well managed, it increases the bank's profitability and sustainability in the future (Rasiah, 2010). However, if failed to do so, it will be a major threat to their survival (Koch and MacDonald, 2014). NPLs affect the bank's liquidity and profitability which are the main components for the overall efficiency of the bank. Also an increase in NPLs provision diminishes income of the bank. The level of non-performing loans is different across the Globe. For examples in 2005, NPLs Commercial banks of China, Egypt, Ghana, Kenya, Nigeria, Morocco and Tunisia was 8.6%, 26.5%, 13.0%, 25.6%, 18.1%, 15.7% and 20.9% respectively.

Similarly, in 2007, NPLs of the above mentioned countries were 6.2%, 19.3%, 6.4%, 10.6%, 9.5%, 7.9% and 17.6% respectively (Geletta, 2012). Thus, taking this into consideration, National bank of Ethiopia imposed restrictions on the proportion of NPLs not to be exceeding 5% of the total loan provided by the Commercial bank of Ethiopia (NBE, 2012). After the restriction, the NPLs of Ethiopian commercial banks have shown improvement. However, according to Mehari (2012), reduction of NPLs in ECBs has not resulted from improved credit risk controlling, measuring, and monitoring systems. Rather, by writing off and restructuring of loans. Debt restructuring is a process where a bank experiencing financial distress and liquidity problems refinances its existing debt obligations to realize more flexibility within the short term and make its debt load more manageable overall or it means that convert (the debt of a business in difficulty) into another kind of debt, typically one that is payable at a later time. Banks are not fulfilling the maximum (5%) allowable limit of the ratio of NPLs. For instance, in 2008 and 2009; NPLs of Zemen Bank were 8.52% and 8.83% respectively. Similarly, NPLs ratio of Dashen bank, Bank of Abyssinia, and Wegagen bank in the same year was 7.3%, 5.25%, and 7.7% respectively. In addition, in 2009, ratio of NPLs of Co-operative Bank of Oromia, Nib International Bank, and lion international bank were 7.62%, 7.4%, and 6.53% of their total loans respectively (Geletta, 2012). Thus, the issue of preventing NPLs in Ethiopian commercial banks is still in question.

Non-performing loans are determined by bank-specific and macro-economic factors such as level of GDP, inflation rate, unemployment rate, volume of deposit, return on equity, return on asset, capital adequacy ratio, total loan, liquidity, bank size, excessive lending, interest rate, and credit growth. These factors are studied by different researchers in different countries (Mileris, 2012), Tomak (2013), Ahmad and Bashir (2013) and Shingjergji (2013). Accordingly, different studies were done in Western Europe and East African countries. For example; the study of (Saba et al., 2012) on the title of “Determinants of Nonperforming Loan on US Banking sector” found a negative significant effect of lending rate and positive significant effect of real GDP per capital and inflation rate on NPL. Similarly, the study of Louzis et al. (2012) examined the determinants of NPLs in the Greek financial sector and found as real GDP growth rate, ROA and ROE had negative whereas lending, unemployment, and inflation rate had positive significant while loan to deposit ratio and capital adequacy ratio had an insignificant effect on NPLs. Besides, Anisa (2015), studied the determinants of non-performing loans of commercial banks in



Ethiopia. The included variables were macroeconomic (deposit rates, GDP growth rate, lending interest rate, and inflation rate) and bank-specific variables (cost efficiency, solvency ratio, and loans to deposit ratio).

The first basic motive for this study is that inconsistent results among researchers in different studies. For example, from the Ethiopian context, the previous study of Atomsa (2017), Abebe (2018), and Minas (2019) on the title of “Determinants of Nonperforming Loan” found a negative and significant effect of return on the asset on NPLs. However, the study conducted by Gezu (2014), Amsalu (2018), and Belay (2019), found a positive and significant effect of ROA on NPLs. Besides, Haile (2018) and Belay (2019) examined the determinants of NPLs and found as CAR had a positive significant effect on NPLs. Whereas the study conducted by Gezu (2014), Asfawesen (2017), Abebe (2018), Fekadu (2018), and Minas (2019) shows a negative and significant effect of CAR on NPLs. Furthermore, Belay (2019) identify the factors affecting NPLs and found as Bank size did not show any significant impact on NPL ratio. Whereas, Amsalu (2018) conducted on “Determinants of NPL and found a significant negative effect of bank size on NPLs. More specifically, even if taxation is not studied by many researchers, this study added as one of the determinant factors of NPLs based on theoretical literature and its sensitivity in the country specifically in Ethiopia. This means effective tax rate was only studied by Gezu (2014) and Abebe (2018) and the findings of both researchers were contradict each other. For instance, the study made by Gezu (2014), found a positive and statistically significant effect of ETR on NPLs. However, the study made by Abebe (2018), found a positive and insignificant effect of ETR on NPLs of commercial banks of Ethiopia. Thus, by considering their inconsistent results between them, this study want to confirm the effect of this variable on NPLs of Ethiopian commercial banks.

In addition to the above motivation, the third reason behind conducting this study was the NPLs ratio of Ethiopian commercial banks was above five percent of the maximum allowable limit set by the National Bank of Ethiopia. For example, NPLs ratio of commercial banks in 2014 - 2019 was 11.83, 7.99, 5.67, 5.47, 5.14, 7.49, and 5.12 respectively. Therefore, this study seeks to fill the existing literature gap in the area of the study by employing three macroeconomic and five bank-specific factors and empirically examine their effect on NPLs of commercial banks in Ethiopia.

## **1.3. Objective of the Study**

### **1.3.1. General objectives**

The general objective of this study was to investigate the determinants of nonperforming loans of Commercial banks in Ethiopia.

### **1.3.2. Specific objectives**

In line with the above general objective of the study, the Specific objectives of this study are as follows;

- To examine the impact of return on asset on non performing loans
- To examine the impact of return on equity on non performing loans
- To examine the impact of capital adequacy ratio on non performing loans
- To examine the impact of loan to deposit ratio on non performing loans
- To examine the impact of bank size on non performing loans
- To examine the impact of effective tax rate on non performing loans
- To examine the impact of inflation rate on non performing loans
- To examine the impact of gross domestic product on non performing loans

## **1.4. Hypotheses development**

The purpose of this study is to examine the determinants of nonperforming loans (NPLs) of commercial banks in Ethiopia. In this study, NPL is treated as a dependent variable that can be explained by different factors, and its determinants are classified into two: bank-specific and macroeconomic variables (Louzis et al. 2012), Saba et al. (2012), Boudriga et al. (2009) and Škarica (2014). The bank-specific variables are internal factors and controllable by bank managers while the macroeconomic variables are uncontrollable and external factors. Reviewed empirical literature showed that there is no consistency among international researches on the sign of the coefficient of an estimate of selected bank-specific and macroeconomic independent variables. The hypothesis is developed after supporting a theoretical framework or comes from prior literature. Accordingly, based on the existing theories and past empirical studies that have been conducted on the determinants of banks non-performing loans, this study has formulated the following eight hypotheses in line with the broad objective of the study.

**Return on Asset (ROA):-** Different researchers found different results regarding the relationship between ROA and NPLs. For instance: - Ahmad and Bashir (2013) and Makri et al. (2014), were examined positive significant relationships between ROA and NPLs. Whereas, Boudriga et al. (2009) and Messai and Jouini (2013) found a negative association between NPLs and ROA by supporting the arguments that deterioration of profitability ratio measured in terms of ROA leads to riskier activities of banks then raise the level of NPLs. Thus, depending on the above different results by different researchers, this study expects a negative relationship between return on asset and non-performing loans.

**HP1:** Return on asset has a negative and statistically significant effect on NPLs of banks

**Return on equity (ROE):** Many researchers were found different results between NPLs and bank profitability measured in terms of ROE. For example: Makri et al. (2014), Messai and Jouini (2013) found that non-performing loans vary negatively with the profitability of banks' assets measured in terms of return on equity. However, García-Marco and Robles-Fernandez (2008) indicate that high levels of return on equity (ROE) are followed by a greater future risk as the policy of profit maximization is accompanied by high levels of risk. Besides, Shingjergji (2013), Ahmad and Bashir (2013), and Makri et al. (2014) found negative relationships between ROE and NPLs. Therefore, depending on the above arguments, this ratio is expected to have negative relationships with NPLs.

**HP2:** Return on equity has a negative and statistically significant effect on NPLs of banks.

**Capital adequacy ratio (CAR):** According to Makri et al. (2014), there is a negative relationship between CAR and NPLs indicating a risky loan portfolio is marked by a high NPL (equivalent to high credit risk) by arguing well-capitalized banks are less incentive to take a risk. However, Fouopi Djiogap and Ngomsi (2012) found a positive association between NPLs and capital adequacy ratio. Thus, depend on the above inconsistent results between this researchers, this study expected a negative association of CAR with NPLs.

**HP3:** Capital adequacy ratio has a negative and statistically significant effect on NPLs of banks.

**Loan to deposit (LTD) ratio:** As disclosed by Jiménez and Saurina (2018) loan growth is considered as one of the most important causes of problems associated NPLs. According to

Louzis et al. (2012), Makri et al. (2014), and Swamy (2012), loan to deposit ratio has a positive and significant effect on the level of NPLs of banking sectors. However, according to Sinkey and Greenawalt (1991), a rapid expansion of loans may not be a problem by itself but such expansion leads to poor screening and lending to borrowers of inferior quality. In this respect, the study expected a positive effect of the loan to deposit ratio on non-performing loans.

**H4.** The loan to deposit ratio has a positive and significant effect on Nonperforming loans of banks.

**Bank Size:** Bank size could reflect bank strength and ability to cope with the problem of information Asymmetry, resulting in a lower level of NPLs. Contrary, smaller banks have fewer resources to realize credit analysis efficiently. The existing literature provides evidence that suggests a negative association between the size of a bank and a bank's NPLs (Swamy, 2012). According to these studies, the negative effect means that large banks have better risk management strategies and technology which allows them for efficient information gathering, processing, and analyzing which finish up with lower levels of NPLs as compared to smaller banks. Similarly, as noted in Hu al. (2004), large banks have more resources and are more experimented for efficient information gathering, processing, and analyzing to tackle moral hazard and adverse selection and ultimately better deal with bad borrowers. On the other hand, small banks may be exposed to the adverse selection problem because of the lack of sufficient competencies and experience to effectively assess the credit quality of borrowers. Hence, the extent that the failure rates of small businesses are higher than those of larger and established firms. Whereas, Misra and Dhal (2010) and Das and Ghosh (2007), found a positive effect of bank size on NPL. Their justification is that large banks are more likely to have relatively more NPLs due to the balance sheet constraint. Thus based on the above arguments, this study expects a negative relationship between the size of a bank and bank's NPLs.

**HP5:** There is a significant negative relationship between the size of a bank and the bank's NPLs.

**Effective tax rate:** High tax burden enable the banks to shift the tax burden either by increasing lending rate and fees or paying low-interest rate on deposits (Albertazzi and Gambacorta, 2009). Thus, the bank is capable of transferring the tax costs to its customers by raising fees and interest

spreads. Banks with high debt pay fewer taxes due to higher interest expense. According to Gezu (2014) there is a positive and statistically significant effect of ETR on NPLs. However, the study conducted by Abebe (2018) found positive and insignificant effect of ETR on NPLs of commercial banks of Ethiopia. This study expects positive relationships between effective tax rate and NPLs of Ethiopian commercial banks.

**HP6:** There is a significant positive effect of the effective tax rate on NPLs of banks

**Inflation rate:** inflation rate measures how fast prices for goods and services rise over time, or how much less one unit of currency buys now compared to one unit of currency at a given time in the past (Muhammad et al., 2012). According to Škarica (2014), Klein (2013) and Tomak (2013), there is a positive relationship between NPLs and Inflation rate. Theoretically, inflation should reduce the real value of debt and hence make lending easier. However, high inflation may pass through to nominal interest rates, reducing borrower's capacity to repay their debt. Through its attraction with the tax system, it can increase the tax burden by artificially increasing income and profits. Furthermore, it made individuals hold less cash and make more trips to banks since inflation lowers the real value of money holdings. It can negatively affect the borrower's real income when wages are stick.

**HP7:** There is a significant and positive effect of inflation on bank's NPLs.

**Gross Domestic Product:** is the market value of all final goods and Services produced in a country during a specified time usually one year. Basel (2013) using the estimation technique method and panel data of 75 countries over ten year period from 2005 to 2010 studied the macroeconomic determinants of non-performing loans. The Analysis presented that real GDP growth was the main driver of non- performing loan ratio.

There is significant empirical evidence of a negative association between a gross domestic product and non-performing loans (Rajan and Dhal, 2003), Jimenez and Saurina (2005), Khemraj and Pasha (2009) and Saba et al. (2012). The explanation provided by the literature for this relationship is that gross domestic product usually increases the income which ultimately enhances the loan payment capacity of the borrower which in turn contributes to lower bad loans and vice versa. Hence, strong positive growth in real GDP usually translates into more income which improves the debt servicing capacity of the borrower which in turn contributes to lower

NPLs. On contrary, when there is a slowdown in the economy (low or negative GDP growth), the economic activities in general are decreasing and the volume of cash held for either businesses or households is decreasing. These conditions contribute in deteriorating the power of borrowers to repay the loans, which cause increase the likelihood of delays their financial obligations, and thus banks' exposure to credit risk increase. However, other authors (Shingjergji ,2013) notified that NPL and GDP have a positive relationship. Therefore, based on the above contradiction of results between researchers, this study expects a negative relationship between GDP and NPLs.

**HP8:** There is a significant negative relationship between real GDP growth and bank's NPLs.

### **1.5. Significance of the study**

The findings of this study are expected to contribute a lot for different stakeholders such as Banking sectors(Commercial banks and National bank of Ethiopia), policy makers, researcher, managers, government, investors, customers, academicians, and for future research as follows:-

- ✓ The private and public bank will benefit from this research to understand and mitigate the root causes of credit risk by identifying the factors of NPL and taking actions appropriately. Similarly, it would enable commercial banks to adopt workable strategies to control the problem of a growing non-performing loan portfolio in the institution and thereby improve its financial performance and profitability. Besides, the study will enable commercial banks how to overcome potential factors that highly affect the level of nonperforming loans in the Ethiopian banking industry.
- ✓ The results will enable the government to make appropriate decisions to improve commercial bank's nonperforming loans.
- ✓ The current study benefited the researcher to obtain new knowledge about problems under the study and gives a clear picture of the discipline.
- ✓ By identifying the main causes of NPLs in the banking sector, the finding of the research gives important suggestions for managers and bank regulating authorities in dealing with NPLs management.
- ✓ Investors who are interested to invest in financial institutions, policymakers, academicians, the bank customer and the public will benefit from this paper through the information available about the bank related to credit risk.

- ✓ For the National bank of Ethiopia, since such investigation has policy implications, the finding of this study might be used as a directive input in developing regulatory standards regarding the lending policies of commercial banks of Ethiopia.
- ✓ Finally, this study will serve as a reference for further studies. Thus, it can minimize the literature gap in the area of study particularly in Ethiopia.

## **1.6. Scope of the Study**

This study focuses on examining the determinants of NPLs in Commercial banks in Ethiopia. It is obvious that incorporating all independent variables in a single econometrics model is impossible. That is why a disturbance term is usually incorporated in the econometrics model (Brooks, 2008). Hence, the scope of this study is limited to five bank-specific variables (return on asset, return on equity, capital adequacy ratio, loan to deposit ratio, bank size and three macroeconomic variables (inflation rate, effective tax rate, and gross domestic product) determinants of NPLs of Commercial banks in Ethiopia. Similarly, its scope was restricted to all commercial banks that are registered by the National bank of Ethiopia before 2010 and that have at least ten years of data (i.e., 2010-2019). This is because; most of the private commercial banks in Ethiopia established & started operations after 2010. As a result, the study included one government-owned commercial banks that is Commercial bank of Ethiopia (CBE) and twelve private commercial banks in the country namely, Awash international bank (AIB), Dashen bank (DB), Bank of Abyssinia (BOA), Cooperative Bank of Oromia (COOP), Wegagen bank(WB), United Bank (UB), Lion international bank (LIB), Nib International Bank (NIB), Oromia international bank (OIB), Buna international bank (BUIB), Berhan international bank (BIB) and Zemen bank (ZB). These banks were selected since they are senior banks and are expected to possess more experience on lending activities. Hence, commercial banks that are established newly in the country and that do not have a minimum of ten years of data were left in this study.

## **1.7. Limitation of the study**

While doing this research, the researcher encounters various problems; from these problems, the most dominant ones are owing to the nature of the subject area, i.e., excessive confidentiality on data of NPL and because of limited access, it was not easy to get all relevant information from respective banks except officially disclosed financial information. Even though the above resistant factors make this study difficult; the researcher hopes that readers will get some valuable ideas from the outcome of this study. Besides, since it is not possible to incorporate all factors that affect NPLs in one study, only eight independent variables that are five bank-specific factors such as return on asset, bank size, return on equity, Loan to deposit ratio, Capital adequacy, and three macroeconomic factors such as inflation rate, effective tax rate and gross domestic product included in this study.

## **1.8. Ethical Issues**

As we know almost all financial institutions have strict policy implications on the confidentiality of their data. Disclosing of data by employees to a third party can expose the institution to potential legal conflict. Because of this ethical issue, they are fearful of disclosure of such information. However, this fear was addressed by explaining the core of the study to the information providing agents with the assurance that the data was handled professionally through a formal letter. Therefore, before data were collected from the National bank of Ethiopia, the center of statistical agency, and head office of each commercial bank, permission was obtained from the management body of all the selected commercial banks through a formal letter. The formal letter was taken from Jimma University specifically from the research and graduate studies office of business and Economics College and then given to those bank managements and all other concerned offices to undertake the tasks freely and confidentially. The researcher tried to respect participant's rights and privacy. The findings of the research were presented without any deviation from the outcome of the research. In addition, the researcher gave full acknowledgments to all the reference materials utilized in this study.



## **1.9. Structure of the thesis**

This thesis is organized into five chapters. The first chapter begins with presenting the background of the study, statement of the problem, the objective of the study, hypothesis development, significance of the study, scope of the study, ethical issue of the study, and structure of the thesis. The second chapter provides the literature review which constitutes theoretical and empirical literature conducted on determinants of NPL of commercial banks in Ethiopia. The third chapter which is about the methodology of the research presents the research design, research approach, target population, sampling techniques and sample size determination, variables and their measurements, model specification, and regression analysis. The fourth chapter presents the results and discussion of the study. Finally, Chapter five consists of the conclusion and possible recommendations including directions for further studies.

## **CHAPTER TWO**

### **2. REVIEW OF RELATED LITERATURE**

#### **Introduction**

This chapter presents the literature review on Nonperforming loans and their determinants. The chapter is organized into two sections. Section 2.1 presents the general theoretical review of banking and nonperforming loans. A detailed review of empirical studies (cross countries and single countries) on determinants of nonperforming loans was discussed in section 2.2. Finally, the conceptual framework of this study was formulated in section 2.3.

#### **2.1. Theoretical Literature parts**

##### **2.1.1. Overview of Banking System in Ethiopia**

Bank of Abyssinia was the first bank established in Ethiopia based on the agreement between the Ethiopian government and the National bank of Egypt in 1905 with a capital of 1 million shillings. However, the bank of Abyssinia was closed at in 1932 by the Ethiopian government under Emperor Haile Selassie and replaced by the Bank of Ethiopia with a capital of pound sterling 750,000. Following the Italian occupation between 1936-1941, the operation of the bank of Ethiopia stopped whereas the departure of Italian and restoration of Emperor Haile Selassie's, the government established the state bank of Ethiopia in 1943. Hence, the State bank of Ethiopia was separated into the National bank of Ethiopia and the commercial bank of Ethiopia S.C. to separate the responsibility of the national bank from commercial banks in 1963.

Following the declaration of socialism in 1974, the government extends the extent of its control over the whole economy and nationalized all large corporations. Accordingly, Addis bank and the commercial bank of Ethiopia Share Company were merged by proclamation No.84 Of August 2, 1980, to form a single commercial bank in the country until the establishment of private commercial banks in 1994. To this end, the financial sector was left with three major banks namely; the National bank of Ethiopia, the commercial bank of Ethiopia, and the Agricultural and development bank during the socialist government. However, following the departure of the Derg regime, the Monetary and Banking proclamation of 1994 established the National bank of Ethiopia as a legal entity. Following this, the Monetary and Banking Proclamation No.84/1994

and the Licensing and supervision of banking business proclamation No.84/1994 laid down the legal basis for investment in banking sectors (Ayele, 2012).

Thus, currently, numbers of banking sectors in Ethiopia were reached nineteen as shown in the following tables.

Table 2.1. Banking sectors in Ethiopia

No	Name of Banks	Year of Establishment
1	Awash International Bank	1994 G.C
2	Commercial Bank of Ethiopia	1963 G.C.
3	Development Bank of Ethiopia	1901 G.C.
4	Dashen Bank	1995 G.C.
5	Wegagen Bank	1997 G.C.
6	Bank of Abyssinia	1996 G.C.
7	United Bank	1998 G.C.
8	Nib International bank	1999 G.C
9	Cooperative Bank of Oromia	2004 G.C.
10	Lion International Bank	2006 G.C.
11	Zemen Bank	2008 G.C.
12	Oromia International Bank	2008 G.C.
13	Buna International Bank	2009 G.C.
14	Berhan International Bank	2009 G.C.
15	Abay Bank S.C	2010 G.C
16	Addis International Bank S.C	2011 G.C
17	Dehub Global Bank S.C	2012 G.C
18	Enat bank	2012 G.C
19	Zamzam bank	2019 G.C

Source: [www.nbe.et](http://www.nbe.et)

### **2.1.2. Nature and Definition of Nonperforming Loan**

Loans are the basic asset that generates the largest share of operating income and represents fifty to seventy-five percent of the total amount of assets at most banks. On the opposite direction, if this loan is not managed properly, it represents the banks' greater risk exposure (Koch and MacDonald, 2014). According to Wei-Shong and Kuo-Chung (2006), the administration of loan portfolios seriously affects the profitability of banks since the major portion of gross profit of the banking industry is earned from loans.

Due to the nature of their business, commercial banks exposed themselves to the risks of default from borrowers, and NPLs are closely associated with banking crises (Waweru and Kalani ,2008). Heffernan (2005), stated that the failure of the commercial banks' clients to repay their obligations caused the emergence of NPLs and is considered the most serious financial problems facing commercial banks. The failure of the commercial banks' clients to repay their obligations caused the emergence of NPLs and is considered the most serious financial problems to commercial banks (Heffernan, 2005)

IMF (2009) defined a nonperforming loan as “any loan in which interest and principal payments are more than 90 days overdue or more than 90 days’ worth of interest has been refinanced. Non-performing loans are defined as defaulted loans in which banks are unable to generate profit. Hou and Dickinson (2007), defined NPLs as a loan that is not earning income and full payment of principal and interest is no longer anticipated, Principal or interest is 90 days or more delinquent, or the maturity date has passed and payment has not been made in full. Similarly, Asari et al. (2011), defined a Non-performing loan as a defaulted loan in which banks are unable to get a return from them.

Petersson and Wadman (2004), defined NPLs as loans or advances whose credit quality has declined such that full collection of principal and/or interest about contractual repayment conditions of the loan or advances is due and uncollected for 90 (ninety) consecutive days or farther away from the scheduled payment date or maturity. NPLs are loans or advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment terms of the loan or advances in question (NBE, 2012). If a loan is past due 90 consecutive days, it was regarded as non- performing loans. Quantitative

measurements based on the number of days passed from the loan being due are used as criteria for the Ethiopian banking industry to identify the determinants of non-performing loans.

### **2.1.3. Theoretical Literature Review**

Historically, the incidence of banking sector failure resulting from insolvency has often been associated with the massive accumulation of non-performing loans. Equally, failure to effectively reduce levels of non-performing loans may lead to bank failure. Samir and Kamra (2013), argue that non-performing loans have a great impact on bank profits as they reduce interest income, and erode current profits and capital base through provisions. Non-performing loans are considered determinants of profitability because, high levels of nonperforming loans adversely affect bank net profit through provisioning of doubtful debts and write-offs of bad debts; which normally affect profitability and capital levels (Ombaba, 2013). Subsequently, the moment non-performing loans exceed bank capital in a relatively large number of banks can compound into a bank crisis, which eventually turns into a financial crisis (Karimet al.,2010). Empirical studies Kithinji (2010), Ombaba (2013) found a possible relationship between high levels of non-performing loans and low profitability.

#### **2.1.3.1. Firm Characteristics Theories**

These theories predict that the number of borrowing relationships was decreasing for small, high-quality, informational opaque and constraint firms, all other things being equal (Godlewski and Ziane ,2008), state that the most obvious characteristics of failed banks are not poor operating efficiency, however, but an increased volume of non-performing loans. Non-performing loans in failed banks have typically been associated with regional macroeconomic problems. DeYoung and Whalen (1994) cited in Saba (2018) observed that the US Office of the Comptroller of the Currency found the difference between the failed banks and those that remained healthy or recovered from problems was the caliber of management. Superior managers not only run their banks in a most efficient fashion and thus generate large profits relative to their peers, but also impose better loan underwriting and monitoring standards than their peers which result in better credit quality.

### **2.1.3.2. Moral hazard theory**

The “moral hazard” hypothesis was first discussed by Keeton and Morris (1987), who argued that banks with relatively low capital respond to moral hazard incentives by increasing the riskiness of their loan portfolio, which in turn results in higher non-performing loans on average in the future. A moral hazard arises as a result of changes in the two parties’ incentives after entering into a contract such that the riskiness of the contract is altered. Louzis et al. (2012), also state that the moral hazard of too-big-to-fail banks represents another channel relating bank-specific features with non-performing loans. Furthermore, a policy concern is that too-big-to-fail banks may choose for undertaking even excessive risk since market discipline is not imposed by its creditors who expect government protection in case of a bank’s failure. Consequently, large banks may compromise and increase their leverage unnecessarily and in turn offer loans to lower quality borrowers.

### **2.1.3.3. Bad management Theory**

First introduced by Berger and DeYoung (1997), points out that in responding to the increase in non-performing loans resulting from adverse selection, bank management tends to inject more resources into managing and monitoring bad loans, which in the long run results in the rise the operating expenses over the rise in interest income, resulting to higher cost-to-income ratio. Accordingly, a higher cost-to-income ratio is a sign of weak bank management, in underwriting, monitoring, and control of the loan portfolio (Louzis et al.,2010), Vardar and Özgüler (2015) and Muratbek (2017). Therefore, we expect a negative relationship between non-performing loans and Return on asset (as a proxy for profitability).

### **2.1.3.4. Efficiency theory**

The efficiency hypothesis, on the other hand, posits that banks earn high profits because they are more efficient than others. There are also two distinct approaches within the efficiency; the X efficiency and Scale–efficiency hypothesis. According to the X-efficiency approach, more efficient firms are more profitable because of their lower costs. Such firms tend to realize larger market shares, which can manifest in higher levels of market concentration, but without any causal relationship from concentration to profitability. The scale approach emphasizes economies of scale rather than differences in management or production technology. Larger firms can obtain lower unit costs and higher profits through economies of scale. This enables

large firms to get market shares, which can manifest in higher concentration and then profitability.

#### **2.1.3.5. Information Asymmetry Theory**

Information asymmetry theory argues that asymmetric information occurs when one party in a transactional relationship is more informed about the transaction than the other party. In the financial decision space, asymmetric information literature looks at the impact of decisions based on the difference in the information available to both parties (Mishkin, 1992). Lenders offering credit facilities to borrowers face the uncertainty of loan repayment, as they cannot observe the characteristics and actions of the borrower, thus making it difficult to assess the creditworthiness of the borrower (Makri et al., 2014). Consequently, adverse selection results in whereby high-quality borrowers are displaced by low-quality borrowers, which in the long run cause deterioration in the overall quality of loan portfolios and leads to accumulation of non-performing loans, decrease in profitability, and erosion of capital (Bofondi and Gobbi, 2003), Bofondi and Ropele (2011) and Makri et al. (2014).

## **2.2. Review of Empirical Literature**

This section provides many pieces of evidence that identify the major determinants of nonperforming loans. Some studies were conducted on a particular country and the others are on the panel of countries. Hence, many researchers have conducted many studies on determinants of nonperforming loans (NPLs), due to their significance for the bank's failure. In case the researcher starts reviewing related empirical literature from the study made across the country and then a single country studies followed by related empirical studies in Ethiopia. There are a lot of variables that affect the NPLs of banking sectors. In this study, the researcher focused on both bank-specific variables and macroeconomic determinants of NPLs of commercial banks in Ethiopia. Internal factors are caused by internal functions and activities of the bank and are due to decisions and practices of officials and staff functions. These factors are controllable during which the manager can prevent them through using a suitable method, determination, and elimination of weakness and improvement of the process. However, external factors cannot be controlled by bank managers and are caused by the external environment including the effect on the implementation of decisions and also government policies. For instance; unexpected events, changes in rules and regulations, political and economic changes (inflation and slump) are external factors (Shaer et al., 2012). A variety of variables that got more attention and are

included in this thesis are loan to deposit ratio, capital adequacy/solvency ratio, Return on Asset, Return on equity, and bank size from bank-specific variables and inflation rate, effective tax rate, and gross domestic product from macro-economic variables.

### **2.2.1. Across Countries Studies**

Bonilla (2011) investigated the determinants of non-performing loan in Spain and Italy from the period January 2004 to March 2012, using credit growth, wages, inflation, unemployment, and GDP as macroeconomic variables. The outcome of the study revealed that of the five macroeconomic variables, unemployment, wages, and GDP significantly affected nonperforming loan indices in both countries.

Fouopi Djiogap and Ngomsi (2012) investigated the determinants of bank long-term loans in the Central African Economic and Monetary Community (CEMAC). They used the panel data of 35 commercial banks from six African countries over the period 2001-2010. They also used the fixed effect model to examine the impact of bank size, GDP growth, and capital adequacy ratio on NPLs. The study found a negative and significant relationship between CAR and NPLs. Their finding justifies that more diversified and well-capitalized banks are better ready to withstand potential credit. However, the inflation variable is statistically insignificant in explaining the entire business loan ratios of banks.

Moinescu and Codirlasu (2012) studied the determinants of NPLs in Central and Eastern European countries (CEEC) during the period between 2003 and 2011. Econometric results of his research confirm that GDP growth is the prominent macroeconomic explanatory variable of NPLs developments among CEEC economies. He found that real GDP growth and the change in the output gap were almost equally important. His analysis reveals a strong determination influence with a short-term impact of the economic performance on the non-performing loans ratio dynamics across the CEEC banking systems. A stylized representation of the change in the banking book quality as a function of the amplitude of the business cycle suggests that the larger the difference between peak and depth of economic growth, the higher the NPL ratio jump during the recession period (Moinescu and Codirlasu, 2012) Similar findings were reported by Mileris (2012). Castro (2013) analyzed the link between the macroeconomic developments and the banking credit risk in a particular group of countries those recently affected by unfavorable economic and financial conditions such as Greece, Ireland, Portugal, Spain, and Italy (GIPSI).



Employing dynamic panel data approaches to those five countries over the period 1997-2011. The result concludes that the banking credit risk is significantly affected by micro and macroeconomic variables. Specifically, GDP growth has a significant negative relationship with banks NPLs. On the other hand, NPLs of banks have a significant positive association with rises of the unemployment rate, interest rate, credit growth increase, and appreciation of real exchange rate.

Klein (2013) investigates the determinants and macroeconomic performance of NPLs in Central, Eastern, and South-Eastern Europe (CESEE) for 1998 to 2011 period data for ten banks of every 16 countries. The study includes the rate of loan growth, inflation, and growth rate of GDP as independent variables of the study. The study was used a fixed-effect/ dynamic model and got as inflation has positive whereas the rate of loan growth and growth rate of GDP has a negative significant effect on NPLs.

Škarica (2013) also conducted a study on the determinants of NPLs in Central and Eastern European countries. In the study, the fixed effect Model and 7 Central and Eastern European countries for the 2007-2012 periods were used. The study utilized loan growth, the growth rate of real GDP, market interest rate, Unemployment, and rate of inflation as determinants of NPLs. The findings reveal as the GDP growth rate and the unemployment rate has a statistically significant negative association with NPLs with a justification of rising recession and falling during expansions and growth has an impact on the levels of NPLs. This shows as economic developments have a robust impact on financial stability. The finding also reveals as inflation has a positive impact with justification as inflation might affect borrowers' debt servicing capacities.

Messai and Jouini (2013) conducted a study on three countries namely Italy, Greece, and Spain for the period of 2004-2008 to identify the determinants of non-performing loans for a sample of 85 banks. The variables included both macroeconomic (GDP rate of growth and real interest rate) and bank-specific variables (return on assets and loan growth). They apply a fixed-effect model and found a significant negative relationship of ROA & GDP growth rate whereas positive relationships of the unemployment rate and the real interest rate with NPLs. For a significant positive association between NPLs and the real rate of interest, they justify that when a rise in real interest rates can immediately result in an increase in non-performing loans

especially for loans with floating rates since it decreases the power of borrowers to achieve their debt obligations. On the other hand, the study found a negative and statistically significant relationship between ROA and the amount of NPLs by argued a bank with strong profitability has less incentive to produce income and fewer forced to perform risky activities like granting risky loans.

Makri et al. (2014) identify the factors affecting NPLs of Euro zone's banking systems for 2000-2008 periods before the start of the recession exclusively pre-crisis period. The study includes 14 countries as a sample out of 17 total Euro zone countries. The variables included were growth rate of GDP, budget deficit, public debt, unemployment, loans to deposit ratio, return on assets, and return on equity and capital adequacy ratio. The study utilized the difference Generalized Method of the Moments (GMM) estimation and found as real GDP growth rate, ROA and ROE had a negative whereas lending, unemployment, and inflation rate had a positive significant effect on NPLs. However, ROA & loan to deposit ratio, inflation, and budget deficit did not show any significant impact on NPL ratio.

### **2.2.2. Single Country Studies**

Muhammad et al. (2012) on the title of "Economic Determinants of Non-Performing Loans: Perception of Pakistani Bankers" utilized both primary and secondary data in 2006 years. The data were collected from 201 bankers who are involved in the lending decisions or handling nonperforming loans portfolio. Correlation and multivariate regression analysis was carried out to analyze the impact of selected independent variables. The variables included were the rate of interest, energy crisis, unemployment, inflation, and GDP growth. The study found that the rate of interest, energy crisis, unemployment, and inflation has a significant positive relationship whereas GDP growth has an insignificant negative relationship with the non-performing loans.

Swamy (2012) Conducted a study to examine the macroeconomic and indigenous determinants of NPLs in the Indian banking sector using panel data for a period from 1997 to 2009. The variables included were GDP growth, inflation rate, per capital income, saving growth rate, bank size, loan to deposit ratio, bank lending rate, operating expense to total assets, a ratio of priority sector's loan to total loan, and ROA. The study found that real GDP rate of growth, inflation, capital adequacy, bank lending rate, and saving rate of growth had an insignificant effect;

whereas loan to deposit ratio and ROA has a strong positive effect but bank size has a strong negative effect on the level of NPLs.

The study of Saba et al. (2012) on the title of “Determinants of Nonperforming Loan on US banking sector” also investigate the bank-specific and macroeconomic variables of nonperforming loans from 1985 to 2010 period using the OLS regression model. They considered total loans, lending rate, and Real GDP per capital as independent variables. The finding reveals as real total loans have a positive significant effect whereas the rate of interest and GDP per capital has a negative significant association with NPLs.

According to Louzis et al. (2012), the determinants of NPLs not be seen only among macroeconomic variables because they are external to the banking sector. Thus, the characteristic features and the choice of the policy of each bank are predicted to have an impact on the NPLs rate. The results indicate that the Greek banking sector is explained by GDP, unemployment, rate of interest, debt, and bank-specific factors like management quality and performance. The leverage has a statistically positive influence on business and mortgage NPLs. In addition, the ROE indicator is statistically significant for mortgage and consumer NPLs while insignificant for the business NPLs. The impact on loan categories is known with mortgages being the least reactive to changes in the macroeconomic environment.

Tomak (2013) conducted on the “Determinants of Bank’s Lending Behavior of commercial banks in Turkish” for a sample of eighteen from 25 banks. The major objective of the study was to identify the determinants of bank’s lending behavior. The data was covered the 2003 to 2012 periods. The variables used for the study were bank size, rate of interest, GDP growth rate, and inflation rate. The finding reveals that bank size and rate of inflation have a significant positive impact on the bank’s lending behavior but, interest rates and GDP are insignificant effects on NPLs.

According to an Empirical Study made on Commercial Banks in Pakistan by Badar et al. (2013), on the title of “Impact of Macroeconomic Forces on Nonperforming Loans” the long and short-run dynamics between nonperforming loans and macroeconomic variables covering the period from 2002 -2011 of 36 commercial banks in Pakistan were assessed. In the study, inflation, interest rate, and gross domestic product were included as macroeconomic variables. They

applied a vector error correction model. The study found that as there is strong negative long-run relationships exist between inflation, interest rate, gross domestic product, and money supply with NPLs.

Shingjergji (2013) studied the impact of bank-specific factors on non-performing loans (NPLs) in the Albanian banking system using a simple regression model for data analysis. The study found that capital adequacy ratio had a negative but insignificant association with non-performing loans, whereas, return on equity and loans to asset ratio had a negative but significant effect on NPLs. The study also found that total loans and net interest margin had a positive significant relationship with non-performing loans (NPLs).

Ahmad and Bashir (2013) conducted a study on the macroeconomic determinants of nonperforming Loans of Banking Sectors in Pakistan. The study was conducted on 30 commercial banks from a total of 34 banks in the 1990-2011 periods. The main aim of the study was to investigate the impact of inflation, credit growth, GDP growth rate, Unemployment rate, consumer price index, and lending/interest rate on nonperforming loans. They found a negative effect of lending rate and GDP rate of growth on NPLs. Their justification for the negative association between the lending rate and NPLs implies that as the lending rate increase, individuals with funds start saving with the banks to earn on their funds but investors with profitable projects feel reluctant to borrow and invest. Besides, existing borrowers pay back their loans to stay their credit rating good as to get loans in the future at discount rates.

Akinlo and Emmanuel (2014) conducted determinants of non-performing loans in Nigeria over the period 1981-2011. The study provides a macroeconomic model for non-performing loans and the analysis confirms that in the long run, economic growth is negatively related to the non-performing loan. On the other hand, unemployment, credit to the private sector, and rate of exchange exert a positive influence on nonperforming loans in Nigeria. In addition, the study reveals that in the short run, credits to the private sector, exchange rate, lending rate, and stock market index are the main determinants of non-performing loans.

Ekanayake and Azeez (2015) investigated the determinants of non-performing loans in licensed commercial banks in Sri Lanka for the period 1999- 2012 and found that the level of non-performing loans can be attributed to both macro-economic conditions and banks specific

factors. Their study results reveal that non-performing loans tend to increase with deteriorating bank's efficiency and there was a positive correlation between loan to asset ratio and nonperforming loans. They also observed that banks with a high level of credit growth are related to a reduced level of non-performing loans, while larger banks incur lesser loan defaults compared to smaller banks. However, the study found with regards to the macro economic variables that non-performing loans vary negatively with a growth rate of GDP, while inflation was positively related to the prime lending rate.

Rahman et al. (2017) assessed the Impact of Financial Ratios on Non-Performing Loans of Publicly Traded Commercial Banks in Bangladesh from 2010-2015. He applied an econometric model to find out correlations among financial ratios and a sample of 96 observations has been analyzed from 20 banks out of 30 listed commercial banks. The result indicates credit-deposit ratio and net interest margin have a positive influence on the non-performing loans and capital adequacy ratio and return on assets have a negative influence on the non-performing loans and sensitive sector's loan and priority sector's loan have a significant positive influence on the nonperforming loans and unsecured loans, profit per employee, and investment deposit ratio have a significant negative impact on gross non-performing loan.

### **2.2.3. Related Empirical Studies in Ethiopia**

Geletta (2012) assess the determinants of nonperforming loans in Ethiopian commercial banks by adopting a mixed research approach. The survey data was collected from both private and state-owned commercial banks with the help of a self-administered questionnaire and in-depth interview of senior bank officials in the Ethiopian banking industry. Descriptive statistics and a correlation matrix were used to analyze the data. The findings of the study reveal that poor credit assessment, failed loan monitoring, underdeveloped credit culture, lenient credit terms, and conditions, aggressive lending, compromised integrity, weak institutional capacity, unfair competition among banks, willful default by borrowers and their knowledge limitation, fund diversion for an unintended purpose, over/under financing by banks ascribe to the causes of loan default. However, the study outcome failed to support the existence of a relationship between bank size, interest rate, and ownership type of banks and occurrences of nonperforming loans.

Zelalem (2013) examined the bank-specific and macro-economic determinants of Nonperforming loans (NPLs) of commercial banks in Ethiopia. The study adopted a mixed-

methods research approach by combining documentary analysis (structured review of documents) and in-depth interviews. The findings of the study show that loan growth, financial performance, operational efficiency, and gross domestic product have a negative and statistically significant relationship with banks' NPLs. On the other hand, variables like bank size and state ownership have a positive and statistically significant relationship with banks' NPLs. The study suggested that focusing on and reengineering the banks alongside the key drivers of NPLs could reduce the probability of loan default in Ethiopian commercial banks.

Gezu (2014) was conducted to examine both bank-specific (loan to deposit ratio, capital adequacy ratio, return on asset and return on equity) and macroeconomic (lending rate, inflation, and effective tax rate) determinants of NPLs. To this end, the researcher has selected eight senior commercial banks in Ethiopia judgmentally. This study used secondary sources of data which is panel data in nature, over the period 2002-2013. Furthermore, the fixed effect model was used to examine the determinants of NPLs of commercial banks in Ethiopia. This research is an explanatory research design. The finding revealed as the LTD ratio had positive whereas INF had a negative, but insignificant effect on NPLs of commercial banks in Ethiopia. However, ROE, banks' capital adequacy ratio and lending rate had negative and statistically significant effects whereas ROA and effective tax rate had a positive and statistically significant effect on NPLs of commercial banks in Ethiopia.

Umer (2015) investigated the Determinants of Nonperforming Loan in Ethiopian Commercial Banks. The study aimed to test and confirm the effectiveness of common commercial bank's nonperforming loan determinants and how it affects the level of nonperforming loans in Ethiopian commercial banks between 2004 to 2013. The study found that the lending interest rate is a very important determinant of nonperforming loans in the Ethiopian banking industry. Cost efficiency had a negative and significant impact on bank's nonperforming loans. Similarly, the Bank solvency ratio and gross domestic product (GDP) had a negative and statistically significant impact on the bank's nonperforming loan. Whereas, loan to deposit ratio, deposit rate, and interest rate had a positive and statistically significant impact on NPLs of commercial banks in Ethiopia. On the other hand, the Inflation rate has a negative and insignificant impact on NPLs. The study then suggested that bank loan officers should constantly monitor each borrower's circumstances to detect loan problems before they become uncorrectable.

Tesfaye and Shete (2015) assessed bank-specific determinants of nonperforming loans in Ethiopian private commercial banks. The quantitative research approach was adopted for the study and survey conducted with professionals engaged in these private commercial Banks of credit departments by using a self-administered questionnaire and in-depth interview. The findings of the study show that poor credit risk assessment, underdeveloped credit culture/orientation, poor understanding of credit terms and conditions, imposing highest interest rate on loan, poor credit monitoring and rapid credit growth or greater risk appetite for the occurrence of nonperforming loans. The study suggested that banks should put in place appropriate terms and conditions, impose moderate lending rate, restrain from engaging in aggressive lending, put in place efficient credit process, give due emphasis in developing the competency of credit operators, proactive monitoring; organizational capacity enrichment of banks with exerted effort to develop a culture of the community towards credit and its management.

Asfawesen (2017) examined the bank-specific and macro-economic determinants of Non-performing loans (NPLs) of Ethiopian commercial banks. The study adopted a quantitative research approach. The study used data collected from the National Bank of Ethiopia, the Central Statistical Agency, and the financial statement of nine commercial banks. Data covers the period from 2006-2016. Descriptive and multiple regression analysis were used to analyze the unbalanced panel data. The findings of the study show that return on equity and capital adequacy has a negative and significant impact on NPLs. Whereas, loan loss provision and loan to deposit have a positive significant relationship with NPLs.

Atomsa (2017) investigated the determinants of non-performing loans (NPLs) in commercial banks in Ethiopia from 2007 to 2016. The study adopted an explanatory research design. This study sought to explain the significance of interest rate, growth in GDP, inflation rate, exchange rate, real interest rate, return on asset, and return on equity and loan growth rate on nonperforming loans in commercial banks in Ethiopia. The study used secondary data collected from eight purposively selected commercial banks in Ethiopia. Econometric regression analysis was used in establishing the significance of the relationship. The study found that from the macro determinants, the Real interest rate has a positive relationship with NPL which are statistically

significant at a 1% level of confidence. ROA and ROE from bank-specific factors have a negative and significant relationship with the NPLs in commercial banks in Ethiopia.

Abebe (2018) investigates bank-specific and macro-economic determinants of Non-performing loans (NPLs) of commercial banks in Ethiopia. The study adopted a mixed research approach. Similarly, the study reviews the financial statements of seven commercial banks in Ethiopia and relevant data on macroeconomic factors considered for the period from the year 2007 to 2016. More specifically, the fixed effect model was used to examine the determinants of NPLs. The finding of the study revealed as Effective Tax Rates had a positive but insignificant effect on NPLs of commercial banks in Ethiopia. Also, Return on Asset, Return on Equity, and banks' capital adequacy ratio had a negative and statistically significant effect on NPLs; whereas average lending rate, inflation rate, and gross domestic product had a positive and statistically significant effect on NPLs of commercial banks in Ethiopia. Furthermore, the study suggested that bank managers should emphasize the management of current assets and loans than fixed assets to reduce the level of nonperforming loans.

Fekadu (2018) investigated the determinants of non-performing loans (NPLs) in commercial banks in Ethiopia. The study adopted a quantitative research approach and used data collected from the National Bank of Ethiopia, Central Statistical Agency, and the financial statement of nine commercial banks from 2006-2017. Descriptive and random effect multiple regression analysis was employed to analyze the unbalanced panel data. The findings of the study show that return on equity and capital adequacy has a negative and significant impact on NPLs. Whereas, loan loss provision and loan to deposit have a positive significant relationship with NPLs. The study also showed that gross domestic product, net interest margin, and unemployment are insignificant factors of NPLs. The study suggested that commercial banks should concentrate or diversify their credit portfolio by calculating risk relative to its return to increase return on equity and to reduce the level of nonperforming loans.

Ambo (2018) Study investigates the bank-specific and macro-economic determinants of Non-performing loans (NPLs) of commercial banks in Ethiopia. The study adopted an explanatory research design and a quantitative research approach. Nine commercial banks have been the subject for the study ranging from 2007 to 2016. More specifically; a random effect model was used to examine determinants of NPLs. The findings of the study showed that trade openness has



a positive and significant effect on non-performing loans, whereas, exchange rate, unemployment, and loan growth have a negative and significant effect on NPLs. The findings also showed an insignificant relationship of real lending rate, capital adequacy ratio, and ownership structure with NPLs of Ethiopian commercial banks. The study suggests that commercial banks should consider the macro economic factors before extending loans.

Belay (2019) examined determinants of non-performing loans evidenced by commercial banks in Ethiopia. The study used an explanatory research design and quantitative research approach with secondary panel data utilized over the study period 2009-2018. Furthermore, the study adopted an ordinary least squares (OLS) model. The finding of the study reveals that; operational efficiency, return on asset, loan to deposit ratio, and capital adequacy ratio found the most significant variables that affect the banks' non-performing loan from bank-specific factors. Whereas, loan loss provision and bank size were found insignificant in determining the non-performing loan of banks. More specifically, from macro-economic variables; inflation is the only significant variable that determines the non-performing loan of the commercial banks in Ethiopia. On the other hand, variables like GDP growth rate, lending interest rate, and exchange rate are found as insignificant variables in determining non-performing loans.

Minas (2019) examined bank-specific and macroeconomic determinants of nonperforming loans in the Ethiopian banking system for the period 2005 to 2013 using the first difference GMM estimation method. Bank-specific factors are ROA, capital to asset ratio, and loan to deposit ratio and macroeconomic factors are real GDP growth, unemployment, and inflation. The estimation result indicates that Profitability and capital adequacy both showed a significant negative effect on NPL. Loan growth has also shown a significant and positive effect on NPL. However, the three macroeconomic factors have an insignificant effect on NPLs.

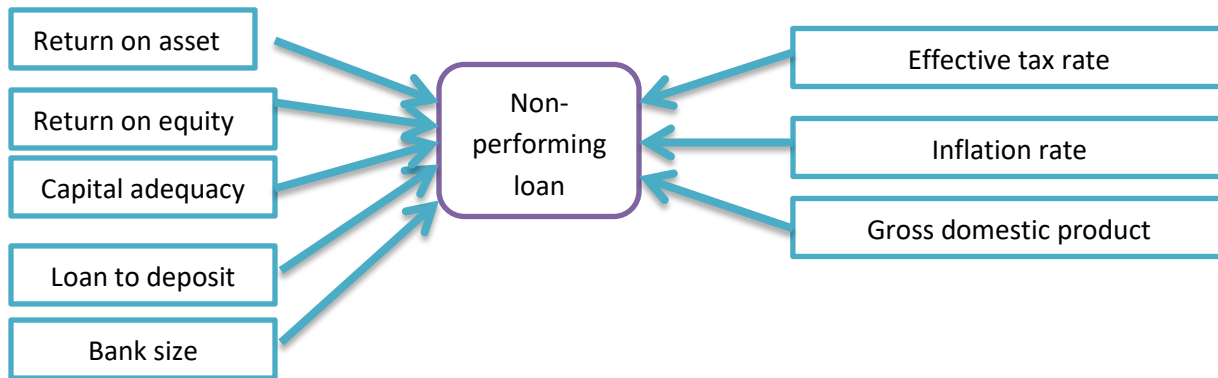
### **2.3 Summary and Knowledge Gap**

The literature review that is discussed so far showed that banks NPLs were determined by macroeconomic and bank-specific factors. The empirical evidence shows that favorable macroeconomic conditions, such as sustained economic growth, inflation rate, and effective tax rate, tend to be associated with a better quality of bank loans. The studies, in general, depicted the association between real GDP growth, inflation, and effective tax rate. In addition, bank-specific factors like return on asset, return on equity, bank size, capital adequacy ratio and loan to deposit ratio are found to be having significance on the occurrence of NPL. However, Most of the literature that is discussed so far appeared to have focused on studies that were conducted in the banking sector of developed economies (such as united state of American, Spanish, Greek and Italian) and some emerging economies (such as Indian, Chinese, Malaysian, and Indonesia). Consequently, the Banking sectors in most developing economies like Ethiopia have so far received inadequate attention in the literature. Moreover, NPLs of different countries do not necessarily share identical immediate causes since those studies were based on data from diverse countries. In the context of Ethiopia, as knowledge of the researcher, limited numbers of pieces of literature were conducted in the banking industry and the impact of the variables differs depending on economic condition, political stability, Rule and regulation of the country, governing system, loan policy, etc. For instance, Negera (2012), Meshesha (2015), and Tesfaye (2015) assessed the determinants of NPLs in Ethiopian commercial banks and considered only bank-specific variables in their study. However, macroeconomic variables were included and analyzed the effects could be appropriate since similar studies have demonstrated these variables have a significant effect on NPLs. Dula (2010) concentrated on managing NPL and the study used only one private bank and does not consider other private and state banks has a large amount of market share. Anisa (2015) studied the determinants of non-performing loans of commercial banks in Ethiopia. The included variables were macroeconomic (deposit rates, GDP growth rate, lending interest rate, and inflation rate) and bank-specific (cost efficiency, solvency ratio, and loans to deposit ratio). Aemiro and Rafisa (2014) examined the bank-specific determinants of credit risk in Ethiopian commercial banks. Zelalem (2013) examined the bank-specific and macro-economic determinants of Non- performing loans (NPLs) of commercial banks in Ethiopia. The macroeconomic factors considered were effective exchange rate, inflation rate, gross domestic product, and lending rate; bank-specific variables were loan growth, bank

size, state ownership, financial performance, operational efficiency, and income diversification. Most of these studies used descriptive analysis and correlations matrix for the analysis. These methods only provide simple summaries about the sample and do not indicate the strength of the relationship between dependent and independent variables. In addition, several studies conducted in different countries, indicate that a number of macroeconomic and bank-specific variables explained the level of NPL. In this respect, as knowledge of the researcher, few of these determinant variables are considered in similar studies conducted so far. Therefore, this study incorporates some of the significant determinants of NPL like bank size and effective tax rate. Generally, the study is expected to fill the existing literature gap in the area of the study by employing macroeconomic and bank-specific factors and empirically examine their effect on NPLs of commercial banks in Ethiopia.

## 2.4. Conceptual Frame Work

From the theoretical and empirical literature reviews, the following conceptual framework of the study is developed by the researcher.



Source: Researcher own construction

Figure 2.1. The conceptual framework

## **CHAPTER THREE**

### **3. RESEARCH DESIGN AND METHODOLOGY**

#### **Introduction**

This study aimed to examine the determinants of NPLs in the commercial banks found in Ethiopia. Accordingly, this chapter was discussed the research procedure that is used to conduct this study. In case, it begins by discussing research design followed by the research approach. The subsequent section presents and discusses data sources and type, target population, sampling technique and sample size determination, the definition of study variables with their measurements and model specifications are presented. Finally, a method of data analysis, interpretation and presentation was presented.

#### **3.1. Research Design**

The choice of research design depends on the objectives that the researchers want to achieve (John, 2007). Explanatory research is conducted to identify the extent and nature of cause-effect relationships between dependent and independent variables. Accordingly, since this study was designed to examine the relationships between NPLs and their determinants, this study was used an explanatory research design. Thus, explanatory research design is devoted to finding causal relationships among dependent and explanatory variables. It implies how and why variables should be related and the existence of or a change in one variable or cause leads to change in other variables.

#### **3.2. Research Approach**

According to Creswell (2009), there are three approaches of research. Those are; quantitative, qualitative, and mixed research approach. Quantitative research is a means for testing objective theories by examining the relationship among variables. In addition, the quantitative research approach is used to identify factors that influence the outcome and specifies how and why the variables are interrelated and why the independent variable influences a dependent variable (Creswell, 2017). Accordingly, by considering the research problem and objective, this study used a quantitative research approach to have a better insight and gain enough understanding about the determinants of nonperforming loans in commercial banks of Ethiopia. Thus, the quantitative research approach better provides and explains cause and effect relations. Also, the

quantitative research approach can be expressed in terms of quantity and attempts to avoid bias in measurement by using standardized measurement tools in interpretation by using defined data categories. It measures what happens (reliable and objective) rather than how someone feels about what happens (subjective). It tests a sample and generalizes a population Often reduces and restructures a complex problem to a limited number of variables (Creswell, 2017).

### **3.3. Data type and sources**

This study was used secondary sources of data that are panel in nature. A secondary source of data was preferred by the researcher since it is less expensive in terms of time and money while collecting. And also, it allows collecting high-quality data (Saunders and Cornett, 2007) as cited in Belay (2012). Secondary data may either be published or unpublished data (Kothari, 2004). In this study, secondary data was obtained from NBE, CSA, and the head office of each respective banks (audited financial statements and annual reports filed with NBE through document review). These data include both bank-specific and macroeconomic factors. The bank-specific was obtained from the National bank of Ethiopia and the head office of each selected commercial banks whereas data of macroeconomic variables was collected from the central statistical agency (CSA) except the Effective tax rate that was calculated from the financial statement of each selected commercial banks.

### **3.4. Target Population**

The target population of the study was all commercial banks registered by NBE and operate in the country. According to NBE (2018), the country has one public-owned commercial banks and seventeen private commercial banks which are operating throughout the country such as Commercial banks of Ethiopia, Dashen Bank, Awash International Bank, Wegagen Bank, United Bank, Nib International Bank, Bank of Abyssinia, Lion International Bank , Cooperative Bank of Oromia, Berhan International Bank, Buna International Bank, Oromia International Bank, Zemen Bank, Addis International Bank, Abay Bank, Enat Bank, and Debub Global Bank and Zamzam bank.

### **3.5. Sampling Techniques and sample size determination**

This study used purposive non-probability sampling method because purposive or judgemental non probability method enables to use the researcher's judgment to select sample and best to meet the research objectives. The selection criteria set by the researcher was first, the required

banks are only Commercial banks in Ethiopia. Second, it is based on the time of establishment and start operation (only banks that have ten and above years' experience in the banking operations were included). Accordingly, from 18 commercial banks registered in the country as of June 2018 G.C, the researcher has selected purposively 13 commercial banks from which 10 years of secondary data were collected for the research analysis. Therefore, the data for this study were collected from thirteen commercial banks in the country. Out of the thirteen commercial banks, the commercial bank of Ethiopia(CBE) is state-owned banks whereas the remaining twelve banks:-Awash international banks (AIB), Dashen bank S.C(DB), Bank of Abyssinia(BOA), Cooperative Bank of Oromia(COOP), Wegagen bank(WB), United Bank(UB), Lion international bank S.C(LIB), Nib International Bank(NIB), Oromia international bank(OIB), Buna international bank(BUIB), Berhan international bank(BIB) and Zemen bank(ZB) are private banks that were registered before 2010 by NBE. The matrix for the frame is 13\*10 that includes 130 observations.

### **3.6. Method of Data analysis, presentation, and interpretation**

To achieve the objective of the study, the study was concentrated on quantitative analysis. Hence, the researcher used an econometric model to identify and measure the effect of explanatory variables on nonperforming loans of Ethiopian commercial banks. According to Brooks (2008), regression is concerned with describing and evaluating the relationship between a given variable (usually called the dependent variable) and one or more other variables (usually known as the independent variables. Therefore, the researcher adopted a panel data regression model to examine the effect of each independent variable on the dependent variable (nonperforming loans) of the commercial bank in Ethiopia. As stated by Brooks (2008), panel data is favored for situation often arises in financial modeling where we have data comprising both time series and cross-sectional elements. In addition, we 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. Accordingly, the study model focused on panel data technique that comprises both cross-sectional and time-series elements. The cross-sectional element is reflected by the different Ethiopian commercial banks (thirteen) and the time-series element is revealed by the period of study (2010-2019).

Thus, to achieve the stated objective, the collected panel data were analyzed using descriptive statistics, correlation matrix, and multiple linear regression analysis. The descriptive statistics (mean, minimum, maximum, and standard deviations) was used to analyze the general trends of the data from 2010 to 2019 based on the sample of 13 banks, and the correlation matrix was used to examine the linear relationship between the dependent variable and independent variables. Multiple linear regression models were used to determine the relative importance of each independent variable in explaining the variation of NPLs in Ethiopian commercial banks. Accordingly, the multiple linear regressions model was conducted by the ordinary listing square (OLS) method using Stata econometric software package. The rationale for choosing OLS is that, if the Classical Linear Regression Model(normality, Heteroscedasticity, autocorrelation, and multicollinearity) assumptions hold, then the estimators determined by OLS have several desirable properties, and are known as Best Linear Unbiased Estimators (Brooks, 2008).

### 3.7. Model Specification

The objective of this study is to examine the determinants of NPLs of commercial banks in Ethiopia. Similar to the most noticeable previous research works conducted on the nonperforming loans of financial sectors, this study used nonperforming loans ratio as dependent variables whereas Return on asset, return on equity, capital adequacy ratio, loan to deposit ratio, bank size, inflation rate, effective tax rate and gross domestic product as explanatory variables. These variables were chosen since they are widely affect commercial banks in Ethiopia. Accordingly, this study examined the determinants of NPLs of commercial banks in Ethiopia by adopting a model that explain the variables in an appropriate. The regression model of this study has the following general form;

$$y_{it} = \beta_0 + \beta x_{it} + \varepsilon \dots \dots \dots 1$$

Where: -  $y_{it}$  is the dependent variable for firm ‘i’ in year ‘t’,

$\beta_0$  is the constant term,

$\beta$  is the coefficient of the independent variables of the study,

$x_{it}$  is the independent variable for firm ‘i’ in year ‘t’ and

$\varepsilon$  the normal error term.

As noted in Brooks (2008), the rationale for the inclusion of the disturbance term is: first, even in the general case where there is more than one explanatory variable, some determinants of  $Y_{it}$  will always in practice be omitted from the model. Second, there may be errors in the way that  $Y_{it}$  is measured which cannot be modeled. Finally, there are bound to be random outside influences on  $Y_{it}$  that again cannot be modeled. For example, a computer failure, human behavior. Hence, the disturbance term intends to mitigate the above problems. Accordingly, to test the determinants of nonperforming loan of commercial banks of Ethiopia, the researcher estimated a linear regression model as presented as follows;

$$NPL_{it} = \beta_0 + \beta_1(ROA)_{it} + \beta_2(ROE)_{it} + \beta_3(CAR)_{it} + \beta_4(LTD)_{it} + \beta_5(BS)_{it} + \beta_6(INFR)_{it} + \beta_7(ETR)_{it} + \beta_8(GDP)_{it} + \varepsilon \dots \dots \dots 2$$

Where,

- $\beta_0$  is an intercept
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6,$  and  $\beta_7$  represent estimated coefficient for specific bank  $i$  at time  $t$ ,
- ROA, ROE, CAR, LTD, BS, INF, ETR, and GDP represent Return on asset, return on equity, capital adequacy ratio, Loan to deposit ratio, bank size, inflation rate, effective tax rate, and gross domestic product in respectively
- $\varepsilon$  represents error terms for intentionally/unintentionally omitted or added variables. It has zero mean, constant variance, and non- autocorrelated. The coefficients of the explanatory variable were estimated by the use of the ordinary least square (OLS) technique.



### **3.8. Variables and Their Measurements**

According to Creswell (2009), to make it is clear to readers what groups are receiving the experimental treatment and what outcomes are being measured, the variables need to be specified in quantitative researches. Therefore, this section explained the variables used as dependent and independent (explanatory) variables in the study, and a hypothesis is developed derived from previous empirical evidence. For the analysis purpose, nonperforming loan ratio was treated as the dependent variable and measured by dividing Nonperforming loans to gross loans. On the other hand, loan to deposit ratio, capital adequacy ratio, return on asset, return on equity and bank size was treated as independent variable from bank-specific factors. Similarly, Inflation rate, effective tax rate, and gross domestic product were included as independent variables from macroeconomic factors. As noted by Brooks (2008), including more than one explanatory variable in the model never indicates the absence of missed variables from the model. Thus, to minimize the effect of missed variables from the model, the researcher was included the disturbance term in this study.

#### **3.8.1. Dependent variable**

##### **Nonperforming Loan**

Nonperforming loans (NPLs) are loans that are outstanding both in their principal and interest for a long period of time disagreeing with the terms and conditions under the loan contract as noted by Gezu (2014). Any loan facility that is not up to date in terms of payment of principal and interest contrary to the terms of the loan agreement is considered as NPLs. Thus, the amount of nonperforming loans represents the quality of bank assets (Tesfaye, 2012). According to the Ethiopian banking regulation, “Nonperforming loans are a loan whose credit quality has deteriorated and full collection of principal and/or interest as per the contractual repayment terms of the loan and advances are in question” (NBE, 2008). Besides, NPL is a loan that delays the payment of principal and interest for more than 90 days. Deterioration in asset quality is a much more serious problem for banks unless the mechanism exists to ensure the timely recognition of the problem. It is a common cause of bank failure. Poor asset quality leads to nonperforming loans that can seriously damage a bank’s financial position having an adverse effect on the bank's operation (Lafunte, 2012). It distresses the performance and survival of banks Mileris

(2012). As per the NBE (2012) directive, NPLs are classified as Substandard, Doubtful, and Loss. It is measured by dividing the amount of NPLs to gross loans.

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

### **3.8.2. Independent Variables**

Independent variables are explanatory variables that explain the dependent variable. Previous researches on the determinants of banks NPLs have shown that independent variables that can explain the variation on NPLs are classified into bank-specific and macroeconomic variables Saba et al. (2012), Vallcorba and Delgado (2007), Louzis et al. (2010) and Masood and Aktan (2009). In this study, bank-specific variables are internal factors and controllable for banks managers whereas, macroeconomic variables are uncontrollable and hence they are called external factors. Thus, independent variables included in this study was; return on asset (ROA), return on equity (ROE), capital adequacy ratio (CAR), loan to deposit ratio (LTD), and Bank size(BS) from bank-specific factors while inflation rate (IFR), effective tax rate (ETR) and gross domestic product (GDP) was included from macroeconomic factors. The majority of these variables were modified and adopted from previous studies done by other researchers based on the extent of their effect on nonperforming loans whereas one of these variables, that is effective tax rate is added from the study of Gezu (2014) and Abebe (2018). Accordingly, the following subsections presented the bank-specific and macroeconomic variables used in the econometrics model of this study.

#### **3.8.2.1. Bank Specific Variables**

The existing literature provides evidence that suggests a strong association between NPLs and several bank-specific variables. The bank-specific variables that are usually theorized as determinants of NPLs are included return on asset, return on equity, capital adequacy ratio, loan to deposit ratio and bank size.

**Return on Asset (ROA):** represents efficiency in asset utilization and shows how much net income is generated out of assets of the bank. It indicates the ability of bank management to generate profits by utilizing the available assets of the bank. Thus, if the ratio of ROA is high, it indicates that it is better performance to generate profit. Strong bank profitability measured in terms of ROA might result from high lending rate, fees and commission that results in bank

growth in size and profitability. Thus, ROA gives a thought on how efficient management is at using its assets to generate earnings. Various researchers found different results regarding the relationship between ROA and NPLs. For instance: - Ahmad and Bashir (2013), Gezu (2014), Makri et al. (2014), Haile (2018) and Belay (2019) were examined positive significant relationships between ROA and NPLs. However, Boudriga et al. (2009) and Messai and Jouini (2013), Atomsa (2017), Abebe (2018), and Minas (2019) found a significant and negative association between NPLs and ROA by supporting the arguments that states deterioration of profitability ratio measured in terms of ROA results in riskier activities of banks and then raise the level of NPLs. They justified that since ROA represents efficiency in asset utilization, poor utilization of assets leads to higher NPLs for the banks. Return on asset is measured by the ratio of net profit to total asset as follows;

$$ROA = \frac{Net\ income}{Total\ asset}$$

**Return on Equity (ROE):** represents the rate of return received from equity invested in banks. It is the amount of net income returned as a percentage of shareholder's equity. Return on equity measures profitability by revealing how much profit a bank can generate with the money shareholders have invested. Thus, ROE measures how much the bank is earning on its equity investment. The finding of this study was consistent with the previous study of Shingjergji (2013), Ahmad and Bashir (2013), Gezu (2014), Makri et al. (2014), Asfawesen (2017), Atomsa (2017), Haile (2018), Fekadu (2018) and Abebe (2018) found significant and negative relationships between return on equity and non-performing loan of Ethiopian commercial banks. In this study, return on equity is measured by the ratio of net profit to total equity.

$$ROE = \frac{Net\ profit}{Total\ equity}$$

### **Capital Adequacy Ratio (CAR)**

Capital adequacy is a measure of a bank's financial strength since it shows the ability to withstand/tolerate operational and abnormal losses. It also represents the ability to undertake additional business (Habtamu, 2012). As noted by Makri et al. (2014), CAR determines the risk behavior of banks. It is a measure of a bank's solvency and ability to absorb risk. Thus, this ratio is used to protect depositors and promote the stability and efficiency of financial systems.

According to Gezu (2014), Makri et al. (2014), Asfawesen (2017), Abebe (2018), Fekadu (2018), and Minas (2019) there is a significant and negative relationship between CAR and NPLs indicating a risky loan portfolio is marked by a high NPL (equivalent to high credit risk) by argued well-capitalized banks is less incentive to take a risk. Whereas, Fouopi Djiogap and Ngomsi (2012), Amsalu (2018), and Belay (2019) found a significant and positive association between NPLs and capital adequacy ratio. In addition, the study of Ambo (2018), found a positive and insignificant relationship between Capital adequacy ratio and NPLs of commercial bank of Ethiopia. CAR is measured by total Equity (capital and advances) to total asset ratio.

$$CAR = \frac{\text{Total equity}}{\text{Total asset}}$$

### **Loan to Deposit Ratio (LTD)**

The loan to deposit (LTD) ratio examines bank liquidity by measuring the funds that a bank has utilized into loans from the collected deposits. It demonstrates the association between loans and deposits. Besides, it provides a measure of income source and also measures the liquidity of bank asset tied to loan (Makri et al., 2014). This ratio also measures customer friendliness of banks implies that relatively more customer-friendly bank is most likely face lower defaults as the borrower expect turning to a bank for the financial requirements (Rajan and Dhal, 2003). Thus, it represents a bank's preference for credit. It is measured in terms of loan to deposit ratio. There is empirical evidence that shows as loan to deposit ratio has a significant and positive effect on the level of NPLs of banking sectors. For example, the previous study of Umer (2015), Beju (2016), Asfawesen (2017), Fekadu (2018), Belay (2019), and Minas (2019) found as loan to deposit ratio has a significant and positive relationship with NPLs. However, the study of Gezu (2014) found a positive and insignificant effect of LTD on NPLs. In addition, Amsalu (2018) found a negative and insignificant relationship between loan to deposit ratio and NPLs of the commercial bank of Ethiopia.

$$LTD = \frac{\text{Total credit}}{\text{Total deposit}}$$

### **Bank size (BS)**

Bank size allows diversification opportunity in lending, consequently, loans of banks were dispersed among different sectors and chances of NPLs declined as compared to the concentrated loans. Therefore, diversification supports the negative association between NPLs and the size of the banks. Hu et al. (2006) used panel data throughout 1996-1999 found that banks with higher government ownership are having fewer NPLs. The authors further concluded that bank size has a negative effect on the growth of NPLs. Thus it can be concluded that an increase in bank size reduces the future growth of NPLs. The empirical evidence relating to the impact of bank size on NPLs suggested an inverse relationship (Rajan and Dhal, 2003) by arguing bigger size allows for more diversification opportunities. According to these studies, the inverse relationship means that large banks have better risk management strategies and technology which allows them for efficient information gathering, processing, and analyzing which finish up with lower levels of NPLs as compared to smaller banks. That is, as the size of the asset increase it is less likely that they failed and longer the survival time. Besides, larger banks have the advantage of better access to additional financing, dealing with liquidity problems, and diversifying risk.

Some studies provide evidence of a positive association between NPLs and asset size (Das and Ghosh, 2007), Misra and Dhal (2010) argued that the too big to fail hypothesis assumes that large banks take excessive risks by increasing their leverage too much and extend loans to lower-quality borrowers, and therefore have more NPLs. The size of a bank was measured by the Natural log of the total assets of each bank.

#### **3.8.2.2. Macroeconomic Variables**

Apart from bank-specific variables, there is so much empirical evidence that suggests that several macroeconomic factors are important determinants of NPLs. Several macroeconomic factors which the literature proposes as important determinants of NPLs are annual growth in GDP, the annual inflation rate, a real effective exchange rate (REER), annual unemployment rate, broad money supply and GDP per capita Rajan and Dhal (2003), and Jimenez and Saurina (2005). This study only considers Inflation Rate, Effective Tax Rate, and Gross domestic product.

**Effective Tax Rate:** Taxation in banking sectors represents the ability of banks to allocate their portfolios for their taxes. Corporate income tax rates affect bank loans in different aspects. High tax burden enables the banks to shift the tax burden either by increasing lending rate and fees or paying low-interest rate on deposits (Albertazzi and Gambacorta, 2006). Thus, the bank is capable of transferring the tax costs to its customers by raising fees and interest spreads (Khan, Siddique et al., 2020). Bank with high debt pay fewer taxes due to higher interest expense. Even if many studies were not conducted on this variable, two researchers conducted in Ethiopia were found different results regarding the relationship between effective tax rate and NPLs. For instance, Gezu (2014) found a significant and positive relationship between ETR and NPLs. whereas, the study conducted by Abebe (2018), found a positive and insignificant effect of the effective tax rate on NPLs of commercial banks of Ethiopia. In this study, the effective tax rate is calculated as tax to net income before tax.

**Inflation Rate** is a situation in which the economy's overall price level is rising. It represents sustained and pervasive increment in the aggregate price of goods and services resulting decline in purchasing power of money. Accordingly, when inflation is high and unexpected, it can be very costly to an economy. At the same time, inflation generally transfers resources from lenders and savers to borrowers since borrowers can repay their loans with birr that are worthless. This indicates that, as inflation increases, the cost of borrowing gets more expensive and deteriorates the quality of the loan portfolio. In addition, inflation cause firms to increase their costs of changing prices. Finally, it made individuals hold less cash and make more trips to banks since inflation lowers the real value of money holdings. It can negatively affect the borrowers real income when wages are stick. Besides, price stability is considered as a prerequisite for one's countries economic growth (Škarica, 2013). The finding of this study was consistent with the previous study conducted by Beju (2016), Amsalu (2018), Fekadu (2018), and Belay (2019). However, the study made by Yared (2018) and Kibur (2019) did not agree with the finding of this study as they found a significant and positive effect of inflation rate on NPLs. Similarly, the study made by Gezu (2014), Umer (2015), and Atomsa (2017) was inconsistent with the finding of this study as they found a negative and insignificant relationship between the inflation rate and NPLs of commercial banks of Ethiopia. In this study, the consumer price index is studied as the proxy of inflation since the most ample measure of inflation defines a change in the price of consumer goods and services purchased by households. An increase in CPI requires monetary

regulators to use contractionary measures by increasing the interest rate to control inflation which later increases the cost of borrowing and ultimately cause NPLs. In case, the figure amount of Consumer price index was taken from Central statistical agency (CSA).

### **Real GDP growth**

The real gross domestic product is the measure of total economic activity within the economy and it is commonly used as economic indicator. Similarly, gross domestic product is a measure of macroeconomic conditions. Fainstein and Novikov (2011) suggests that real GDP growth was the main driver of nonperforming loan ratios.

Some Scholars stated that GDP is inversely associated with non-performing loans (Louzis et al. ,2010), Zelalem (2013). In addition to the above scholars Messai and Jouini (2013) and Alizadeh Janvisloo and Muhammad (2013) stated that non-performing loan and GDP has an indirect relationship with NPLs. They explain that the enhancement of GDP reflects the economic growth and development of the country. When the economic growth increases the borrower income and their ability to pay their debt at payment period increase and which in turn contributes to lower NPLs. Besides, strong positive growth in real GDP usually translates into more income which improves the debt servicing capacity of the borrower which in turn contributes to lower NPLs. However, other authors Shingjergji (2013), Amsalu (2018), Abebe (2018), and Minas (2019) notified that GDP has a significant and positive relationship with NPLs. Similar to the above inconsistent results, the study conducted by Berhanu (2019), found a positive and insignificant relationship between real GDP and NPLs of commercial banks of Ethiopia. For the purpose of this study, GDP growth was measured by the annual percentage change in the real GDP.

In conclusion, the expected Sign of Variables is presented in table 3.1 as follows.

Table 3.1: Expected Sign (+/-) of Explanatory Variables in this Study

Explanatory variables	Expected sign
Return on Asset	-
Return on Equity	-
Capital Adequacy Ratio	-
Loan to Deposit Ratio	+
Bank size	-
Effective Tax Rate	+
Gross domestic product	-
Inflation Rate	+

**Notes:** A positive sign “+” indicates direct impact; whereas a negative sign “-” indicates an inverse impact of explanatory variables on a dependent variable.



## CHAPTER FOUR

### 4. RESULTS AND DISCUSSIONS

#### Introduction

This chapter captures the presentation, analysis and discussions of the result of the research work to achieve research objectives and set a base for a conclusion. The data were analyzed in terms of the random effect model via Stata 16 version. The chapter contains seven sections. The first section of this chapter commences with the discussion of the result of descriptive statistics. The second section presents the correlation analysis among dependent and independent variables. The third section presents the basic tests for the assumptions of the classical linear regression model followed by the model specification test. The fifth section presents the rationale behind choosing the appropriate model. Then the result of regression analysis was presented in section six. Finally, the results of the selected variables were discussed in accordance with supportive literature in section seven.

#### 4.1. Descriptive Statistics

The summary of descriptive statistics is presented to determine the minimum, maximum, mean, and standard deviation for the dependent variable and independent Variables. The dependent variable was nonperforming loans and the independent variables were classified into two, the macroeconomic factors (inflation rate, effective tax rate, and gross domestic product) and bank-specific factors were (Return on asset, return on equity, capital adequacy ratio, loan to deposit ratio and Bank size) which were used to see their impacts of on non-performing loan.

Table 4.1 below provides a summary of the descriptive statistics of the dependent and independent variables for thirteen commercial banks in Ethiopia from the year 2010 to 2019 with a total of 130 observations. The table shows the mean, minimum, maximum and tandard deviation data over the period under consideration.

As it can be seen from Table 4.1, for the total sample, the mean of NPLs was 3.368%. The mean value of NPLs suggests that from the total loan Ethiopian commercial banks disbursed on average, 3.368% were being defaulted or uncollected over the sample period. This ratio is lower than the National bank of Ethiopia's limit of NPLs ratio which is 5%. This indicates that there is

a good movement by ECBs towards minimizing NPLs in the sample years. This may be due to either improvement in the levels of loan quality or being escaping of banks from providing loans and advances. But when the NPL ratio of each bank is compared, there is great variation between them. i.e., it is ranging from 0.88 percent to 6.373 percent

From bank-specific independent variables, as stated in the below Table 4.1, ROE measured by the net profit divided by total equity of the bank has a mean value of 25.26% with the highest 43.91% and the lowest 10.4%. That means, most profitable bank of the sample commercial banks earned 0.44 cents of net income from a single birr of equity investment and the minimum profit earned by the sample banks was 0.104 cents on each birr of equity investment. The mean of ROE was 25.26 % showed that Ethiopian commercial banks earned 0.25 cents on average for each one-birr capital investment over the sample period. The average return on equity suggests that ECBs had been producing a good return for their owner during the period under study.

As far as profitability ratios are concerned, ROA records a minimum of 1.57% and a maximum of 5.34% with a mean value of 3.41%. In case, even if high ROA indicates better performance in the management of available assets, commercial banks in Ethiopia show low performance concerning ROA during the study period as compared to ROE. The standard deviation for ROA was 0.78 which indicates that the profitability variation between the selected banks was very small. On the other hand, it implies that the values in a statistical data set are close to the mean of the data set on average.

The loan to deposit ratio that is measured by total loans divided by total deposits indicates how far the bank used the depositor's fund on credit activity which is prone to default risk. The mean value of the Loan to deposit ratio was 52.23% with the highest standard deviation of 35.19% from its mean value. The average 52.23 % shows that ECBs provide on average 0.52 cent loan from one birr collected as a deposit from the depositor. The highest standard deviation of the loan to deposit ratio indicates that the values in the data set are further away from the mean on average. The maximum and minimum were 79.28 % and 17.83% respectively, suggesting that the ECBs concentrate on lending business which is exposed to risk uses depositors' money.

Capital adequacy ratio also measured by total equity(capital and advances) divided by total assets presents a minimum of 1.35 and a maximum of 52.88% with a mean value and standard

deviation of 20.013% and 10.53% in respectively. This indicates that CAR for the sample commercial banks in Ethiopia during the study period was above the minimum requirement, which is 8% of the NBE showing that EBCs have less ability to bear loss results from loan default.

Lastly, from bank-specific factors, the size of banks which was measured by the natural log of total assets revealed the highest standard deviation (22.2%), next to the loan to deposit ratio, which means, it was the most deviated variable from its mean compared to other variables. This indicates the existence of high variation among ECBs in terms of their size.

On the other hand, from the macroeconomic variables that can affect a bank's nonperforming loan over time is a gross domestic product. Gross Domestic Product (GDP) is an indicator of the economic health of a country as well as the gauge of a country's standard of living. It is the measurement of the level of economic activity of a country. For the purpose of this study, GDP is measured by the annual real growth rate of the gross domestic product. The mean value of the real GDP growth rate is 9.604 percent and the minimum value was 7.7 percent per year to a maximum of 11.4 percent. The mean result was indicated that the economic growth of the country was 9.6 percent per year for the study period between 2010 and 2019 and the average real growth rate of the country's economy over the past ten years was good and there was a stable economic growth because the standard deviation is 1 percent. This may categorize the country under the fastest economic growth rate category. The maximum growth of the economy was recorded in the year 2011 (i.e. 11.4%) and the minimum was in the year 2018 (i.e. 7.7%).

Inflation is a situation in which the economy's overall price level is rising. It represents sustained and pervasive increment in the aggregate price of goods and services resulting decline in purchasing power of money. Furthermore, INF ranges from minimum values of 2.8% to a maximum of 34.1%. The general inflation rate of the country over the past ten years was more than the average GDP (i.e. 9.604%). The rate of inflation was highly dispersed over the periods under study towards its mean with a standard deviation of 8.23 %. This implies that the inflation rate in Ethiopia during the study period remains somewhat unstable. The maximum inflation rate was recorded in the year 2012 (i.e. 34.1%) and the minimum was in the year 2010 (i.e. 2.8%). Finally, from macro-economic variables, the effective tax rate ranges from a minimum of 16.12% to a maximum of 26.11 %.

In conclusion, the loan to deposit ratio had the highest standard deviation which is 35% whereas the return on equity had the lowest standard deviation which is 2.62 % from its mean value. The highest standard deviation of 35% indicates that the values are spread out over a wider range and a lowest standard deviation of 2.62% indicates the values tend to be close to the mean of the data set on average. Besides, CAR is more than the minimum requirement (8%) showing better risk withholding ability of banks as per the National bank of Ethiopia.

Table 4.1 Summary of Descriptive statistics for dependent and independent variables

Variables	Mean	Standard deviation	Minimum	Maximum
NPL	0.0336815	0.0132066	0.0088	0.06373
ROA	0.0340954	0.0078764	0.0157	0.0534
ROE	0.2526277	0.0918703	0.1039737	0.4390537
CAR	0.2001265	0.1053341	0.0135	0.5288
LTD	23.02396	0.8890193	20.47618	25.20563
BS	0.5223056	0.1704546	0.1783171	0.7927741
ETR	0.1286	0.0823162	0.028	0.341
INF	0.20098	0.0270282	0.1612	0.2611
GDP	0.09604	0.0114554	0.077	0.114

Source: own computation from NBE and CSA via Stata 16

## 4.2. Correlation Analysis

This section presented the correlation between dependent and independent variables. Accordingly, the purpose of the correlation matrix in this particular study was to show the linear association between the dependent and independent variables. According to Brooks (2008), the correlation between two variables measures the degree of linear association between them. To find the relationship between variables, this study used the Pearson correlation matrix. Values of Pearson's correlation coefficient are always 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 a perfect negative association between variables. A correlation coefficient of zero, on the other hand, indicates the absence of relationship (association) between two variables (Brooks, 2008).

A low correlation coefficient; 0.1 - 0.29 suggests that the relationship between two items is weak or non-existent. If  $r$  is between 0.3 and 0.49 the relationship is moderate. A high correlation coefficient i.e.  $> 0.5$  indicates a strong relationship between variables. The direction of the dependent variable change depends on the sign of the coefficient. If the coefficient is a positive number, then the dependent variable was move in the same direction as the independent variable; if the coefficient is negative, then the dependent variable was move in the opposite direction of the independent variable. Hence in this study, both the direction and the level of relationship between the dependent and independent variables conducted using Pearson's correlation coefficient.

Besides, as it can be understood from the correlation result in Table 4.2 below, from bank-specific factors, return on asset, return on equity, loan to deposit ratio and bank size have a negative correlation with nonperforming loans with a coefficient of -0.5801, -0.5830, -0.2345 and -0.5977 respectively. This refers that when this ratio increases, nonperforming loans of the banks were decreased. Similarly, from macro-economic factors, inflation has a negative correlation with nonperforming loans with a coefficient of -0.1194 with opposite direction between them. On the other hand, from macro-economic factors, effective tax rate and growth domestic product have a positive correlation with nonperforming loans with a coefficient of 0.0361 and 0.0933 respectively; which indicates that when these ratio decreases, at the same time, nonperforming loan of the bank was decreased. Similarly, from bank-specific factors, the capital adequacy ratio has a positive correlation with non-performing loans (0.5166). This implies that there is the same direction between CAR and NPLs of commercial banks in Ethiopia.

In conclusion, it should be noted that all the above correlation coefficient results merely show the linear association among the dependent (NPLs) and independent variables. In other words, the relationships are not casual (i.e., the change in one variable does not result from the movement of the other variable).

Table 4.2 Correlation matrix between dependent and independent variables

	NPL	ROA	ROE	CAR	BS	LTD	INF	ETR	GDP
NPL	1.000								
ROA	-0.580	1.000							
ROE	-0.583	0.488	1.000						
CAR	0.517	-0.459	-0.342	1.000					
BS	-0.235	0.127	0.206	0.020	1.000				
LTD	-0.598	0.398	0.367	-0.369	-0.015	1.000			
INF	-0.119	0.163	0.068	-0.082	-0.146	0.091	1.000		
ETR	0.036	-0.179	-0.079	0.041	0.455	-0.005	-0.350	1.000	
GDP	0.093	0.069	0.027	-0.025	-0.297	-0.037	-0.297	-0.614	1.000

Source: own computation from NBE and CSA via Stata 16

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

In the part of the descriptive statistics, the study shows the mean, standard deviation, minimum and maximum values of the dependent and explanatory variables during the period under consideration, that is from 2010-2019. This section provides a test for the classical linear regression model (CLRM). The basic assumptions include linearity in parameters of the regression model, normality, heteroscedasticity, and Multicollinearity tests. For the econometric estimation to bring robust, unbiased/reliable, and consistent results, it has to fulfill the basic linear classical assumptions. Besides, these were required to show that the estimation technique, ordinary least squares (OLS), had many desirable properties, and also so that hypothesis tests regarding the coefficient estimates could validly be conducted (Brooks, 2008). If these assumptions are violated but this fact is ignored and the researcher proceeds the coefficient estimates are wrong, the associated standard errors are wrong and the assumed distributions are also wrong.

The linearity of the parameter is assumed since the model applies linear ordinary least squares (OLS). Thus, to maintain the validity and robustness of the regression result of the research in CLRM, it is better to satisfy the basic assumption of CLRM. As noted 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 was data that left out of the model.

Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, diagnostic tests were made for identifying misspecification of data if any to fulfill research quality. Accordingly, the following sections discuss the results of the diagnostic tests that ensure whether the data fits the basic assumptions of the classical linear regression model or not. The diagnostic tests performed in this study was detailed as follows;

#### **4.3.1. The errors have zero mean ( $E(u_t) = 0$ )**

According to Brooks (2014), this assumption requires that the average value (mean) of the error is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated. If the regression did not include an intercept and the average value of the errors was non-zero, several undesirable consequences could arise. First,  $R^2$ , defined as Explained sum of squares divided by total sum of squares(SS/TSS) can be negative, implying that the sample average,  $\bar{y}$  (mean of  $y$ ), explains more of the variation in  $y$  than the explanatory variables. Second and more fundamentally, a regression with no intercept parameter could lead to potentially severe biases in the slope coefficient estimates (Brooks, 2008). From the regression result, we can see that constant term was included the regression equation (7.196). Thus, the research study result has fulfilled the assumption that the average value of the error term is zero because the constant term 7.196 is included in the regression equation. Therefore, from these, the researcher concluded that there is no problem of biases in the slope of coefficient estimates and therefore, it justified the correctness of the coefficients and this assumption was not violated.

#### **4.3.2. Test of Normality Assumption**

One assumption of the classical linear regression model (CLRM) is the normal distribution of the residual part of the model. As noted by Gujarati (2004), OLS estimators are BLUE regardless of whether the  $u_i$  are normally distributed or not. If the disturbances ( $u_i$ ) are independently and identically distributed with zero mean and constant variance and if the explanatory variables are constant in repeated samples, the OLS coefficient estimators are asymptotically normally distributed with means equal to the corresponding  $\beta$ 's. According to Gujarati (2004), Normality can be tested by either by numerical/statistical or graphical methods. Accordingly, this study was tested normality of the data by using both statistical and graphical methods. As stated by Brooks (2008), if the residuals are normally distributed, the histogram should be bell-shaped. This means the P-value given at the bottom of the normality test screen should be bigger than

0.05 to not reject the null of the normality hypothesis that the data is normally distributed. The hypothesis of the normality test was formulated as follows:

H0: Error term is normally distributed

H1: Error term is not normally distributed.

$\alpha = 0.05$

Decision Rule: Reject H0 if the p-value is less than the significant level. Otherwise, do not reject H0

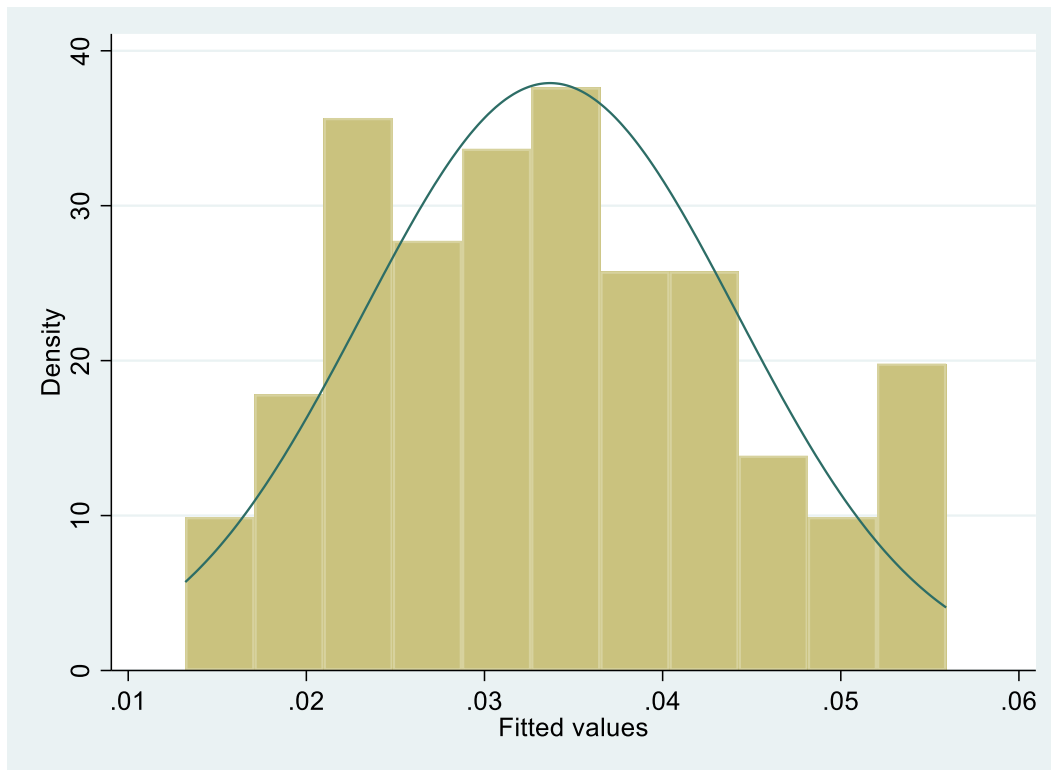
As shown in below Table 4.3, the skewness/kurtosis test statistics have a P-value of 0.0529 clearly implies that it is greater than 0.05, which indicates there is no evidence for the presence of an abnormality in the data. Thus, the null hypothesis that the data is normally distributed should not be rejected since the P-values were in excess of 0.05 significant levels. It can be concluded that there is no problem with normality. In addition to this test, normality assumption was also showed by graphical methods as it shown on below figure 4.1. This graphical methods also shows normality of the data because if residuals are normally distributed, the histogram should be bell-shaped (Brooks, 2008).

Table 4.3. Skewness/kurtosis tests for normality

Variable	obs	pr(skewness)	pr(kurtosis)	adj chi2(2)	Prob>chi2
resid	130	0.1423	0.0467	5.88	0.0529



Figure 4.1: Histogram from sample of Commercial banks in Ethiopia.



Source: own computation from NBE and CSA via Stata 16

### 4.3.3. Test for Heteroscedasticity assumption ( $\text{var}(u_i) = \sigma^2 < \infty$ )

One of the basic assumptions of the classical linear regression model was Homoscedasticity that states that the probability distribution of the disturbance term remains the same for all observations. That is the variance of each  $u_i$  is the same for all values of the explanatory variables. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity (Babulo and Hassen, 2005). Similarly, According to Brooks (2008), Heteroscedasticity means that error terms do not have a constant variance. If heteroscedasticity occurs, 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, OLS estimators were still given unbiased coefficient estimates, but they are no longer BLUE -- that is, they no longer have the minimum variance among the class of unbiased estimators (Brooks, 2008). Besides, if the errors are heteroscedastic, the formulae presented for the coefficient standard errors no longer hold. The reason is that the error variance plays no part in the proof that the OLS estimator is consistent

and unbiased, but error variance does appear in the formulae for the coefficient variances. There are several tests to detect the Heteroscedasticity problem, which are Park Test, Glesjer Test, Breusch-Pagan-Goldfrey Test, Whites Test, and Autoregressive Conditional Heteroscedasticity (ARCH) test. Accordingly, to detect the heteroscedasticity problems, Breusch-Pagan or Cook Weisberg test was utilized in this study as follows.

This test states that if the p-value is significant at 95% confidence interval, the data has a heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem. Thus, as shown in the below result, there was no evidence for the presence of heteroscedasticity problem for this study since the p values for all versions of the test statistic were more than 0.05 (87.05%) showing an insignificant value.

Table 4.4: Breusch-Pagan or Cook Weisberg test for heteroscedasticity assumption

Chi2(1)	0.03
Prob > chi	0.8705

Source: own computation from NBE and CSA via Stata 16

#### 4.3.4. Test of Multicollinearity Assumption

The term Multicollinearity indicates the existence of exact linear association among some or all explanatory variables in the regression model. This problem occurs when the explanatory variables are very highly correlated with each other (Brooks, 2008). According to Kennedy (2008), Multicollinearity problem exists when the correlation coefficient among the variables is greater than 0.70.

If an independent variable has exact linear combination with the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks, 2008). According to Gujarati (2004), when independent variables are multi collinear, there is overlapping or sharing of predictive power. Thus, if Multicollinearity is perfect, the regression coefficients of the independent variables are undermined and their standard errors are immeasurable. Besides, Multicollinearity problem makes significant variables insignificant by increasing p-value since increased p-value lowers the t-statistics value. Therefore, this problem is solved by dropping highly correlated variables (Ahmad and Bashir, 2013). This is because when explanatory variables are highly correlated with one another, they share the same information.

Besides, it reduces the individual explanatory variables' predictive power. That is none of the predictor variables may contribute uniquely and significantly to the prediction model after the other independent variables are included (Kinfе, 2011)

The method used in this study to test the existence of Multicollinearity was by checking the correlation matrix between the independent variables. As shown in the Table below, there is no correlation coefficient that exceeds or even closer to 0.70. Moreover, as noted in Brooks (2008), if the independent variables are not correlated with one another, adding or removing a variable from a regression equation would not cause a change on the values of the significant level and the coefficients estimates of other variables.

As noted by Gujarati (2004), a serious problem for Multicollinearity occurs if the correlation among independent variables is about 0.8 or larger. However, Multicollinearity between explanatory variables may result in wrong sign in the estimated coefficients and bias the standard errors of coefficients (Kinfе, 2011). To overcome this problem, a VIF test was conducted. That means, the larger the value of VIF indicates the more collinearity of the variables with each other. According to the rule of thumb, if the VIF of a variable exceeds 10, the variable is said to be highly collinear (Babulo and Hassen, 2005). Accordingly, Based on the result indicated in the above test, there is no Multicollinearity problem in this study. This is because the mean of VIF of variables is 2.03 which is much lower than the threshold of 10. The VIF for each variable was also very low. Kennedy (2008), stated that the Multicollinearity problem exists when the correlation coefficient among the variables is greater than 0.70, but in this study, no correlation coefficient exceeds or even close to 0.70. All correlation results are below 0.70. This indicates that the explanatory variables included in the model were not correlated with each other. Thus, this results enhanced the reliability for regression analysis.

In conclusion, in addition to the descriptive statistics, correlation analysis was made for explanatory variables to detect the Multicollinearity problem in the regression model. In case, there is no multicollinearity problem between variables. Therefore, the explanatory variables are the basic determinants of NPLs of commercial banks in Ethiopia. This enhanced the reliability of regression analysis. However, to reach on such a conclusion, this has to be supported by regression results after the appropriate model is applied as discussed in the upcoming sections.

Table 4.5. Test for Multicollinearity assumption

Variable	VIF	1/VIF
ETR	3.59	0.278690
GDP	3.11	0.321873
INF	2.23	0.448536
ROA	1.68	0.595812
ROE	1.47	0.681497
BS	1.44	0.696096
CAR	1.39	0.721557
LTD	1.32	0.755695
MEAN VIF	2.03	

Source: own computation from NBE and CSA via Stata 16

#### 4.4. Model Specification test

According to Brooks (2008), further implicit assumption of the classical linear regression model is that the appropriate functional form is linear. This means that, the appropriate model is assumed to be linear in the parameters and that in the bivariate case, the relationship between dependent and independent can be represented by a straight line. The assumption of the CLRM that the econometric model used in the analysis is correctly specified has two meanings. The first is since the model is correctly specified, there is no equation specification error and the second is no model specification error.

Model specification error exists due to omission of an important independent variable(s), the inclusion of unnecessary variable(s), incorrect specification of the error, adoption of wrong function form, and error of measurement in the regress and regressors. When the appropriate variables are omitted from a model, the OLS estimators of the variables retained in the model are biased and inconsistent. In addition to the above, the variance and standard error of these coefficients are incorrectly estimated. As a result, including irrelevant variables in the model are also that the estimated variances tend to be larger than necessary, thereby making for a less precise estimation of the parameters. That is, the confidence intervals tend to be larger than necessary (Gujarati, 2009). Therefore, to select a correct estimated model, the researcher had carry out the Ramsey RESET Test to check on the model specification.

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

H0: The model specification is correct.

H1: The model specification is incorrect.

From below Table 4.6, it can be concluded that this research does not reject the null hypothesis (H0), since the p-value is 0.447, which is greater than the significance level of 0.05. Thus, it can be concluded that the model specification is correctly specified from the year 2010 to 2019.

Table 4.6. Ramsey-reset test for model specification

F(3, 118)	0.89
Prob > F	0.447

Source: own computation from NBE and CSA via Stata 16

#### **4.5. Model Selection test (Fixed effect versus random effect Models)**

Econometrics model used to examine the impact of loan to deposit ratio, capital adequacy ratio, return on equity, return on asset, Bank size, growth domestic product, inflation and effective tax rate on nonperforming loans of commercial banks in Ethiopia was panel data regression model which is either fixed-effects or random-effect model. The appropriate test used to decide whether fixed effect or random effect model was Hausman Specification Test. Thus, Hausman Specification Test identifies whether the fixed-effects or random-effect model is the most appropriate under the null hypothesis that unobservable individual effects ( $u_i$ ) are uncorrelated with one or more of explanatory variables ( $X_i$ ).

##### **4.5.1. Hausman fixed random specification test**

According to Brooks (2008), conducting the Hausman test for model specifications is used to decide whether the fixed effect or random effect is an appropriate model to explain our result. In this case, the null hypothesis is random effects and the alternative hypothesis is a fixed effect. If the Hausman test result is statically significant then we accept the alternative hypothesis. However, if the result is statically insignificant then we accept the null hypothesis. Accordingly, as presented in Table 4.7, the p-value for tests is 0.9877 implies that the fixed effect model was not appropriate to explain the result since its p-value is more than 0.05. So we have to reject the alternative hypothesis. (I.e. fixed effect is appropriate). In this case, rejecting the alternative

hypothesis does not mean that accepting the null hypothesis. Hence, it needs further test (Breusch pagan Lagrange multiplier) to select from random effect or simple Ordinary least square regression model.

Table 4.7. Hausman fixed random specification test

Chi2 (8)	1.75
Prob > chi2	0.9877

Source: own computation from NBE and CSA via Stata 16

#### 4.5.2. Further test for model selection

As discussed above, a further test must be conducted to choose from the random effect and pooled OLS regression model. Accordingly, the Breusch pagan Lagrangian multiplier test was conducted to select the appropriate model from the random effect and simple OLS regression model. As it can be seen from the below Table 4.8 of further test for selection of the appropriate model from random effect and ordinary least square, the probability of chibar2 square is significant( less than 5%). This implies that the random effect model is appropriate rather than OLS regression model since 0.0015 is less than 0.05.

Table 4.8. Testing for random effects: Breusch and pagan Lagrangian multiplier (LM)

Chibar2 (01)	8.81
Prob > chibar2	0.0015

Source: own computation from NBE and CSA via Stata 16

#### 4.6. Result of Regression Analysis

This section presents the regression result of the random effect model that was made to examine the determinants of NPLs of commercial banks in Ethiopia. Regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables when the target is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed.

Accordingly, the regression result was made and coefficients of the variables were estimated via Stata version 16 software. As stated earlier in the model selection part, a random effect regression model is an appropriate model used in this study depends on the Hausman test and Breusch and pagan Lagrangian multiplier result of model selection. Thus, the model used to examine the determinants of NPLs of commercial banks in Ethiopia in this study was:

$$NPL_{it} = \beta_0 + \beta_1(ROA)_{it} + \beta_2(ROE)_{it} + \beta_3(CAR)_{it} + \beta_4(LTD)_{it} + \beta_5(BS)_{it} + \beta_6(INFR)_{it} + \beta_7(ETR)_{it} + \beta_8(GDP)_{it} + \varepsilon \dots \dots \dots 2$$

Where;

NPL= nonperforming loan ratio of bank 'i' in year t

LTD= Loan to deposit ratio of bank 'i' in year t

CAR= capital adequacy ratio of bank 'i' in year t

ROA= return on asset of bank 'i' in year t

ROE=return on equity of bank 'i' in year t

INFR=inflation rate of bank 'i' in year t

ETR = effective tax rate of bank 'i' in year t

BS = Bank size of bank 'i' in year t

GDP = Gross domestic product of bank 'i' in year t

$\beta_0$ = an intercept,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7,$  and  $\beta_8,$  = estimated coefficient of explanatory variables for bank 'i' in year t,  $\varepsilon_{it}$ = the error term for error terms for intentionally/unintentionally omitted or added variables.

The above model presented the econometric regression result of nonperforming loans as the dependent variable and three macroeconomic and five bank-specific independent variables from

a sample of thirteen commercial banks in Ethiopia as independent variables. On the above regression outputs, the beta coefficient indicates the influence of each independent variable on the dependent variable. Accordingly, the results presented above broadly confirm that both bank-specific and macroeconomic factors play a role in affecting the bank's NPLs although the contribution of macroeconomic factors is relatively low as compared with bank-specific variables.

This study used panel data models that comprised random, fixed effect and OLS regression model to investigate the relationship between NPLs and explanatory variables. To select either the Random, Fixed Effect or OLS regression Model, the character of individual effects was tested through the Hausman specification and Breusch and pagan Lagrangian multiplier test. Based on the comparison result between the random, fixed effect and OLS regression model through the Hausman and Bresuch and pagan Lagrangian multiplier test, an appropriate model for this study was the random effect model. Thus, the cause and effect relationship between NPLs and explanatory variables was examined by the random effect model. Accordingly, Table 4.9 below presents the result of the random Effect regression model made to examine the impact of explanatory variables on NPLs. In this study, NPLs ratio was treated as dependent variable whereas loan to deposit ratio, capital adequacy ratio, return on asset, return on equity, gross domestic product, inflation rate, and effective tax rate are explanatory variables. Thus, the regression result in the following table demonstrates both coefficients of explanatory variables and corresponding p-values as follows.

Based on the below Table 4.9, the following model was developed to examine the determinants of NPLs in this study.

$$NPL_{it} = 7.196 - 0.311ROA - 0.359ROE + 0.0239CAR - 0.0303LTD - 0.00228BS + 0.0145INF + 0.0995ETR + 0.2412GDP + \varepsilon$$

The  $R^2$  and the adjusted-  $R^2$  results are intended to show how well does the model containing the explanatory variables that can explain variations in the dependent variable and usually known as a goodness of fit statistics Brooks (2008). Accordingly, as shown in below Table 4.9, the coefficient of determination (R-squared statistics) and the adjusted- $R^2$  statistics of the model were 63.76% and 61.37% respectively. The adjusted  $R^2$  value of 61.37 % indicates that the



dependent variable of Nonperforming loan (NPL) of Ethiopian commercial banks is well explained by the selected explanatory variables that are listed in the model variables (loan to deposit ratio, profitability, capital adequacy ratio, gross domestic product, inflation rate, bank size, and effective tax rate. It implies that 63.76% of changes in nonperforming loans of commercial banks are due to change in the explanatory variables identified by the researcher. In other words, the change in the annual inflation rate, real GDP growth rate, effective tax rate, bank size, profitability, capital adequacy ratio and loan to deposit ratio collectively explain 63.76% of the variation in NPLs ratio of ECBs. On the contrary, the remaining 36.24% of changes on the NPLs of ECBs were explained by other factors which were not included in the econometrics model of this study. Thus, as it can be understood from the below results, these variables collectively are good explanatory variables to identify the nonperforming loans of Ethiopian commercial banks.

Furthermore, the researcher examined the impact of both banks specific and macroeconomic factors on the level of NPLs based on the regression result of the random effect Model in Table 4.9 in terms of examination of coefficients of explanatory variables and significance level. Through the examination of coefficients for bank-specific factors, ROA, ROE, LDR, and BS had a negative impact on NPLs having a coefficient of -0.31, -0.0359, -0.03, and -0.0023 in respectively. This indicates that one unit change in ROA and ROE, LTDR, and BS can result in a change on NPLs rate by 0.31, 0.0359, 0.03, and 0.0023 units in opposite direction respectively. Thus, it can be concluded that an increase on those variables leads to a decrease in NPLs of Ethiopian commercial banks. Whereas, from bank-specific factors, CAR had a positive impact on NPLs having a coefficient of 0.23 which implies, one unit change in CAR can result in a change on NPLs rate by 0.23 units in the same direction.

From macroeconomic factors, Inflation rate, effective tax rate, and growth domestic product had a positive impact on the level of NPLs by having a coefficient of 0.145, 0.0995, and 0.241 in respectively. This indicates that one unit change in the inflation rate can result in a change on NPLs by 0.145 units. Similarly, one unit change in tax rate can result in a change on NPLs by 0.0995 units. Besides, one unit change in the real gross domestic product can result in a change on NPLs by 0.241 units. Therefore, from this result, it can be concluded that an increase on those variables leads to an increase in NPLs of Ethiopian commercial banks.

In terms of significance level (corresponding p-value), all explanatory variables had p-values of less than the selected significance levels (5%) except for INF. P-value indicates at what percentage or precession level of each variable is significant. As shown in Table 4.9, ROE, CAR, and LDR had a strong and statistically significant impact on the level of NPLs even at 1%. Besides, ROA, BSIZE, ETR and GDP had statistically significant (p-value = 0.012, 0.029, 0.035 and 0.019 respectively) impact on the level of NPLs at 5%. So, it implies that the independent variables in the model were able to explain variations in the dependent variable. However, INF had no statistically significant impact on the level of NPLs (p-value of 0.232.). Generally, contrary to the researcher`s expectation, the inflation rate from macroeconomic factors did not show any significant impact on the level of NPLs of commercial banks in Ethiopia.

Table 4.9. Results of random effect regression model

Explanatory variables	Coefficient	Standard error	p-value
Return on Asset	-0.3107231	0.1230776	0.012
Return on Equity	-0.0359264	0.0092207	0.000
Capital adequacy ratio	0.0238997	0.0081774	0.003
Bank size	-0.0022847	0.0010467	0.029
Loan to deposit ratio	-0.0302758	0.0050708	0.000
Inflation rate	0.0144733	0.0121097	0.232
Effective tax rate	0.0995121	0.0472144	0.035
Gross domestic product	0.2412127	0.1025817	0.019
Constant	0.0719564	0.0286413	0.012
R-squared = 0.6376			
Adjusted R-squared = 0.6137			
Rho = 0.20429661			

Source: own computations Via Stata 16 from NBE and CSA

## **4.7. Discussion of the relationship between dependent and independent variables**

Based on previous studies and the finding of this study, this section discussed the general result obtained via random Effect regression Model as shown in the above table 4.9. Referring to the literature, the results of each explanatory variable including their impact on the level of NPLs of commercial banks in Ethiopia was discussed. Hence, the result of the findings was discussed in relation to the previous empirical and theoretical evidence.

### **4.7.1. Determinants of Nonperforming Loans**

Taking into consideration that the basic aim of this study was to investigate the determinants of NPLs of commercial banks in Ethiopia, the estimation results of the random effect Model that presents the impact of explanatory variables on NPLs were discussed as follows:

#### **Return on Asset and Non-performing loans**

As it can be seen from the regression result above (Table 4.9), the coefficient of ROA revealed a negative and statistically significant impact on NPLs. The interpretation of the result is that other things remain constant; an increase in ROA by one birr in commercial banks leads to declined in non-performing loans of commercial banks by 0.311 birr. Similarly, the magnitude of the coefficient estimate (-0.311) for ROA was the largest of all the variables used in the model. This indicates that ROA had a great impact in explaining the variation of NPLs in commercial banks of Ethiopia. Besides, the coefficient estimate was statistically significant at 1% and 5% significant levels (p-value of 0.012).

The finding of this study was consistent with the previous study of Atomsa (2017), (Abebe (2018), and (Minas (2019). Whereas this finding was inconsistent with the study of Gezu (2014), Amsalu (2018), and Belay (2019). Also, this finding was consistent with prior expectation and theory that indicated profitable banks are less engaged in risky activities as they have less pressure to create revenues and ultimately resulted with a lower volume of NPLs (Berger and DeYoung, 1997). Thus, the null hypothesis that ROA and nonperforming loan has negative relationship should be failed to reject. From this study, we can concluded that, as the financial performance measured by return on asset was increase, the likelihood that banks engaged in risky activities would reduced and ultimately, the probability that loans became NPLs was

reduced with the same manner. Thus, return on asset was a vital determinant of NPLs in Ethiopian commercial banks.

### **Return on Equity and Non-performing loans**

The results of the random effect model in above Table 4.9 indicate that there is a negative and statistically significant impact of ROE on the level of NPLs. The result shows a strong effect of bank profitability measured in terms of ROE on NPLs with a coefficient of -0.0359 and a p-value of 0.000 at 1% significance level. This implies that for one unit change in ROE, keeping the other things constant had resulted in 0.0359 unit change on the level of NPLs in opposite direction.

This result confirms the finding of Zelalem (2013), Gezu (2014), Beju (2016), Asfawesen (2017), Atomsa (2017), Abebe (2018), Fekadu (2018), and Haile (2018) where particular country data was used. Contrary to the findings of Louzis et al. (2012) where particular country data was used, this result as expected indicates a negative significant effect of ROE on the levels of NPLs of commercial banks in Ethiopia. This implies that deterioration of profitability ratio in terms of ROE results in higher NPLs. This negative significant impact of ROE on the levels of NPLs indicates the existence of better management of funds invested by shareholders via good agency relationships in commercial banks in Ethiopia. Besides, this also shows that banks with higher profitability are less enticed to generate income. Thus, they are less constrained to engage in risky activities of granting risky loans. In conclusion, the study fails to reject the alternative hypothesis (i.e. ROE is significant and negative relationship with Ethiopian commercial banks NPL).

### **Capital Adequacy Ratio and Non-performing loans**

The capital adequacy ratio determines the amount of Equity that holds against risky assets reserve to protect the depositors from any unexpected loss. The regression result of the random effect model in above Table 4.9 indicates a positive and statistically significant impact of capital adequacy ratio on NPLs (p-value= 0.003) at 5% level. The finding of the study reveals that; one unit increase in capital adequacy ratio causes non-performing loans to increase by 2.39 units.

The result of this finding is consistent with the study made by Fouopi Djiogap and Ngomsi (2012) where aggregate country data was used and Shingjergji (2013) and Swamy (2012), Akinlo and Emmanuel (2014), Amsalu (2018) and (Belay (2019) where particular country data was used.

Unlike the study made by Makri et al. (2014) where aggregate country data was used and Gezu (2014), Asfawesen (2017), Fekadu (2018), Abebe (2018) and Minas (2019) and Rahman et al. (2017) where particular country data was used, the result of this finding confirms the positive and significant effect of CAR on the levels of NPLs by argued that the more capital adequacy, the more the firm has the ability to absorb risks and results in increases non performing loans of commercial banks of Ethiopia. To sum up, the regression result of the random effect model in Table 4.9 is inconsistent with the hypothesis developed in this study. The study hypothesized that there is a negative association between CAR and NPLs of banks.

### **Loan to Deposit Ratio and Non-performing loans**

The coefficient sign of the loan to deposit ratio shows that there is a negative and statistically significant effect of the loan to deposit ratio on a bank's nonperforming loan (p-value of 0.000) at 1% significant level. This implies that every one percent change (increase or decrease) in the bank's loan to deposit ratio keeping the other thing constant has a resultant change of 3.03 % on the nonperforming loan in opposite direction.

The finding of this study was consistent with studies such as Makri et al. (2014), (Saba et al. (2012), Dimitrios et al. (2016) found that there is a negative relationship between LTD and NPLs. Whereas, the finding of this study is inconsistent with the previous study made by Umer (2015), Beju (2016), Asfawesen (2017),Fekadu (2018), Belay (2019) and Minas (2019) as they found a positive and statistically significant impact of loan to deposit ratio on NPLs. In addition, Amsalu (2018) found a negative and insignificant effect of loan to deposit ratio on non-performing loans of Commercial banks in Ethiopia. Similarly, the study made by Gezu (2014) found a positive but insignificant effect of loan to deposit ratio on NPLs. On the other hand, the result of this finding was inconsistent with the expected result which says there is a positive and statistically significant effect of loan to deposit ratio on non-performing loans of commercial banks in Ethiopia.

## **Bank size and Non-performing loans**

Bank size is what the bank possesses and it is useful to measure the bank's general capability to undertake its intermediary function. The result shows the effect of bank size measured by the natural log of total assets on NPLs with a coefficient of -0.002 and a p-value of 0.029 at 5% significance level. This implies that; when bank size is going up by one percent, non-performing loan goes down by 0.2% provided other independent variables are constant. In other words, it indicates that in Ethiopian commercial banks, the level of non-performing loans was relatively higher in banks that have small size.

This negative relationship between bank size and non-performing loans indicated that larger banks are more able to solve problems of information asymmetry in comparison to their smaller counterparts. Similarly, larger banks have the advantage of better access to additional financing, dealing with liquidity problems, and diversifying risk. This is probably because larger banks benefit from a “too large to fail” policy and are believed to be more likely to survive than smaller banks. In addition with skilled employees and quality information bases, larger banks are more effective in credit analysis and monitoring their debtors. Furthermore, larger banks have the advantage of better access to additional financing dealing with liquidity problems and diversifying risk. More specifically, large banks have better risk management strategies and technology which definitely allows them for efficient information gathering, processing, and analyzing which finish up with lower levels of NPLs as compared to smaller banks.

The finding of this study was consistent with those reported by the majority of previous studies such as Shingjergji (2013) and Haile (2018) as they reported an inverse relationship because big banks have large resources to evaluate their loans, which improve the quality of loans, and greater opportunities for portfolio diversification more than small banks. Similarly, the finding of this study was consistent with prior expectation and theory that suggesting larger banks have more resources for efficient information gathering, processing, and analyzing to tackle moral hazard and adverse selection and ultimately deal with a lower volume of NPLs. However, the result of this finding was not agreed with Amsalu (2018) as the study found a positive and significant impact of bank size on NPLs. In addition, the study made by Belay (2019) found a positive and insignificant effect of bank size on NPLs of commercial banks in Ethiopia. In conclusion, the magnitude of the coefficient estimate (0.002) for bank size was the smallest of all

the variables used in the model implying that the responsiveness of bank size on the variation of NPLs was very low as compared to other variables. Hence, the finding suggested that bank size was the modest determinant that can affect NPLs of Ethiopian commercial banks negatively.

### **Effective Tax Rate and Non-performing loans**

The regression result of the random effect model in above Table 4.9 is consistent with the hypothesis developed in this study. The study hypothesized that there is a positive association between effective tax rates and NPLs of banks. Thus, consistent with the hypothesis, the estimated coefficient of effective tax rate was 0.099 showing a significant positive impact of the effective tax rate on the level of NPLs of commercial banks in Ethiopia at 5% significance level. This implies that every one unit change in the effective tax rate, keeping other things constant, had resulted in 0.099 units change on the levels of NPLs in the same direction. The result of this study indicates that commercial banks in Ethiopia incur high NPLs at the time of high corporate income tax payments.

The result of this study confirms the study of Gezu (2014). Thus, this result implies NPLs of commercial banks in Ethiopia get higher during the high-income tax rate in the country. This positive and significant impact of the effective tax rate on NPLs of commercial banks in Ethiopia result as bank shift its tax burden to borrowers via increasing fees and other commission and also lending rate on loans, the borrowers pay this tax burden for the banks as compensation and also their own tax to the government as an obligation. Thus, borrowers who faced this double burden are unable to pay their debt. However, the findings of this study were inconsistent with Abebe (2018) as the study found a positive but insignificant effect of the effective tax rate on NPLs.

### **Inflation rate and Non-performing loans**

Inflation is a general increase in the price of goods and services within a given period. The result of this study suggests that inflation has a positive and insignificant relationship with NPL (P-Value of 0.232). The positive coefficient estimate of inflation (0.0145) indicates a strong direct association with NPLs. That means an increase in the inflation rate; leads to an increase in NPLs. The result indicates that a higher inflation rate can make borrowers debt servicing easier by reducing the real value of outstanding loans. However, it can also weaken some borrower's ability to service debt by reducing their real income. Besides, even if the finding is insignificant,

the result disclosed that the inflation rate has a positive relationship with nonperforming loans. So, depend on this insignificant impact, the Inflation rate is not an important determinant of NPL in Ethiopia commercial banks.

The result of this study was consistent with the findings of Gezu (2014), Umer (2015) who found an insignificant effect of inflation on NPL. However, the result is not compatible with the findings of Abebe (2018) and Minas (2019) where these authors found a significant and positive relationship between inflation and NPL. In addition, the study made by Beju (2016), Amsalu (2018), Fekadu (2018), and Belay (2019) found a negative and significant effect of the Inflation rate on NPLs. This study was consistent with the hypothesis developed and supported by theories that argue that inflation rate and non-performing loan have a positive relationship with each other.

### **Gross domestic product and Non-performing loans**

The real GDP is the sum of the value-added in the economy during a given period or the sum of incomes in the economy during a given period adjusted for the effect of increasing prices Inekwe (2013). The coefficient estimate of real GDP growth of this study revealed a significant and positive relationship between real GDP and non-performing loans in the Ethiopian banking industry at 5% significance level (p-value of 0.019). The magnitude of the coefficient estimate (0.24) indicates the existence of a strong direct relationship between real GDP growth and NPLs of Ethiopian commercial banks which is inconsistent with prior expectation.

The finding of this study was consistent with the previous studies made by Inekwe (2013), Amsalu (2018), Abebe (2018), and Minas (2019). The findings of this study have several implications. It may be argued that the improvement in our real economy, within the period under consideration was not substantial to lead to a reduction in the NPLs. This may be because credit facilities obtained from the banks were not properly utilized in productive activities or it may be due to customers operating in a harsh economic environment. Therefore, an increase in Real GDP is accompanied by an increase in NPLs in Ethiopia.

However, this result was inconsistent with the findings of Umer (2015), Beju (2016), Atomsa (2017), and Fekadu (2018) by argued that the economic growth indicates an improvement in business performance where a payment capacity is positive, lower growth induces NPLs as the



economic slowdown is likely to raise unemployment, which may cause borrowers to have greater difficulties in repaying their debt. Besides, the previous study of Belay (2019) found the positive but insignificant effect of the Gross domestic product on NPLs. In conclusion, the findings revealed that the real GDP growth rate was one of the vital determinants of NPLs in Ethiopian commercial banks next to return on equity. In addition, the real GDP correlation with NPLs is statistically significant. Khemraj and Pasha (2009) and Adebola et al. (2011) find evidence of a significant inverse and instantaneous relationship between GDP and NPLs. The finding of inverse relationship is interpreted to mean that an improvement in the real economy is likely to see an instantaneous reduction in the NPLs.

## **CHAPTER FIVE**

### **5. CONCLUSIONS AND RECOMMENDATIONS**

#### **Introduction**

In the previous chapter, descriptive statistics and regression analysis were presented and analyzed to examine the determinants of NPL of commercial banks in Ethiopia. Besides, the results of findings and discussion were also made as well. This chapter summarizes the findings and recommendations of the study. Accordingly, this chapter is organized into three sub-sections. The first section presents the conclusion of the study that presents a summary of the finding of the study. The second section reveals the recommendation for the findings. Lastly, the direction for further studies was given in section three.

#### **5.1. Conclusions**

The main objective of the study was to examine the determinants of NPLs of commercial banks in Ethiopia. In doing so, some macro-economic and bank-specific variables are included in the study as a determinants of non-performing loans. The panel data was used for the sample of thirteen commercial banks in Ethiopia from 2010 to 2019 and presented by using descriptive statistics and multiple linear regression analysis. Data were collected from NBE, CSA, and the head office of each selected commercial banks. The study was used the explanatory research design and quantitative research approach. The data was analyzed by using a random Effect Model based on the Hausman specification test. For analysis, Stata version 16 was used.

The model was tested for the classical linear regression model assumptions and shows no evidence for the presence of normality, heteroscedasticity, Multicollinearity, and autocorrelation problem and it fulfills the assumptions of the CLRM. The analyses were made in line with the stated hypothesis and specific objectives formulated in the study. In doing so, previous studies on determinants of bank's NPLs have been reviewed and as per the literature, NPLs of banks are usually expressed as a function of internal and external determinants. The internal determinants refer to those factors which characterized individual banks and are usually associated with the specific policy choices of a particular bank such as Return on asset, return on equity, capital adequacy ratio, loan to deposit ratio, and bank size. On the other hand, the external determinants

are variables that are not related to bank management but reflect the economic, legal, and surrounding natural environment that can affect the loan quality of banks. The macroeconomic factors which the literature proposes as important determinants of NPLs are annual growth in GDP, the annual inflation rate, and level effective tax rate.

The study suggested that ROA, ROE, CAR, LTD, BS, ETR, and GDP had a statistically significant effect on the level of NPLs. However, the results of the random effect regression model revealed the insignificant effect of inflation rate on the level of NPLs of commercial banks in Ethiopia for the period under consideration. The findings indicated that bank profitability measured in terms of return on equity had a negative and statistically significant effect on the levels of NPLs. This implies that high ROE contributes to lower NPLs and suggests that the overall financial strength of a bank an indicator of efficient management. Better managed banks have on average better quality of assets because the profitability of the banks increases the likelihood of managers engaged in risky lending activity decreases and ultimately reduces NPLs. Similarly, the study also found that the loan to deposit ratio has a negative and statistically significant impact on NPLs of commercial banks in Ethiopia. Besides, bank size has a negative and significant effect on NPLs. The finding of capital adequacy ratio, effective tax rate and gross domestic product are a factor that has a positive impact on the levels of NPLs of commercial banks in Ethiopia as per the regression result in this study. Furthermore, the result of the inflation rate did not support an important association with NPLs reported by Ethiopian banks. Therefore, the inflation rate was not found to be an important determinant of NPLs in Ethiopian commercial banks.

## **5.2. Recommendations**

Based on the findings of the regression analysis and conclusion, the following recommendations were forwarded to the concerned body as follows;

First and foremost, Ethiopian commercial banks should pay more attention to the above factors, which have been discussed in the finding, when providing loans to curtail the level of impaired loans. Similarly, when a bank's ROA and ROE decline, non-performing loans in commercial banks will increase. Therefore, bank management should focus on strategies that increase non-interest income which in turn increase ROA and ROE.

Besides, to reduce or minimize the level of NPLs in the Ethiopian banking industry, the government should implement policies that will create an enabling environment to improve the country's real GDP. This includes improved infrastructural development, moderate interest rate, and aligned exchange rate among others. It equally involves improved regulatory role by relevant agencies to ensure that due process and principles of good lending are strictly adhered to. It also includes ensuring that loan advances for productive purposes are used as such. This may be achieved through bank Customer Relationship Management of "Know Your Customer" (KYC).

### **5.3. Direction for Further Research**

This study examined both bank-specific and macroeconomic determinants of nonperforming loans of senior commercial banks in Ethiopia using selected variables. However, there are so many variables that were not included in this study. Thus, future research could incorporate factors such as regulatory environment, money supply, corporate governance, and social factors like corruption practice, family relationship, Political interference; bankers' inefficiency/incompetence is still needed to be explored. Even if this study found a significant and positive relationship between real GDP and NPLs, many studies found a negative and significant relationship between them. Thus, future research could incorporate real GDP. Furthermore, the same study may be required on newly emerging banks.

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## Appendix

Appendix 1: Summary of descriptive statistics among dependent and independent variable

```
sum npl roa roe car bsize ldr inf etr gdp
```

Variable	Obs	Mean	Std. Dev.	Min	Max
npl	130	.0336815	.0132066	.0088	.06373
roa	130	.0340954	.0078764	.0157	.0534
roe	130	.2526277	.0918703	.1039737	.4390537
car	130	.2001265	.1053341	.0135	.5288
bsize	130	23.02396	.8890193	20.47618	25.20563
ldr	130	.5223056	.1704546	.1783171	.7927741
inf	130	.1286	.0823162	.028	.341
etr	130	.20098	.0270282	.1612	.2611
gdp	130	.09604	.0114554	.077	.114

Appendix 2: Correlation matrix among dependent and independent variables

```
. corr npl roa roe car bsize ldr inf etr gdp
(obs=130)
```

	npl	roa	roe	car	bsize	ldr	inf	etr	gdp
npl	1.0000								
roa	-0.5801	1.0000							
roe	-0.5830	0.4875	1.0000						
car	0.5166	-0.4586	-0.3415	1.0000					
bsize	-0.2345	0.1269	0.2059	0.0202	1.0000				
ldr	-0.5977	0.3976	0.3666	-0.3696	0.0148	1.0000			
inf	-0.1194	0.1630	0.0684	-0.0820	-0.1460	0.0912	1.0000		
etr	0.0361	-0.1786	-0.0789	0.0407	0.4551	-0.0050	-0.3502	1.0000	
gdp	0.0933	0.0689	0.0266	-0.0246	-0.2969	-0.0370	-0.2974	-0.6141	1.0000

Appendix 3: Test for Heteroscedasticity assumption

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of npl

chi2(1) = 0.03

Prob > chi2 = 0.8705

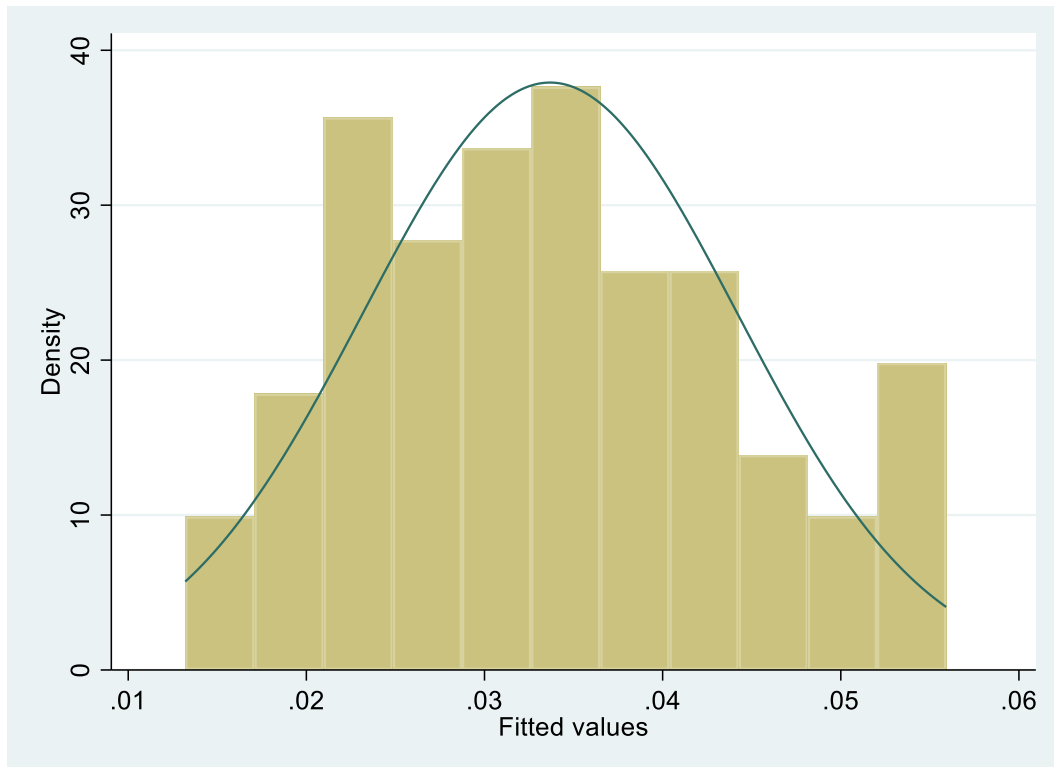
Appendix 4: Test for Multicollinearity assumption

Variable	VIF	1/VIF
etr	3.59	0.278690
gdp	3.11	0.321873
inf	2.23	0.448536
roa	1.68	0.595812
roe	1.47	0.681497
bsize	1.44	0.696096
car	1.39	0.721557
ldr	1.32	0.755695
Mean VIF	2.03	

Appendix 5: Test for Normality assumption

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
resid	130	0.1423	0.0467	5.88	0.0529



## Appendix 6: Test for model specification

Ramsey RESET test using powers of the fitted values of npl

Ho: model has no omitted variables

F(3, 118) = **0.89**

Prob > F = **0.4470**

## Appendix 7: Hausman fixed random specification test

hausman fe re

	— Coefficients —		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
roa	-.3031658	-.3107231	.0075573	.0498742
roe	-.0361989	-.0359264	-.0002726	.0024901
car	.0216761	.0238997	-.0022236	.0029559
bsize	-.0020031	-.0022847	.0002815	.0005003
ldr	-.0323504	-.0302758	-.0020746	.0019636
inf	.0145018	.0144733	.0000286	.0019533
etr	.0956966	.0995121	-.0038155	.0092508
gdp	.2402884	.2412127	-.0009243	.0160638

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V\_b-V\_B)^(-1)](b-B)  
 = **1.75**  
 Prob>chi2 = **0.9877**

## Appendix 8: Further test for model selection

Breusch and Pagan Lagrangian multiplier test for random effects

$$npl[code,t] = Xb + u[code] + e[code,t]$$

Estimated results:

	Var	sd = sqrt(Var)
npl	.0001744	.0132066
e	.0000586	.0076546
u	.000015	.0038786

Test:  $\text{Var}(u) = 0$

chibar2(01) = 8.81  
 Prob > chibar2 = 0.0015

## Appendix 9: Test for regression output

```

Random-effects GLS regression           Number of obs   =       130
Group variable: code                   Number of groups =        13

R-sq:                                  Obs per group:
  within = 0.6376                       min =          10
  between = 0.6137                       avg =         10.0
  overall = 0.6321                       max =          10

corr(u_i, X) = 0 (assumed)              Wald chi2(8)    =       211.21
                                           Prob > chi2     =        0.0000
  
```

npl	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
roa	-.3107231	.1230776	-2.52	0.012	-.5519508	-.0694955
roe	-.0359264	.0092207	-3.90	0.000	-.0539987	-.0178541
car	.0238997	.0081774	2.92	0.003	.0078722	.0399272
bsize	-.0022847	.0010467	-2.18	0.029	-.0043362	-.0002331
ldr	-.0302758	.0050708	-5.97	0.000	-.0402144	-.0203372
inf	.0144733	.0121097	1.20	0.232	-.0092613	.0382078
etr	.0995121	.0472144	2.11	0.035	.0069736	.1920507
gdp	.2412127	.1025817	2.35	0.019	.0401563	.4422691
_cons	.0719564	.0286413	2.51	0.012	.0158205	.1280923
sigma_u	.00387862					
sigma_e	.00765459					
rho	.20429661 (fraction of variance due to u_i)					