

# **Impact of Credit Risk on Profitability of Private Commercial Banks in 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  
Banking and Finance (Msc)*

*BY:*

*Selamawit Ayele Tesfaye*



**JIMMA UNIVERSITY**

**COLLEGE OF BUSINESS & ECONOMICS**

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JUNE 01, 2021

JIMMA, ETHIOPIA

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Under the Guidance of

Dr. Demis H/Gebreal

And

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## DECLARATION

I hereby declare that this thesis entitled “Impact of Credit Risk on Profitability of Private Commercial Banks in Ethiopia”, has been carried out by me under the guidance and supervision of Dr. Demis H/Gebreal and 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
<u>Selamawit Ayele Tesfaye</u>	_____	_____

## CERTIFICATE

This is to certify that the thesis entitles “Impact of Credit Risk on Profitability of Private Commercial Banks in 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 Miss. Selamawit Ayele Tesfaye 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.*

<i>Main Adviser's Name</i>	<i>Date</i>	<i>Signature</i>
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<i>Co-Advisor's Name</i>	<i>Date</i>	<i>Signature</i>
<u>Gadise Gezu</u>	_____	_____

## ***Abstract***

*The general objective of the study was to examine the impact of credit risk on profitability of private commercial banks in Ethiopia. To examine the profitability as a dependent variable the researcher used ROE (return on Equity) as measurement tool. The researcher used secondary data's of ten banks eleven years' data by using panel data analysis. Data used for this study were obtained from National Bank of Ethiopia and the bank's annual report. To achieve the intended objective of this study Explanatory research design used as the research method. Quantitative approach was used to collect the qualitative data from the audit report of the bank. The analysis of the data was made indescriptive statistics analysis like, mean, and standard deviation and inferential like regression and Pearson correlation to give the meaningful conclusions for the result of this study. Then the findings of this study were: non-performing loan, net interest margin (NIM), Loan to deposit, Loan loss Provision has significant impact on profitability of private commercial Banks in Ethiopia, and Capital adequacy ratio has no significant impact on profitability of private commercial Banks in Ethiopia.*

**Keywords:** *-non-performing loan; net interest margin; Loan to deposit; Loan loss Provision; Capital adequacy ratio.*

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## **LIST OF ACRONYMS AND ABRIVATIONS**

NBE	:	National Bank of Ethiopia
BS	:	Bank Size
CAR	:	Capital Adequacy Ratio
LTD	:	Loan to Deposit
ROA	:	Return on Assets
ROE	:	Return on Equity
NPL	:	Non-performing Loans
LLP	:	Loan Loss Provision
NIM	:	Net Interest Margin
CLRM	:	Classical Linear Regression Model
OLS	:	Ordinary Least Square
VIF	:	Variance Inflation Factor
DW	:	Durbin-Watson

# Chapter one

## 1.1 Background of the study

As a financial institution, the primary function of a commercial bank is to collect the public deposits and invest them into most profitable sectors. Such public deposits result in the forms of creative deposits by the means of credit creation to generate income as interest. The overall process is an important asset of commercial banks that not only multiplies the income of the individual banks, but also contributes to the growth of the economy. However, in certain circumstances, such assets may not perform in generating income and repay in due time as expected, known as credit risk. Poudel, (2012).

Profitability is the measure of the overall success of a company. It is a necessary coordination for survival. Investors could prefer a single measure of profitability that would be meaningful in all situations. Test of profitability focuses on measuring the adequacy of income by comparing it with one or more primary activity that is measured in the financial statements. The development of different kinds of counterparties, ranging from individuals to sovereign governments and the new forms of obligations has stressed on the reason why credit risk management is on top in terms of actions laid down for the benefits of managing risk in the banks.

Credit risk is one of significant risks of banks by the nature of their activities. Through effective management of credit risk exposure banks not only support the viability and profitability of their own business but also contribute to systemic stability and to an efficient allocation of capital in the economy. Psillaki, Tsolas, and Margaritis(2010). Credit risk is a risk of borrower default, which happens when the counterpart fails to pay on time. There can be many reasons for default. One of the most common ones is the obligor is in a financially stressed situation, Gestel and Baesens(2008). Besides, if a borrower with high credit quality

has deteriorated profile, it can also cause credit risk loss to the banks. Gestel and Baesens (2008).

Agu and Ogbuagu (2015) define credit risk as losses from the refusal or inability of credit customers to pay what is owed in full and on time. The main sources of credit risk include, limited institutional capacity, inappropriate credit policies, volatile interest rates, poor management, inappropriate laws, low capital and liquidity levels, directed lending, massive licensing of banks, poor loan underwriting, reckless lending, poor credit assessment, laxity in credit assessment, poor lending practices, government interference and inadequate supervision by the central bank. To minimize these risks, it is necessary for the financial system to have; well-capitalized banks, exposure within acceptable limit in order to provide a framework of the understanding the impact of credit risk on banks profitability.

Risk is defined a probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be avoided through preemptive action, Juanjuan S, (2009). It is also the probability of a loss or drop in value. Credit risk is the most obvious risk of a bank by the nature of its activity. In terms of potential losses, it is typically the largest type of risk. Credit risk is the risk that a borrower defaults and does not honor its obligation to service debt. It can occur when the counterpart is unable to pay or cannot pay on time. There can be many reasons for a default, Tony van Gestel (2009).

Banks play a very important role in manufacturing industries and for the overall economic development of every nation. They have control over a large part of the supply of money circulation and stimulus for the economic progress of a country. The financial sectors contribution to growth lies in the central role, they play in mobilizing savings and allocating the resources efficiently to the most productive uses and investments in the real sector Joseph Et al, (2012).

Disclosed that the most essential issue in the managing of an economy is the mitigation of risk, Carey, A (2001). This is not different from what happens in the banking industry. In the

aspect of banking, credit risk is given much attention due to the characteristics of their borrowers and the kind of businesses they invest into. The bank theory identifies six popular categories of risk which are related with credit guidelines of banks. They include credit risk (risk of repayment), interest risk, portfolio risk, operating risk, credit deficiency risk, and trade union risk. Muhammad (2014).

As Ethiopian economy is developing from time to time, the banking industry also has shown a rapid progress in terms of number of branches, assets and deposits, loans given to customers and capital structure. Because of these facts giving emphasis to credit risk management against profitability is very essential. Accordingly, the research has tried to see the impacts of credit risk on profitability of the Ethiopian private Commercial Banks.

## 1.2 Statement of the problem

Banks consciously take risk as they perform their role of financial intermediation economy, TenguhNC.(2008). Consequently, they assume various risks, which include credit risk, interest rate risk, liquidity risk, internal control & compliance risk, money laundering risk, foreign exchange risk and operational risk Funso et-al.(2012). Among these risks credit risk gets most attention.

Credit risk is one of the most vital risks for banks. It arises from nonperformance by a borrower GreenawaltM.(1991). It may arise from either an inability or an unwillingness to perform in the pre-commitment contracted manner. The credit risk of a bank is also effect the book value of a bank. The more credit risk is in a particular, the more probability of a bank to be insolvent.

Credit risk is the most obvious risk of a bank by the nature of its activity. In terms of potential losses, it is typically the largest type of risk. Bart B. and Tony Van G.(2009) Credit risk is the risk that a borrower defaults and does not honor its obligation to service debt. It can occur when the counterpart is unable to pay or cannot pay on time. The main part of the profit of a bank comes from the service fees and the earned interests from its assets. Its main expense is the paid interest on its liabilities.

Previous studies investigated the impact of credit risk on profitability of Ethiopian commercial banks. For instance, Kemal(2018), Tegegne Abera(2018), Tibebu(2011), Fan Li and Yijun Zou(2014), Ranasinghe (2017) and Misikir Bizuayehu(2015) confirmed a negative impact of credit risk on profitability of commercial banks. On the other hand Million(2015), Saeed and Zahid(2016), Girma(2011) and Opoku Asare(2015) found a positive effect of credit risk on profitability. Based on their findings, the results defer from each other on the relationship between credit risk and profitability. And by reviewing many researches some variables such as net interest margins and loan loss provisions need to be studied furthermore by using recent researchable data's (2020) along with Nonperforming loan, capital adequate ratio, and loan to deposit.



Based on the above research, which some researchers found a negative relationship between credit risk and profitability and others found positive that contradict each other.

Insufficient credit control and low quality lending activities are exposed for high provision for anticipated loan losses, kidist bekele(2019) Commercial banks in Ethiopia mostly interpreted low quality lending activities and inadequacy of integrated credit policy and procedure for the purpose of customer handling so that, there is a need to conduct a research on impact of credit risk on profitability of private commercial banks in Ethiopia.

### **1.3. Objectives of the study**

#### **1.3.1 General objective**

The general objective of the study was to examine the impacts of credit risk on profitability of the private Commercial Banks in Ethiopian.

#### **1.3.2 Specific objectives**

- ❖ To examine the impact of nonperforming loan on profitability of the Ethiopian private Commercial Banks.
- ❖ To examine the impact of loan loss provision on profitability of the Ethiopian private Commercial Banks.
- ❖ To examine the impact of net interest margins on profitability of the Ethiopian private Commercial Banks.
- ❖ To examine the impact of capital adequacy on profitability of the Ethiopian private Commercial Banks.
- ❖ To examine the impact of loan to deposit on profitability of the Ethiopian private Commercial Banks.

## 1.4. Hypotheses

Based on related literatures review nonperforming loan, loan loss provision, Capital Adequacy, loan to deposit, net interest margin, expected to influence profitability of private commercial banks in Ethiopia.

**Nonperforming loan (NPL):-** is the most important issue that has negative effect on bank profitability and inability to survive. In which case, there has a negative effect on banks profitability as it reduces loan amount and interest income of the banks simultaneously Ugoani (2016). In line with National bank of Ethiopia regulations, the lending institution has to make provision and charges for credit losses which ultimately reduce the profit level. Beside this delay or failure of repayment of loan principal and interest on time and in full, negatively affects the profitability of the banks by reducing the interest income generated from granting more credit risk.

**H1:** Nonperforming loan has significant impact on profitability of private commercial Banks in Ethiopia.

**Loan loss Provisions (LLP):-** Ahmed et al (1998) used multi- variant regression and discovered that, loan loss, which is the last aspect of non- performing loans has a strong impact on profitability because, a rise in loan loss suggests an elevation in credit risk and therefore affecting the banks financial standings negatively. Another study conducted by Ahmad and Ariff (2007), revealed that a dominant element of credit risk in commercial banks is loan loss provision so that any jump in the level of loan loss has a direct relationship with credit risk. They again stressed on the fact that, credit risk in developing countries supersedes that of developed economies.

**H1:** Loan loss Provision has significant impact on profitability of private commercial Banks in Ethiopia.

**Capital Adequacy (CAR):-** is also known as capital to risk-weighted assets ratio, measures a bank's financial strength by using its capital and assets. Generally, a bank with a high capital adequacy ratio is considered safe and likely to meet its financial obligations Hellmann et al. (2000). Flamini et al (2009) argued that although capital is expensive in terms of expected return, highly capitalized banks face lower cost of bankruptcy, lower need for external funding especially in the emerging economies where external borrowing is difficult. Thus, well capitalized banks should be profitable than lowly capitalized banks. Therefore, based on the above argument, the following Hypothesis is formulated.

**H1:** Capital adequacy has significant impact on profitability of private commercial Banks in Ethiopia.

**Loan to deposit (LTD):-**measures the exposure level of the Bank to credit risk. Banks with higher loan to deposit ratio have high exposure to credit risk. Altunbas (2005), Misikir (2015) it is the result of the interest rate difference between what the banks charging on loan and what they actually paying on the deposits. Whenever this ratio increases more and more, the bank becomes more and more risky as the loan amount would be equal or sometimes greater than the deposit amount. As a result banks suffer with a liquidity problem and that may also makes the bank risky.

**H1:** Loan to deposit has significant impact on profitability of private commercial Banks in Ethiopia.

**Net interest margin (NIM):-**Particular attention has been paid to relating interest margins to risks faced by the bank. For example, the net interest margins of commercial banks reflect both default and interest risk premiums, while other classes of banks are more sensitive to one of these risks, but not the other. Low-interest rates indeed increase bank risk-taking substantially. Net interest margin is the cash flow banks receive from loans less interest expense on deposits and other forms of debt. Berger (1995), bring into being evidence for positive relationships that is, the ratios of capital to assets and returns on equity were

positively linked. He argued that a higher capital ratio (with reduced risk of bankruptcy) should fit down a bank's cost of funds, both by reducing the price of funds and the quantity of funds required, thus improving a bank's net interest income and hence profitability. Hence, net interest income of a bank has significant and negative effect on profitability of commercial banks. A positive relationship between loan to total asset ratio and net interest margins on their cross-country study of Portugal, Spain, France, and Germany. Carbo and Rodriguez (2007) show that credit risk is positively related with net interest margins of seven EU countries extant literature indicates that banks that make risky loans may be obliged to hold a higher amount of provisions. In turn, this may force them to charge higher margins in order to compensate for the higher risk of default, leading naturally to a positive relationship. Empirical evidences show that credit risk affects net interest rate margins positively and so the coefficients of credit risk are expected to be positive because a high proportion of bad loans may cause banks to increase their interest margins with risk premium to compensate for possible default risk. Therefore, based on the above argument the following hypothesis is developed

**H1:** Net interest margin has significant impact on profitability of private commercial Banks in Ethiopia.

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

The research has a benefit for different stake holders. Primarily it is benefit selected private commercial banks of Ethiopia to know their credit risks on profitability. And then, it will have greater importance in the indicating governor (National Bank of Ethiopia) that the area to give emphasis and finally the study serve as reference material for further studies to be conducted on the same area.

## **1.6. Scope of the study**

The scope of the research was within ten private commercial banks of Ethiopia excluding government banks. The study was focused on the impact of credit risk on profitability of private commercial banks in Ethiopia which are Awash Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank, Nib International Bank, Cooperative Bank of Oromia, Lion International Bank, Zemen Bank and Oromia International Bank. The independent variables which was used for the study are loan loss provisions, NPL, net interest margin, capital adequate ratio and loan to deposit and the dependent variable has profitability as measured by ROE. As a constant variable bank size was used. In order to achieve objectives of the study used ten private banks and eleven years data from 2010 to 2020 were collected and analyzed.

## **1.7. Organization of the paper**

The research paper was organized into five chapters. The first chapter presented the introductory portion of the study. This part includes background of the study statement of the problem, objectives of the study, hypotheses, significance of the study, scope of the study, and organization of the paper. The second chapter tried to present and describe both theoretical and empirical review of literature. The third chapter was show the methodology of the study which was included research design, data type and source, data analysis techniques and variables description and measurement. The fourth chapter presented data analysis and the result of the study. In the fifth chapter conclusion and recommendation of the study were presented. The below figure 1.1 shows that organization chart of the study.

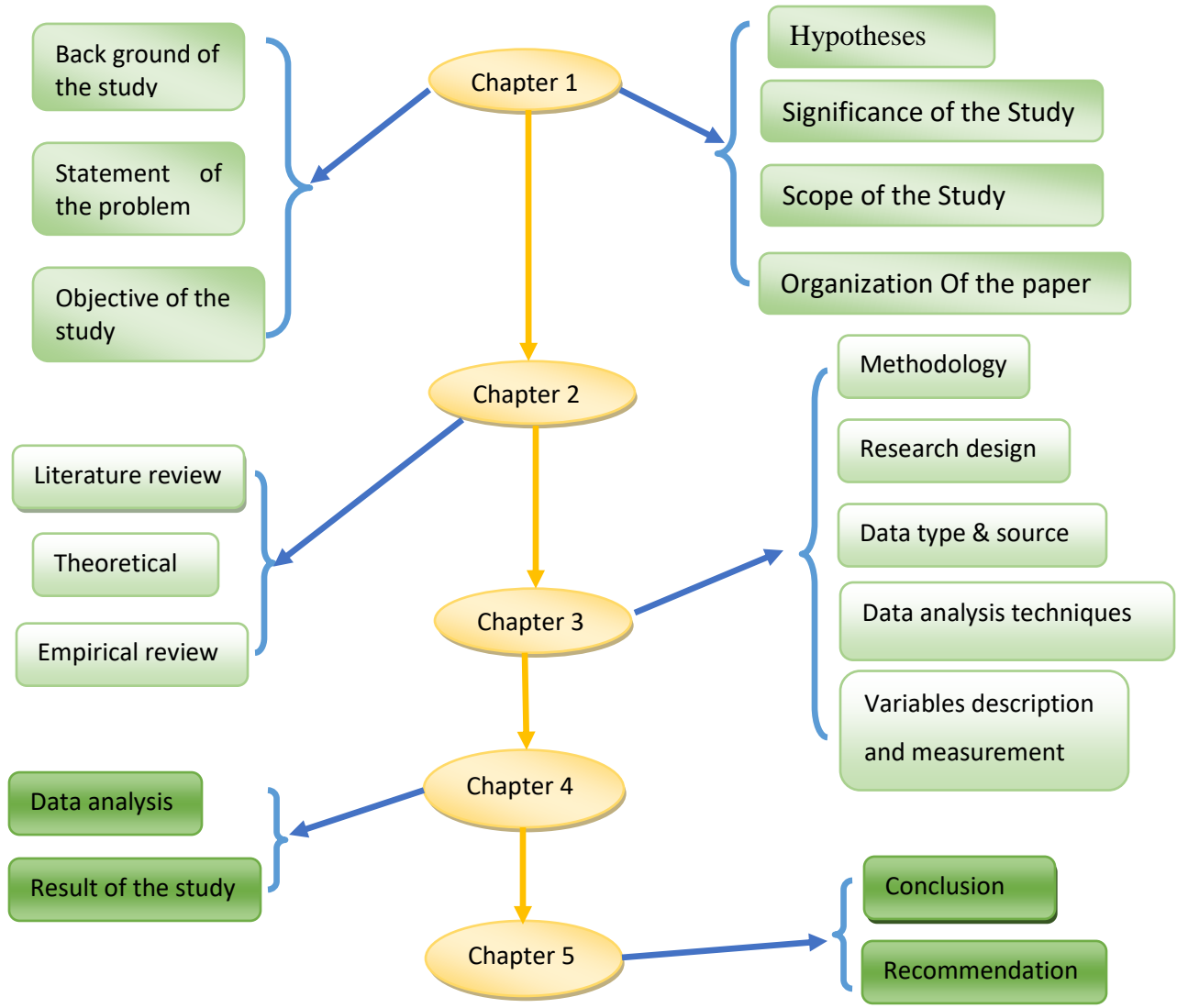


Fig. 1.1 Organizational chart of the paper

## **CHAPTER TWO**

### **2. Literature review**

This chapter presents the review of related literatures. The chapter is divided into two sections. The first section presents the theoretical review of literatures related topic of the study. The second section discusses the empirical literatures studied by different researchers from globally and Ethiopia point of view that are related to the problem under study.

#### **2.1 Overview of Banking in Ethiopia**

Modern banking in Ethiopia started in 1905 with the establishment of Bank of Abyssinia, which was based on a fifty year franchise given to the British owned National Bank of Egypt. A significance feature of commercial banking in Ethiopia then was its innovative nature rather than its contribution to growth and its competitive nature. As the society was new for the banking service, banks had faced difficulty in familiarizing the public and they faced considerable cost of installation. In 1931, Emperor Haile Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking services until the Italian invasion of 1936. During the Italian invasion, Bank of Italy was formed a legal tender in Ethiopia. In 1943, after Ethiopia regains its independence from fascist Italy, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed (NBE 2020, annual report).

In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution. In the pre-1974 era, the banking industry was dominated largely by a single government owned bank, State Bank of Ethiopia. Despite the efforts made to free banking from foreign control and to make the institution responsible to

Ethiopia's credit needs, these developments did not bring about meaningful competitive environment, as banking industry was characterized by specialization and low level of business. The establishment of privately owned Addis Ababa Bank in 1964 and its growing branch network created relatively better banking service among commercial banks, with concentration of their branch offices in big towns and trade routes in the country. The then monetary and banking system gave at most emphasis to stability and balanced growth of the economy (NBE 2020, annual report).

During the Derge regime, there was one commercial bank, whose overriding objective was to accelerate development so as to improve the standard of living of the broad masses rather than maximization of profit (NBE 2020, annual report).

The change of government in 1991 and the consequent changes in economic policy witnessed another transformation in the banking industry. Monetary and Banking Proclamation of 1994 established the National Bank of Ethiopia as a judicial entity, separated from the government and outlined its main functions. Monetary and Banking proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 laid down the legal basis for participation of the private sector in banking business, which had been completely prohibited during the Derge regime. Shortly, the first privately owned commercial bank, Awash International Bank, was established in 1994. Afterwards, additional sixteen privately owned banks have been established. The government's strategy for financial development was characterized by gradualism and maintaining macroeconomic stability. Currently two public and sixteen private banks are operated in Ethiopia under the supervision of NBE (NBE 2020, annual report).

The financial sector in Ethiopia is composed of the banking industry, insurance companies, microfinance institutions, saving and credit cooperatives and the informal financial sector. The banking industry accounts about 95% of the total financial sector assets, implying that the financial sector is under developed, and activities that banks could perform are legally limited, which in turn contribute to lesser contestability. Zerayehu et al., (2013)

According to NBE, Ethiopia's banking industry is closed and generally less developed than its regional peers. The industry was contained one state owned development bank and 17



commercial banks, of which one is state-owned including the dominant commercial bank of Ethiopia (CBE) along with former Construction and business bank which is now united with CBE, with assets accounting for approximately 70 percent of the industry's total holdings. Keatinge, (2014), the banking industry's nonperforming loan ratio is commendably low, and profitability is good, but the dominance of public sector banking certainly restricts financial intermediation and economic growth. It contrasts with regional and international peer countries where banking industries have a much higher share of private sector and foreign participation.

## **2.2. Theoretical Reviews**

### **2.2.1. The Profit-Maximizing and Competition-Based Theory:**

The external environment in the context of this study is considered in terms of regulation, technological environment, and economic conditions. In this regard, all banks do not use internally developed technological input, but adopt externally acquired technologies which all have equal opportunities and capacities.

The regulatory regime correspondingly applies its policies and monitoring systems on all banks. The sampled banks operate in the same region with similar economic environment. Therefore, the regulatory, technological and economic factors are assumed to be the same for all and not have an impact on differences in financial performance. However, the market and the customers are the core determinant factors from the perspective of external environment where banks have to compete for and maintain competitive excellence. Therefore, customer behavior is taken as component factor in the development of the measure of performance.

### **2.2.2. The Contingency Theory:**

The contingency theory overhauled the whole idea of the classical management theory which stated that there is always one best way of doing things. Contingency theory is one of the theories which helped to analyze in what way performance measurement system (PMS) fits

in the organization's environment Gimzauskiene and Kloviene (2008, 2009). Thus, the basic paradigm of contingency theory is that an organization seeks effectiveness and efficiency by fitting the qualities of the organization with the contingencies that indicate its situations Donaldson,(2001).

Contingency theory suggests that there is no one size fits all system (example management accounting system) to manage or control people in every situation Gimžauskienė and Kloviėnė, (2009) but is dictated on the strategies and objectives set by the organization after careful analysis of internal and external environment Thompson, Strickland and Gamble (2005). Thus, to understand the factors that influence the choice of performance measures, it is necessary to understand the relationship between organizational strategy and the environment in which the firm operates. Further, the theory considers the internal and external environment as important contingency variables and source of competitive advantage for a firm when aligned with its strategy Ahokposi, (2013).

The relevance of the contingency theory in the accounting literature was recognized in the mid-1970s. Thus, the structural contingency theory was developed based on the premises that survival, effectiveness and high performance are related to the fitness of contingencies such as organizational size Child, (1975), technological level Gerwin, (1993), strategy Chandler, (1962), and environment Hambrick, (1981). A firm's accounting system is an important component of organizational structure and the particular features of this system are affected by the contingencies that a firm encounters. Consequently, changes in circumstances (contingencies) require an adjustment to the structure so as to improve the fit condition and lead to higher performance.

### **2.2.3. Credit Risk Theory:**

Although people have been facing credit risk ever since early ages, credit risk has not been widely studied until recent 30 years. Early literature (before 1974) on credit uses traditional actuarial methods of credit risk ,whose major difficulty lies in their complete dependence on historical data. Up to now, there are three quantitative approaches of analyzing credit risk: structural approach, reduced form appraisal and incomplete information approach crosbie etal, (2003). Melt on 1974 introduced the credit risk theory otherwise called the structural

theory which is said the default event derives from a firm's asset evolution modeled by a diffusion process with constant parameters. Such models are commonly defined "structural model" and based on variables related a specific issuer. An evolution of this category is represented by asset of models where the loss conditional on default is exogenously specific. In these models, the default can happen throughout all the life of a corporate bond and not only in maturity Long staff and Schwartz, (1995).

#### **2.2.4. Credit Default Theory**

This theory is relevant for a situation where there is indirect relation to the effect of default that affects the financial performance. Delinquency is defined as a failure to meet a loan payment by a due date, whereas insolvency is defined as a situation where assets are less than liabilities. The term credit default really revolves around the concept of delinquency. Delinquency occurs when a borrower is unable to make a loan payment by the due date, caused by liquidity failure. Delinquency triggers a solvency assessment which may lead to a conclusion of negative equity position causing loan termination and an expectation of loss by the lender. The theory proposes two cardinal ratios with regard to non-performing loans: Loan Serviceability Ratio(LSR) is defined as the maximum loan interest rate owner-occupier borrower can service a loan amount from net disposable income after living expenses

#### **2.2.5. Net interest margin**

Risk, and the ways, in which it can be identified, quantified and minimized, is key concerns for a bank's management and its auditors when they are considering the need to provide forbad and doubtful loans. No loan is entirely without risk. Every loan, no matter how well it is secured, and no matter who is the borrower, has the potential to generate loss for the lender. It is the degree of risk to which a loan is susceptible and the probability of loss that vary; these should normally be reflected in the interest margin and other terms set at the inception of the loan Brown, (1993).

Net interest margin may be defined as net interest – the difference between total interest income and total interest expense – as a percentage of interest income Mergent Online,

(2019). It is a measure of a bank's efficiency in maintaining interest expenses at a minimum for a given value of interest income.

## **2.3 Empirical Literature**

This review summarizes various studies conducted in Ethiopia and other countries which are related with impact of credit risk on banks profitability. The researcher reviewing empirical studies which concluded on the existence of significant impact of credit risk on banks profitability and then reviewing those empirical studies which concluded the existence of positive impact of credit risk on banks profitability and then later reviewing those studies which shows the negative relationship of credit risk and banks profitability

The ROE tells common shareholders how effectively their money is being employed. Peer Company, industry and overall market comparisons are appropriate; however, It should be recognized that there are variations in ROEs among some types of businesses. In general, financial analysts consider return on equity ratios in the 15-20% range as representing attractive levels of investment quality Richard, (2015).

Ben-Naceur and Omran (2008) in attempt to examine the influence of Bank regulations, concentration, financial and institutional development on commercial Banks' margin and profitability in Middle East and North Africa (MENA) countries from 1989-2005 found that Bank capitalization and credit risk have positive and significant impact on Banks' net interest margin, cost efficiency and profitability.

Felix and Claudine (2008) investigated the relationship between Bank performance and credit risk management. It could be inferred from their findings that return on equity (ROE) and return on assets (ROA) both measuring profitability were inversely related to the ratio of nonperforming loan to total loan of financial institutions thereby leading to a decline in profitability.

Ahmad and Ariff (2007) examined the key determinants of credit risk of commercial Banks on emerging economy banking systems compared with the developed economies. The study found that regulation is important for banking systems that offer multi-products and services; management quality is critical in the cases of loan-dominant Banks in emerging economies. An increase in loan loss provision is also considered to be a significant determinant of potential credit risk. The study further highlighted that credit risk in emerging economy Banks is higher than that in developed economies.

Ayadi and Boujelbene (2012) in their Banking performance study of twelve Tunisian deposit Banks over the period of 1995-2005, notice a significant positive relation between size and Return on Average Assets proving the existence of economies of scale in the Tunisian Banking sector. On the contrary,

Saeed and Zahid (2016) found that based on regression models; it is interesting and quite surprising to find out that credit risk indicators have a positive association with profitability of the banks. This means that even after the deep effects of credit crisis in 2008, the banks in the UK are taking credit risks and earning benefits from interest rates, fee, and commissions etc. Thus, results do not disclose any major negative association between bank profitability and credit risk variables. However, few minor negative relationships indicate that credit risk improves bank profitability. Hence, UK banks should be confident in minimizing the lending rates, and also decreasing commission and fee charges. It is also important for the borrowers to repay their full loans on time settled in the beginning of the agreement.

Mekasha (2011) studied credit risk and its impact on the performance of a sample of six Ethiopian commercial banks using return on asset as a surrogate of performance and nonperforming loan to total loan ratio, loan provisions to nonperforming loan ratio, loan provision to total loan ratio and loan provision to total assets ratio used as a surrogate of credit risk measures. The result revealed that nonperforming loan to total loan ratio and loan provision to total loan ratio have inverse relationship with return on asset but only nonperforming loan to total loan was statistically significant. Whereas loan provision to

nonperforming loan and loan provision to total asset have positive association with return on asset but both are insignificant to impact return on asset.

Misikir B. (2015) carried out a study on the impact of credit risk on the financial performance of banks in Ethiopia using bank specific and macroeconomic factors covering a period of years 2003 -2008. Return on equity used as a proxy for financial performance and nonperforming loan to total loan ratio, capital adequacy ratio and total loan to deposit ratio, bank size, interest rate spread, gross domestic product and inflation rate as a proxy for credit risk. The study revealed that both bank specific factors and macroeconomic factors have inverse association with return on equity but only the bank specific factors are significant factors influencing return on equity.

Gizaw, Kebede and Selvaraj (2015) evaluated the impact of credit risk on the performance of commercial banks in Ethiopia over a period of years 2003-2004. Return on asset and return on equity used as proxy of performance and nonperforming loan to total loan ratio, capital adequacy ratio, and loan and advance to deposit ratio and loan loss provision to total loan ratio were used as a proxy for credit risk. The findings revealed that non-performing loan to total loan and loan and advances to deposit have inverse association with return on asset while the other two have positive association with return on asset. However; only nonperforming loan to total loan and loan loss provision to total loan are statistically significant to impact return on asset. Further, the study revealed that except loan loss provision to total loan ratio all the proxies of credit risk have inverse relationship with return on equity and all are significant factors impacting return on equity.

Finally the researcher tried to find studies which are conducted in Ethiopia and to the best knowledge of the researcher studies on the relationship between credit risk and profitability of Ethiopian commercial banks are few. Of these studies, Mekasha (2011) studied the effect of credit risk management on the performance of commercial banks in Ethiopia. He used secondary data from annual reports of commercial banks and survey of primary data from bank managers and officers which similarly showed that there is a negative relationship between credit risk and performance of commercial banks in Ethiopia.

In general, to the best of the researcher's understanding, Mekasha (2011), Bizuayehu (2015) and Gizaw, Kebede and Selvaraj (2015) are studies carried out in Ethiopia's commercial

banks. entitled as the impact of credit risk management on the financial performance of Ethiopian commercial banks. In addition to this, they are still a gap especially in private banks.

Therefore, there is a need to study the impact of credit risk on profitability of Ethiopian private commercial banks. The current study interpreted that the gap in the literature by employing alternative econometric models. Therefore, the main purpose of this research is in order to examine the impact of credit risk measures Nonperforming loan, net interest margined, loan to deposit, loan loss provision and capital adequacy ratio bank size on measures of financial performance return on equity.

## 2.4. Conceptual framework

A Conceptual framework is a visual representation that helps to illustrate the expected relationship between variables. The dependent and independent variables are drawn up in the frames.

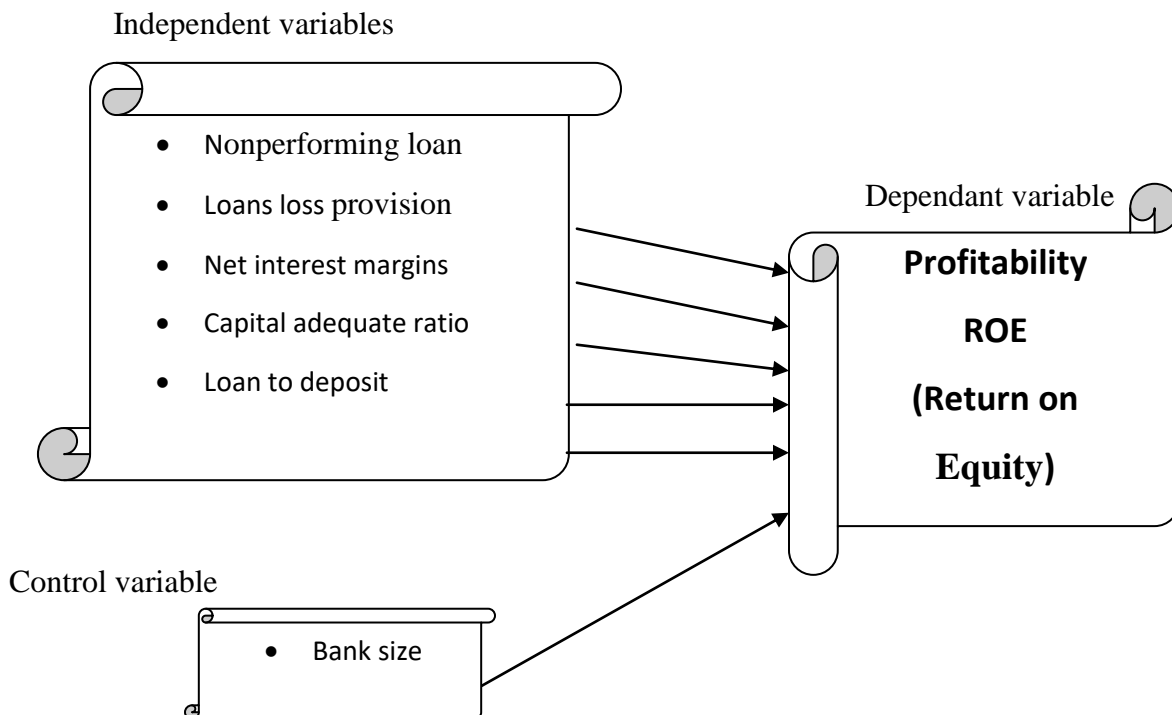


Figure 2.1 Conceptual framework

## **CHAPTER THREE**

### **3. Methodology**

#### **3.1 Research Design**

Explanatory research design was used to explain extent and nature of cause-and-effect relationships between variables. Explanatory research can add quality and insightful information to a study. It used to compare and contrast different techniques, such as secondary research, discussions, or qualitative research through focus groups, surveys or case studies are useful to observe. To assess impacts of specific changes on existing norms, various processes and explain the patterns of relationships between dependant and independent variables, Zikmund (2003). On the other hand other researcher, Pranaow.et.al (2010) used explanatory research design to explain the cause and effect relationship between study variables. In addition, Misker (2015) and Assefa (2016) also used explanatory research design in their study. Hence, It's preferable to use explanatory research since the aim the study has the impacts of credit risk on profitability of the Ethiopian private Commercial Banks.

#### **3.2 Data Type and source**

The secondary data was used as sources of data for this study. These secondary data were collected from audited financial statements of private commercial banks in Ethiopia, National Bank of Ethiopia.

#### **3.3 Population of the study**

The target populations of the study are according to the 2021 National Bank of Ethiopia report, there are 18 banks in Ethiopia of which 16 (sixteen) are private commercial banks, one is state owned commercial bank and the remaining is the development bank of Ethiopia (DBE). Among the total 16 private commercial banks 10 banks are establish before 2009.



The population or lists of all private commercial banks with the year of establishment are indicated in Appendix 1.

### **3.4 Sampling design and techniques**

The study used purposive sampling method was used to take a sample with private commercial banks selected based on date of establishment before 2009 which helps to take a sample of ten private commercial banks and taking eleven years data because of the higher the length of the period the result becomes more accurate and descriptive.

### **3.5 Data analysis techniques**

In the study quantitative data analysis method was used. Both descriptive statistics such as Mean, Median and standard deviation and inferential statistics such as regression and correlation were used using panel data. For data presentation Tables and figures were used. Finally, classic linear regression model analysis were used, using E-view 10, explaining all of its assumptions were employed.

### **3.6 Variables description and measurement**

#### **3.6.1 Dependent variable**

**ROE (Return on Equity):-** The researcher used return on equity (ROE) as dependent variable and measures of profitability. It measures how much shareholders have gained in their return on investment in the bank. ROE was used as the measure of the profitability in this study because ROE along with ROA has been widely used in earlier research, Ara al el, (2009). Return on equity measures a company's profitability by revealing how much profit a company generates with respect to the shareholders' worth. More specifically, it is a ratio between earning earned by the company and the shareholders' equity.

Return on Equity is a ratio which measures net income over shareholder's equity. "The net income comprised of all types of earnings like preferred stock income, surpluses, undivided profits and capital reserves. The difference between net assets and liabilities is termed as shareholder's equity on the other hand. The most common measure to determine the effectiveness of banks of generating revenue based on every element of shareholder's equity" Saeed and Zahid (2016).

Return on Equity = Net income/Total equity

### 3.6.2 Independent variables

**Nonperforming Loan (NPL):-** is a loan in which the borrower is in default due to the fact that they have not made the scheduled payments for a specified period. Although the exact elements of nonperforming status can vary depending on the specific loan's terms, "no payment" is usually defined as zero payments of either principal or interest. The specified period also varies, depending on the industry and the type of loan. It distresses the performance and survival of banks, Mileris, (2012).

The calculation method for the NPL ratio is dividing the NPL total by the total amount of outstanding loans in the bank's portfolio. The ratio can also be expressed as a percentage of the bank's nonperforming loans.

**NPL ratio** = total nonperforming loan/ total outstanding loan

**Loan loss provisions:-**A loan loss provision is an expense that is saved for defaulted loans or credits. This serves as an internal insurance fund. This is the money set aside to cater for the inability for a borrower to make payments. That is either the principal or interest or even both. This protects depositors from a loss in the funds deposited in the banks. According to, Gizaw et al (2015), the basic assumption behind LLPR is that banks managers reflect their

belief toward the bank's asset quality. An increase in LLPR means a decrease in the quality of the assets.

$LLP = \text{Loan loss} / \text{Total Loan}$

**Net interest margin:** -NIM ratios indicate specific factors that contribute to bank profitability. Net interest margin (NIM) equals net interest income divided by earning assets and thus represents the net interest return on income producing assets. Net interest margin may be defined as net interest – the difference between total interest income and total interest expense – as a percentage of interest income, Mergent Online (2019). It is a measure of a bank's efficiency in maintaining interest expenses at a minimum for a given value of interest income.

Increase in interest margin leads to growth in profitability and capital; but it may affect efficiency and competition, thereby economic growth. This indicates that Net Interest Margin (NIM) is one factor that affects economic efficiency. As a result, policymakers in different part of the world have been working to establish optimal intermediation cost that bring stable and efficient banking system, leading to economic efficiency and growth.

$NIM = \text{net interest income} / \text{earning assets}$

**Capital Adequacy Ratio:**-Capital adequacy is measured with the total risk-based capital ratio. This measure of capital is preferred to the traditional equity-to-asset ratio as it captures more information about core equity and puts it in relation to risk-weighted assets. Capital adequacy can be defined in term of capital to deposit ratio because the primary risk is depository risk derived from the sudden and considerably large scale of deposit withdrawals. The theoretical relationship between capital and bank risk is ambiguous. Higher capital might be an indication of a larger buffer stock of equity against large losses, lowering the probability of failure and improving risk-taking incentives. It also means that banks have more equity at risk which implies that expected default costs are higher which improves banks' risk-taking incentives .On the other hand, a capital ratio might be high for regulatory reasons as stricter capital requirements are imposed on riskier banks. A high capital base also means that the default probability is less sensitive to risky investment decisions distorting

incentives to monitor risks properly. Since quickly declining capital levels mechanically precede bank defaults, we expect capital to be negatively related to the probability of failure, i.e. a higher level of capital is associated with a lower probability of default, Hellmann et al. (2000).

$CAR = \text{Total Equity} / \text{Total Asset}$

**Loan to Deposit Ratio:**-Loan-deposit ratio, also known as the LTD ratio, is a ratio between the banks total loans and total deposits. If the ratio is lower than 1, the bank relied on its own deposits to make loans to its customers, without any outside borrowing. If, on the other hand, the ratio is greater than 1, the bank borrowed money which it relined at higher rates, rather than relying entirely on its own deposits. Banks may not be earning an optimal return if the ratio is too low. If the ratio is too high, the banks might not have enough liquidity to cover any unforeseen funding requirements or economic crises.

The formula for the loan to deposit ratio is exactly as its name implies, loans divided by deposits. The loan to deposit ratio is used to calculate a lending institution's ability to cover withdrawals made by its customers. A lending institution that accepts deposits must have a certain measure of liquidity to maintain its normal daily operations. Loans given to its customers are mostly not considered liquid meaning that they are investments over a longer period of time. Although a bank has keep a certain level of mandatory reserves, they may also choose to keep a percentage of their non-lending investing in short term securities to ensure that any monies needed can be accessed in the short term.

$LTD = \text{Total Loan} / \text{Total Deposit}$

**Bank Size:**-Firm size (Fsize) is measured by the natural logarithm of total asset, this indicate how large the Company's in terms of its asset size.

### 3.7 Model specification

The study has assessed the impacts of credit risk on profitability of the Ethiopian private Commercial Banks. To achieve the objective of the study the researcher will use the following model which is adopted by many researchers under similar studies. *e.g.* Hassan and Bashir, (2003); Haron, (2004) and thus makes it suitable for this Study.

The equation to investigate the impact of credit risk on profitability of commercial banks in Ethiopia was as follows.

$$Y_{i,t} = \alpha + \beta X_{it} + e_{it} \dots \dots \dots (1)$$

Where

Y = dependent variable

$\alpha$  = constant term

$\beta$  = coefficient of explanatory variable

X = Explanatory variable and

e = Error term (assumed to have zero mean and independent across time period).

i = banks

t = time period

The regression function determines the relation of X to Y.  $\alpha$  is the constant term and  $\beta$  is the coefficient of the function, it is the value for the regression equation to predict the variances in dependent variable from the independent variables. This means that if  $\beta$  coefficient is negative, the predictor or independent variable affects dependent variable negatively: one unit increase in independent variable decreases the dependent variable by the coefficient amount. In the same way, if the  $\beta$  coefficient is positive, the dependent variable increases by the coefficient amount.  $\alpha$  is the constant value which is forecast dependent variable when independent variables equal to zero. Finally,  $e_{it}$  is the disturbance or error term, which expresses the effect of all other variables except for the independent variables on the dependent variable.

$$\text{Profitability} = f(\text{credit risk, control variables}) \dots \dots \dots (2)$$

By using the econometric model as in equation above for this study, below has develop.  
So that, the researcher was use the following regression model.

$$ROE_{i,t} = \alpha + \beta_1 NPL_{i,t} + \beta_2 LLP_{i,t} + \beta_3 CAR_{i,t} + \beta_4 LTD_{i,t} + \beta_5 NIM_{i,t} + \varepsilon_{i,t} \dots \dots \dots (3)$$

**Where:**

$\alpha$  = constant term

ROE = Return on Equity

NPL = Nonperforming Loan

LLP = Loan Loss Provisions

CAR= Capital Adequacy Ratio

LTD = Loan to Deposit

NIM = Net Interest Margin

BS = Bank size

eit= Error term

## **CHAPTER FOUR**

### **4. RESULTS AND DISCUSSION**

The general objective of the study was to examine the impact of credit risk on profitability of private commercial banks in Ethiopia. By examining nonperforming loan, net interest margin, capital adequate, loan loss provision and loan to deposit that affect banks profitability. To examine the profitability as a dependent variable the researcher used ROE (return on Equity) as measurement tool. The researcher used secondary data's of ten banks eleven years' data by using panel data analysis. And also quantitative data analysis methods were used. Data's used for this study were obtained from National Bank of Ethiopia and the bank's annual reports.

Under this chapter the collected data had been analyzed and presented in tables and followed with. The analysis of the data was made in descriptive statistics analysis like, mean, and standard deviation and inferential like regression and correlation to give the meaningful conclusions for the result of this study.

#### **4.1. Descriptive statistics**

The descriptive statistics for the dependent and independent variables are presented on table 4.1 below. The dependent variable profitability is measured by ROE and independent variables are: nonperforming loan, capital adequate, loan loss provision and loan to deposit that affect banks profitability. Descriptive statistics were used to describe the sample data of each variable in the study with a single value that represents the centre of the data, the largest and smallest values. It also used to determine how spread out the data is from the mean. The central value of the variables denoted by location is measured by mean whereas the spread of the data from mean is measured by standard deviation.

Table 4.1 below shows the descriptive statistics of dependent and independent variables of ten private commercial banks for the period of eleven years from 2010-2020 with a total of

110 observations. It also describes the overall variables employed in the study and their interpretation.

The dependant variable in this study i.e. returns on equity (measure of profitability) measured by net profits divided by net owners' equity with a mean value of 0.215585 indicate that private commercial banks earn, on average, net profit of 0.215585 cents from each birr invested on their respective total equity during the review period. As shown from the statistical result private Commercial banks that operate in Ethiopia earn 21.55% return on averages from the equity per year. Based on Richard (2015), Return on equity between 15% and 20% are considered desirable, the average industry mean value of 21.55% return on equity tells that where banking industry makes good profit. Its standard deviation of 0.077221 indicates less spread in the sample data for this variable. And also has a maximum and minimum value of 0.478000 and -0.049200 respectively. The maximum value is 47.8% which mean that the private sample banks earned 42.4% of profit after tax for a single birr invested on the firm. In contrast, the least profitable bank of the sample banks incurred 4.92 of profit after tax for each birr invested.

The first independent variable used in this study is non performing loan has the mean value of 0.041913, maximum value of 0.119500 and minimum value 0.006000 and standard deviation of 0.018537. It indicates that selected banks, on average, set aside as maximum and minimum amount of as 11.95 cents and 0.60 cents respectively. The standard deviation value was 1.85 indicate that private banks non performing loan has high variation relative to other independent variables.

Net interest margin (NIM) which measured as net interest income divided by loans and other investment. The mean value of net interest margin is 7.63% with the maximum and minimum value of 9.59% and 4.69% respectively.

Loan to deposit is measured as Total loan and advances divided by total deposits, has a mean value of 0.614484 and maximum and minimum value of 0.891200 and 0.404900 respectively and a standard deviation of 0.087724 over the last eleven years.



Loan loss provision of private banks has a mean value of 0.042016 and maximum and minimum value of 0.065067 and 0.016233 respectively during the review period and the variation from the mean is the 1.10%.

Capital adequate ratio is measured by total equity divided by total assets having a maximum of 0.581400 and minimum of 0.013200 with a mean value and standard deviation of 0.138616 and 0.091869 respectively.

**Table 4.1** Descriptive Statistics

	ROE	NPL	NIM	LTD	LLP	CAR
Mean	0.215585	0.041913	0.076329	0.614484	0.042016	0.138616
Median	0.210000	0.038800	0.077150	0.614850	0.041367	0.109500
Maximum	0.478000	0.119500	0.095967	0.891200	0.065067	0.581400
Minimum	0.049200	0.006000	0.046933	0.404900	0.016233	0.013200
Std. Dev.	0.077221	0.018537	0.005762	0.087724	0.011022	0.091869
Skewness	0.427117	1.331405	-2.167580	0.279997	0.268353	2.680268
Kurtosis	3.499289	5.827336	12.96086	2.985364	2.431548	11.75323
Sum	23.71440	4.610400	8.396137	67.59320	4.621733	15.24780
Sum Sq. Dev.	0.649983	0.037455	0.003619	0.838802	0.013241	0.919949
Observations	110	110	110	110	110	110

Source: The Researcher computation through EViews 10

## 4.2. Correlation Analysis

Correlation analysis measures the relationship between two items. The resulting value (called the "correlation coefficient") shows if changes in one item have result in changes in the other item. Correlation analysis is a statistical tool which is used to measure the strength or degree of linear association between two variables. The correlation coefficient, which

always lies between -1 and +1, was used to measure the strength and degree of linear association between two variables Brooks, (2008). According to Brooks, (2008), if it is stated that y and x are correlated, it means that y and x are being treated in a completely symmetrical way.

Thus, it is not implied that changes in x cause changes in y, or indeed that changes in y cause changes in x rather, it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient. If the correlation coefficient is +1, it indicates that the linear relationship between two variables is perfect or strong and positive. On the other hand, -1 correlation coefficient indicates that two variables are perfectly or strong related but in a negative way. A correlation coefficient of 0 indicates that there is little or no linear association between the two variables.

Table 4.2; correlation between dependent and independent variables used in the analysis. As we can see from the under table, the coefficient of correlation between ROE and NPL is 0.5583. This implies that when Nonperforming loan increased by 1% the return on equity of private commercial banks in Ethiopia decreased by 55.83%, which shows a strong relationship between ROE and NPL for banks.

The other independent variable employed in the study was loan to deposit ratio. The coefficient of correlation between ROE and LTD was 0.4579. This implies that when private commercial banks increase LTD by 1% the ROE is decreased by 45.79%, which shows also a strong relationship between ROE and LTD.

The coefficient of correlation between ROE and net interest margin of the private commercial banks was 0.0064. This implies that when private commercial banks increases NIM by 1% the ROE is decreased by 0.0064, which shows weak relationship between ROE and NIM.

The coefficient of correlation between ROE and loan loss provision of the private commercial banks was 0.2757. This implies that when private commercial banks increase

LLP by 1% the ROE is increased by 27.57%, which shows a moderate relationship between ROE and LLP.

The correlation coefficient between ROE and capital adequate ratio was -0.2748 this implies that as cost per loan increase by 1%, the profitability of bank decreased by 27.48% which shows also moderate relationship between ROE and CAR than other variables.

Private commercial banks Non performing loan has a negative correlation with net interest margin having a coefficient of -0.1750 which implies that private commercial banks increase NPL by 1% Net interest margin by decrease 17.50% which shows a moderate relationship between NPL and NIM.

The correlation coefficient between banks Non performing loan and Loan to Deposit was 0.0514 which implies that the private commercial banks increase NIM by 1% Loan to Deposit increase by 5.14% which shows weak relationship between NPL and LTD.

The correlation coefficient between banks Nonperforming loan and loan loss provision was 0.2595 which implies that the private commercial banks increase NPL by 1% Loan loss provision increase by 25.95% which shows moderate relationship between NPL and LLP.

The correlation coefficient between banks Non performing loan and Capital adequate ratio was -0.0265 which implies that the private commercial banks increase NPL by 1% Capital adequate ratio decreases by 2.65% which shows a weak relationship between NPL and CAR.

The net interest margin of private commercial banks has positively correlated with Loan loss provision and Capital adequate ratio having correlation coefficient of 0.0499 and 0.0417, it implies relatively weak relationship between net interest margin with LTD and CAR. On the other hand NIM has a weak relationship between LLP, with a value of -0.0519 (5.19%).

The loan to deposit of private commercial banks has a positive correlation coefficient of Loan loss provision and negatively correlated with Capital adequate ratio of 0.1532, -0.2584 respectively which shows a moderate relationship with loan to deposit.

The total loan of private commercial banks has positive correlated with total cost per loan having correlation coefficient of -0.082289, it implies a weak relationship. And also gross

yield on asset has a weak relationship between gross yields to asset ratio with a value of 0.178575.

The loan loss provision of private commercial banks negative correlated with capital adequate ratio having correlation coefficient of -0.1598. It implies weak relationship between loan loss provision and capital adequate ratio.

**Table 4.2** Correlation matrix among dependent and independent variables

	ROE	NPL	NIM	LTD	LLP	CAR
ROE	1					
NPL	0.5583	1				
NIM	0.0064	-0.1750	1			
LTD	0.4579	0.0514	0.0499	1		
LLP	0.2757	0.2595	-0.0519	0.1532	1	
CAR	-0.2748	-0.0265	0.0417	-0.2584	-0.1598	1

Source: The Researcher computation through EViews 10

### 4.3. Testing assumptions of classical linear regression model (CLRM)

The five basic assumptions relating to the linear regression model (CLRM) were made in this study. The assumptions were as follows: the mean of the error term for all X is (independent variables) are zero  $\{E(u_t) = 0 \text{ for all } u_t\}$ , the assumption of homoscedasticity (no heteroscedasticity) which assumes that the variance of the error is constant  $\{\text{var}(u_t) = \sigma^2 < \infty \text{ for all } u_t\}$ , assumption of non autocorrelation assumes that covariance between the error terms over time (or cross-sectional, for that type of data) is zero. In other words, it is assumed that the errors are uncorrelated with one another  $\{\text{cov}(u_i, u_j) = 0 \text{ for } i \neq j\}$ , the assumption of normality says the disturbances are normally distributed  $\{u_t \sim N(0, \sigma^2)\}$  and the assumption of multicollinearity. When these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there will be data that left out of the model Brooks, (2008).

### 4.3.1 Test for average value of the error term is zero ( $E(u_t) = 0$ ) assumption

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated. Brooks, (2008) Therefore, since the constant term (i.e.  $\alpha$ ) was included in the regression equation, the average value of the error term in this study is expected to be zero.

### 4.3.2 The assumptions of homoscedasticity (no heteroscedasticity)

According to this assumption, the variance of the errors is constant,  $\{V(\epsilon_i) = \sigma^2 \text{ for all } i\}$ . If the errors do not have a constant variance, they are said to be heteroscedastic (Brooks, 2008). The test undertaken to check for this assumption is known as a heteroscedasticity test. In the classical linear regression model, one of the basic assumptions is Homoscedasticity assumption that states as the probability distribution of the disturbance term remains same for all observations. That is the variance of each  $u_i$  is the same for all values of the explanatory variable. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity .

Accordingly, in order to detect the heteroscedasticity problems, white test was utilized in this study. This test states that if the p-value is significant at 95 confidence interval, the data has heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem.

**Table 4.3 Heteroskedasticity Test**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

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F-statistic	0.755703	Prob. F(5,104)	0.5838
Obs*R-squared	3.856396	Prob. Chi-Square(5)	0.5703
Scaled explained SS	4.306125	Prob. Chi-Square(5)	0.5062

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Source: The Researcher computation through EViews 10

The result of White test using the Eviews 10 statistical software package is presented in table: 4.3 above. it shows that the F-,  $\chi^2$  and scaled explained SS versions of the test statistic give the same conclusion that reveals the absence of heteroscedasticity due to evidence by the p-values of F-stat. 0.5838 and Obs\*R-squared 0.5703 which are significantly greater than 0.05. Thus, there is no Heteroskedasticity.

#### 4.3.3. Test for Assumption of No Autocorrelation $\{cov(u_i, u_j) = 0 \text{ for } i \neq j\}$

The diagnostic test for CLRM assumption of no autocorrelation was tested by this study. According to Gujarati (2004) the assumption of no autocorrelation between the disturbances assumes that given any two X values,  $X_i$  and  $X_j$  ( $i \neq j$ ), the correlation between any two  $u_i$  and  $u_j$  ( $i \neq j$ ), is zero. According to (Chris Brooks 2008) it is assumed that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it would be stated that they are auto correlated or that they are serially correlated. This assumption was tested by Durbin Watson (DW) test of autocorrelation. Durbin--Watson (DW) is a test for first order autocorrelation -- i.e. it tests for a relationship between an error and its immediate previous value. One way to motivate the test and to interpret the test statistic would be in the context of a regression of the time  $t$  error on its previous value

$$u_t = \rho u_{t-1} + v_t$$

Where  $v_t \sim N(0, \sigma^2 v)$  and  $\rho$  is the coefficient of autocorrelation.

The DW test statistic has as its null and alternative hypotheses. Under the null hypothesis, the errors at time  $t - 1$  and  $t$  are independent of one another (the errors at time  $t - 1$  and  $t$  are uncorrelated), and the alternative hypothesis says the errors at time  $t - 1$  and  $t$  are independent (the errors at time  $t - 1$  and  $t$  are serially correlated). Therefore

H0:  $\rho = 0$  (no autocorrelation )

H1:  $\rho \neq 0$  (autocorrelation )

In addition to DW test, the researcher used Breusch-Godfrey Serial Correlation LM Test to examine a joint test for autocorrelation that will allow examination of the relationship between error term and several of its lagged values as the same time. As we can see from Table 4.4 based on Breusch-Godfrey Serial Correlation LM Test table we can see, p value of F-stat is 0.2692 and p value of Obs\*R-squared is 0.2473, both of them above significant level

0.05. As a result, the conclusion from the test the null hypothesis of no autocorrelation should not be rejected since the value of p is greater than 0.05.

**Table 4.4 Serial Correlation**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.329468	Prob. F(2,102)	0.2692
Obs*R-squared	2.794631	Prob. Chi-Square(2)	0.2473

Source: The Researcher computation through EViews 10

**4.3.4. Assumption of normality (errors are normally distributed  $\{utN(0, \sigma^2)\}$ )**

The other important diagnostic test conducted in this paper is the normality assumption (i.e the normally distributed errors). Brooks (2008) stated that the normality assumption ‘(ut~ N (0,  $\sigma^2$ ))’ is required in order to conduct single or joint hypothesis tests about the model parameters. Gujarati, (2004) as any linear function of normally distributed variables is self normally distributed; A normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. If residuals are normally distributed the histogram is bell shaped and the value of Jarque-bera statistic is not significant at 5% significance level. Brook (2008).

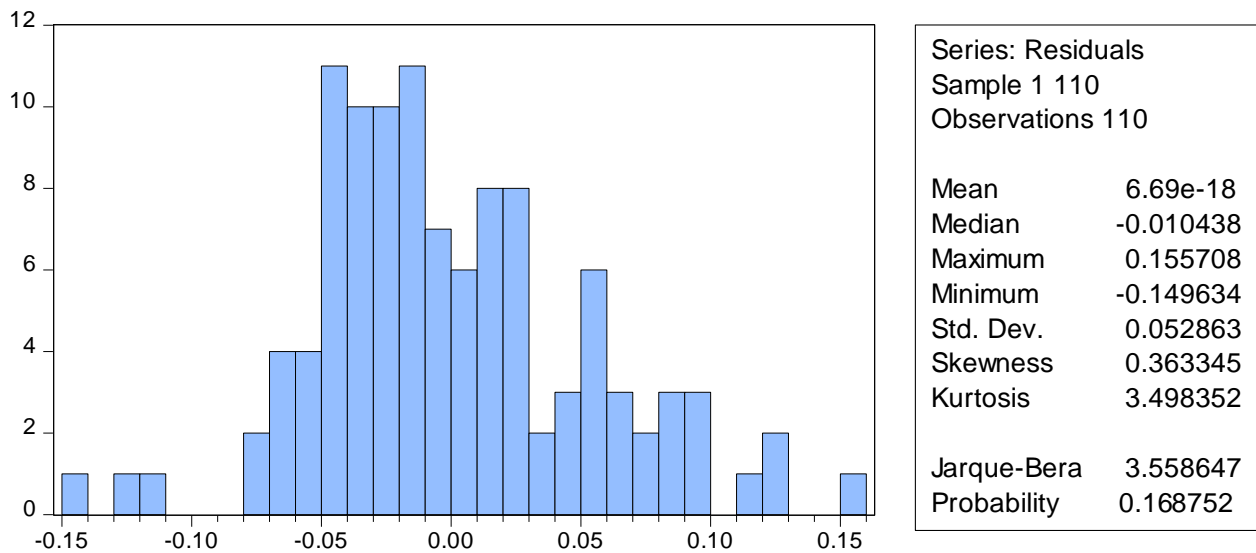
One of the most commonly applied tests for normality is the Jarque-Bera (JB) test. JB uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments - the mean and the variance Brooks, (2008,). In case of this study, the researcher used JB normality test to test the null hypothesis of normally distributed errors assumptions.

The null hypothesis for this test is that the data is not normally distributed. The alternative hypothesis of this the data is normally distributed. Can be rewritten as:

H0: The residuals do not follow a normal distribution

H1: The residuals follow a normal distribution

Figure 4.1. Jarque-BeraNormality Test



Source: The Researcher computation through EViews 10

From this figure, it can be concluded that the normality assumption is normally distributed because the p-value of Bera-Jarque test is significantly greater than 5% significance level and the coefficient of kurtosis is 3.498352 which is close to 3 and the skewness is also close to zero with coefficient a of 0.363345.

#### 4.3.5. Testes for the Absence of Multicollinearity Assumption

The last test which is conducted in this study is the multicollinearity test, this help to identify the correlation between explanatory variables and to avoid double effect of independent variable from the model.

A correlation is a single number that describes the degree of relationship between two variables. According to Gujarati (2004), the standard statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficients. Therefore, in this study correlation matrix for five of the independent variables shown below in the table had been estimated.



According to Cooper and Schendler (2009) the correlation coefficient between independent variable up to 0.8 may not cause series multicollinearity problem therefore, coefficient of correlation less than 0.8 is acceptable. According to Hair et al (2006), the correlation coefficient between independent variable should not exceed 0.9 which means coefficient of correlation less than 0.9 is acceptable.

The results of multicolliniarity test show that the maximum coefficient of correlation between two independent variables in this study was 0.840394. This coefficient of correlation does not violate the acceptable level stated by Hair et al (2006), Cooper and Schendler (2009).

As we can see from the below multicolliniarity test there is no multicollinearity problem with in the variables because the VIF of all independent variables is not more than 0.10%.

**Table 4.5 Multicolliniarity Test**

Variance Inflation Factors  
Included observations: 110

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
NPL	0.086374	6.803120	1.104559
NIM	0.840394	184.9234	1.038518
LTD	0.003815	55.19342	1.092572
LLP	0.246235	17.43859	1.113181
CAR	0.003478	3.602075	1.092361
C	0.006748	253.4231	NA

Source: The Researcher computation through EViews 10

#### 4.4 Model Specification

Model specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form. When the omitted variable is correlated with the variable which included, the estimators will be biased and inconsistent and model specification error will tends to occur. If the omitted variable is not correlated

with the included variable, the estimators are unbiased and consistent and model specification error will not occur. Therefore, in order 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 follow;

**H<sub>0</sub>**: The model specification is correct.

**H<sub>1</sub>**: The model specification is incorrect.

**Table 4.6: Ramsey RESET Test**

Ramsey RESET Test

Equation: UNTITLED

Specification: ROE NPL NIM LTD LLP CAR

	Value	df	Probability
T-statistic	0.303776	103	0.7619
F-statistic	0.092280	(1, 103)	0.7619
Likelihood ratio	0.098507	1	0.7536

Table 4.6 showed that the p value is greater than 0.05 so that the null hypothesis is not rejected. Therefore, the model specification is correct.

#### 4.5 Choosing Random effect (RE) versus fixed effect (FE) models

The main objective of this section was to select the best model for the study. According to Brooks (2008), there are broadly two classes of panel estimator approaches that can be employed in financial research: fixed effects models and random effects models. There are different ways of selecting the best model. According to Gujarati (2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model and random effect model. When the number of time series is greater than the number of cross-sectional units fixed effect model will be preferable in this study. According to Brooks

(2008) and Gujarati (2004), random effect model is more appropriate when the entities in the sample having been randomly selected from the population, but a fixed effect model is more conceivable when the entities in the sample effectively constitute the entire population/sample frame.

In this study the method used in each model is selected based on the Correlated Random Effects- Hausman Test, Redundant fixed effect Tests-Likelihood ratio (Chow test) and Breusch-Pagan Test. The Hausman test that examines whether the unobservable heterogeneity term is correlated with explanatory variables, while continuing to assume that regresses are uncorrelated with the disturbance term in each period. The null hypothesis for this test is that unobservable heterogeneity term is not correlated or random effect model is appropriate, with the independent variables. If the null hypothesis is rejected then we employ Fixed Effects method Padachi, (2006). The Redundant fixed effect Tests-Likelihood ratio (Chow test) also the other important test to examine whether ordinary least square (OLS) model or fixed effect model is appropriate. And, Breusch-Pagan Test is the most important and the final test for the purpose of examining ordinary least square (OLS) or random effect model is appropriate in the panel data. The null and alternative hypothesis for each tests with their corresponding results are given as:

**H<sub>0</sub>**: Random effects model is appropriate

**H<sub>1</sub>**: Fixed effects model is appropriate

**Table 4.7: Hausman Test**

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.794233	5	0.3268

Source: The Researcher computation through EViews 10

As shown from the Hausman specification test for this study has a p-value of 0.3268 for the regression model. This indicates that p-value is insignificant at 5% and then the null hypothesis is not rejected and Hausman test showed that random effect is appropriate.

#### 4.6. Discussion of regression results

This section presents over all the empirical results of the regressions. The regression result was made and coefficients of the variables were estimated by EView software version 10. As stated earlier in this study random Effect regression model is used to examine the impact of credit risk on profitability of commercial banks in Ethiopia. The regression model output presented in table 4.7 below show that the coefficients, standard errors, t-values and p-values for the explanatory variables, R-squared, adjusted R-squared, Standard error of regression, F-statistic, probability F-statistics for the regression.

**Table 4.8 Regression Results**

Dependent Variable: ROE

Method: Panel EGLS (Cross-section random effects)

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL	-0.283524	0.304294	9.317447	0.0000
NIM	0.179022	0.666110	2.687570	0.0084
LTD	0.299652	0.046123	6.496863	0.0000
LLP	-0.135467	0.504418	-2.685616	0.0084
CAR	-0.050261	0.045899	-1.095025	0.2760
C	-0.160139	0.069075	-2.318317	0.0224
Effects Specification				
			S.D.	Rho

Cross-section random	0.045930	0.6080
Idiosyncratic random	0.036880	0.3920

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Weighted Statistics

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R-squared	0.594837	Mean dependent var	0.050728
Adjusted R-squared	0.575358	S.D. dependent var	0.056811
S.E. of regression	0.037020	Sum squared resid	0.142533
F-statistic	30.53731	Durbin-Watson stat	1.663384
Prob(F-statistic)	0.000000		

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Unweighted Statistics

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R-squared	0.442769	Mean dependent var	0.215585
Sum squared resid	0.362191	Durbin-Watson stat	0.536534

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Source: The Researcher computation through EViews 10

Note: \*\*: denotes 1% significant level.

After running this equation using Eview 10, the regression model was as follows.

$$\text{ROE} = -0.160139 - 0.283524\text{NPL} + 0.179021\text{NIM} + 0.299652\text{LTD} - 0.135467\text{LLP} - 0.050264\text{CAR}$$

Table 4.8 shows the regression result of private commercial banks profitability which is measured by ROE as dependent variable and the explanatory variables of Nonperforming loan, net interest margin, loan to deposit, loan loss provision and capital adequate ratios. The R-squared value of 0.594837 indicates that the independent variables in this model are representing 59.48% to explain the dependent variables. The remaining 0.405163 of the variability in the dependent variables left unexplained by the explanatory variables used in the study. The F-statistic with its probability is usually used to test the significance of the model. The F-statistics 30.53731 with p-value 0.0000 since it indicates that all of the coefficients are not jointly zero. In this case, it indicates that coefficients included in the estimation are jointly significant. The F-statistic is a test of the null hypothesis that explanatory variables in the model are not jointly significant. Null hypothesis of F-statistic

(the overall test of significance) which says the Adjusted R-squared is equal to zero was rejected at 1% significance level. In this case the Probability (F-statistic) with 0.000 values indicates that strong statistical significance which enhanced the reliability and validity of the model. Thus, the regression model is feasible. Brooks (2008)

Brook (2008) noted that a simple way to determine the regression line fits the data well is to look at the value of adjusted R-squared. A value of adjusted R-squared close to 1 indicates that the model explain nearly all of the variability of a dependent variable about its mean value while a value close to zero indicates that the model poorly fits the data.

Accordingly, the adjusted R-squared of 0.575358 implies that 57.53% of the variability in the dependent variable can be explained by the change in the included independent variables. This means that the remaining 42.46% of the changes was explained by other variables which are not included in the model.

The regression outcomes in table 4.8 above shows that net interest margin and loan to deposit had positive coefficient whereas non performing loan, Loan loss provision and capital adequate ratio had negative coefficients.

#### **4.7. Testing of Hypothesis and discussions**

The following section provides the results for each explanatory and their importance in determine the profitability of private commercial banks in Ethiopia through testing hypothesis.

##### **Nonperforming loan /NPL/**

From table 4.8, the results indicate that non performing loan has a coefficient of -0.283524 which indicate that if non performing loan increases by 100% return on equity changed or decrease by 28.35% by controlling other factors constant. It has negative impact on the profitability of private commercial banks of Ethiopia. The coefficient of the ratio of nonperforming loan /NPL/ variable in the regression model has negative effect on profitability of private commercial banks in Ethiopia and the variable is statistically

significant at 1% in explaining the effect of credit risk on the return on equity of private commercial banks in Ethiopia. Biruk (2016) identified a significant relationship with profitability. The negative sign of NPL ratio shows that increasing of this variables lead to the decreasing of profitability. Therefore, the null hypothesis which stated no significant relationship between return on equity and non-performing loan was rejected.

Non-performing loan indicates the level of banks revelation to credit risk. Commercial banks profitability affected by NPL because banks collect credits from lender must be on time otherwise when banks have small NPL, banks profitability is high and when banks have high NPL, banks profitability become decline.

#### **Net interest margin /NIM/**

From table 4.8, the results indicate that net interest margin Ratio has a coefficient of 0.179022 which indicate that if net interest margin increases by 100% return on equity increases by 17.9% by controlling other factors constant. Since the coefficient has a positive sign, it has positive impact on the profitability of private commercial banks of Ethiopia. The coefficient of the ratio of net interest margin (NIM) variable in the regression model has positive effect on profitability of private commercial banks in Ethiopia and the variable is statistically significant at 1% in explaining the effect of credit risk on the return on equity of private commercial banks in Ethiopia. Biruk (2016) identified a significant relationship with profitability. Therefore, the null hypothesis which stated no significant relationship between return on equity and net interest margin ratio was rejected.

#### **Loan to deposit /LTD/**

From table 4.8, the results indicate that loan to deposit Ratio has a coefficient of 0. 299652 which indicate that if loan to deposit increases by 100% return on equity increase by 29.96% by controlling other factors constant. Since the coefficient has a positive sign, it has positive impact on the profitability of private commercial banks of Ethiopia. The coefficient of the ratio of loan to deposit (LTD) variable in the regression model has positive effect on

profitability of private commercial banks in Ethiopia and the variable is statistically significant at 1% in explaining the effect of credit risk on the return on equity of private commercial banks in Ethiopia. According to Misikir (2015), Saed MS and Zahid (2016) which identified that LTD has a significant effect on profitability Therefore, the null hypothesis which stated no significant relationship between return on equity and loan to deposit ratio was rejected.

The loan-to-deposit ratio (LTD) is used to assess a bank's liquidity by comparing a bank's total loans to its total deposits for the same period. If the ratio is too high, it means that the bank may not have enough liquidity to cover any unforeseen fund requirements. Conversely, if the ratio is too low, the bank may not be earning as much as it could be.

#### **Loan loss provision /LLP/**

From table 4.8, the results indicate that Loan loss Provision has a coefficient of -0.135461 which indicate that if Loan loss Provision increases by 1 return on equity decreases by 13.5% by controlling other factors constant. Since the coefficient has a negative sign, it has negative impact on the profitability of private commercial banks of Ethiopia. The coefficient of the Loan loss provision (LLP) variable in the regression model has negative effect on profitability of private commercial banks in Ethiopia and the variable is statistically significant at 1% in explaining the effect of credit risk on the return on equity of private commercial banks in Ethiopia. Engdawork, (2014) identified a negative and significant effect on profitability. Therefore, the null hypothesis which stated no significant relationship between return on equity and Loan loss Provision was rejected.

#### **Capital adequacy ratio /CAR/**

From table 4.8, the results indicate that Capital adequacy ratio has a coefficient of -0.050261 which indicate that if Capital adequacy ratio increases by 100% return on equity decrease by 05.02% by controlling other factors constant. Since the coefficient has a negative sign, it has negative impact on the profitability of private commercial banks of Ethiopia. The coefficient of the ratio of Capital adequacy ratio (CAR) variable in the regression model has negative



effect on profitability of private commercial banks in Ethiopia and the variable is statistically insignificant at 5% in explaining the effect of credit risk on the return on equity of private commercial banks in Ethiopia. there are some other researches that found no relationship between CAR and ROE, including the one conducted by Kithinji (2010) in Kenya, Fan LiYijun Zou (2014) identified there is an insignificant relation between Capital adequacy ratio and profitability. Therefore, the null hypothesis which stated no significant relationship between return on equity and Capital adequacy ratio was not rejected.

## **CHAPTER FIVE**

### **5. Conclusions and Recommendations**

This chapter has two sections and the first section presents conclusion drawn from the data analysis and discussion. The second section presents possible recommendation progressed based on the conclusion on the study.

#### **5.1 Conclusion**

Credit risk is one of significant risks of banks by the nature of their activities. Credit risk is a risk of borrower default, which happens when the counterpart fails to pay on time. The main objective of this study was to examine the impact of credit risk on private commercial banks profitability in Ethiopia based on panel data analysis for the period 2010 to 2020. EView software 10 was used for the purpose of analysis.

The analysis was presented by using secondary data derived from the financial statements of each private banks and national bank of Ethiopia. The study was used purposive sampling method and quantitative data analysis method was used.

For the purpose of this study return on equity is taken as a dependent variable in order to measure profitability and five independent (explanatory variables) are used which are nonperforming loan, net interest margin, loan to deposit, loan loss provision and capital adequate ratio. The study selected random effects model to estimate the relationship between the dependent variable (ROE) and the independent variables placed above.

Before running the regression result, the model was checking the five classical linear regression models assumption. As a result the model has passed all the necessary tests of classical linear regression model which are constant term assumption heteroscedasticity assumption, autocorrelation test, multicollinearity and normality assumption. From the regression analysis four of the five explanatory variables are to be statistically significant.

The regression result shows that profitability which is measured by return on equity has negative relation with non performing loan, loan loss provision and capital adequate ratio but it has a positive relation with net interest margin, and loan to deposit.

According to the regression results, the findings indicated that bank credit risk measured in terms of nonperforming loan has negative and statistically significant impact on ROE. The study concluded that NPL had a statistically significant effect against ROE.

The ratio of net interest margin has positive and statistically significant impact on ROE. The study concluded that NIM had a statistically significant effect against ROE.

The ratio of loans to deposit has positive and statistically significant impact on ROE. The study concluded that LTD had a statistically significant effect against ROE.

On the other side, the study found loan loss provision has a negative and statistically significant impact on ROE of private commercial banks in Ethiopia. This indicates LLP had a statistically significant effect against ROE.

The ratio of capital adequate on asset has negative effect respectively and statistically insignificant impact on ROE.

## **5.2. Recommendations**

Based on the findings and conclusions of the study, the researcher has forwarded the following possible recommendations.

- From the results non performing loan ratio have negative and significant impact on profitability. The existence of NPL ratio affects the profitability of the private banks in Ethiopia. Thus, the study recommends that private commercial banks should decrease the level of NPL by using continuous follow-up on NPL because it goes to a loss and decline of their financial position.
- The positive and significant sign of Net interest margin of bank shows that decrease in profitability of the private commercial banks in Ethiopia. So, the selected private commercial

banks give more consideration for this variable in order to be profitable. And private banks be use price set of loan interest rate.

- Loan to deposit has positive and significant impact on profitability. The positive sign of LTD shows that increasing of this variable will lead to the decreasing of profitability. Thus, well bank is attracting and retaining customers it increase deposits and new customers and banks can leaned more and increase their profit with interest rate. Otherwise it becomes liquidity problem.
- This implies that the existence of high LLP inversely affects the profitability of the banks. Thus, the study suggests that private commercial banks should decrease their level of LLP.
- Commercial banks always must interpreted credit roles and procedures that are minimizing credit risk and increase their profitability.

Generally this research contributes a great roll for the private commercial banks to closely follow the relationship between credit risk and profitability and also it is recommended that there should be further studies related with credit risk by adding additional variables.

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## Appendixes

### Appendix: 1 Establishment date of private banks

	<b>Bank Name</b>	<b>Year Est.</b>
1	Development Bank of Ethiopia	1901
2	Commercial Bank of Ethiopia (State Bank)	1963
3	Awash International Bank	1994
4	Dashen Bank	1995
5	Bank of Abyssinia	1996
6	Wegagen Bank	1997
7	United Bank	1998
8	Nib International Bank	1999
9	Cooperative Bank of Oromia(s.c.)	2005
10	Lion International Bank	2006
11	Oromia International Bank	2008
12	Bunna International Bank	2009
13	Zemen Bank	2009
14	Abay Bank S.C.	2010
15	Berhan International Bank	2010
16	Addis International Bank	2011
17	Dehub Global Bank	2012
18	Enat Bank	2013

