
# Determinants of Ethiopian Private Commercial Banks' Asset Quality

**By:**

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**Statement of Declaration**

I, Tesfa Getachew Anteneh, hereby declare that this thesis entitled "Determinants of Ethiopian Private Commercial Banks Asset Quality" submitted by me for the award of the degree of Master of Accounting and Finance, Addis Ababa University at Addis Ababa, Ethiopia, is my original work and it has never been presented in any university. All sources and materials used for this thesis have been duly acknowledged.

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This master thesis, has been submitted for examination with my approval as thesis.

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This is to certify that the thesis entitled, "Determinants of Ethiopian Private Commercial Banks Asset Quality" was carried out by Tesfa Getachew Anteneh under the supervision of Ababaw Kassie (Phd), submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## List of Acronyms

| | |
|---|---|
| CAR | Capital Adequacy Ratio |
| CBB | Construction and Business Bank |
| CBO | Cooperative Bank of Oromia |
| CLRM | Classical Linear Regression Model |
| DB | Dashen Bank |
| DBE | Development Bank of Ethiopia |
| EIC | Ethiopian Insurance Corporation |
| GDP | Gross Domestic Product |
| INF | Inflation Rate |
| M2 | Broad Money Supply |
| MoFEC | Ministry of Finance and Economic Cooperation |
| NBE | National Bank of Ethiopia |
| NIB | Nib International Bank |
| NPL/s | Non-Performing Loan/s |
| OLS | Ordinary Least Square |
| REER | Real Effective Exchange Rate |
| RLR | Real Lending Rate |
| ROA | Return on Asset |
| ROE | Return on Equity |
| WB | Wegagen Bank |

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**Abstract**

*Both macroeconomic and bank-specific factors affect the occurrence of Non-Performing Loan; the most suitable proxy for asset quality measurement. This study identifies bank specific and macroeconomic factors that contribute to these nonperforming loans in Ethiopian private commercial banks. Six private commercial banks have been the subject for the study ranging from 2004/2005 to 2012/2013. The bank's financial statement, National Bank of Ethiopia and Ministry of finance and Economic Cooperation has been the main source for the study and the panel analysis has been carried out to obtain the result for this empirical study. The study begins with Hausman test (Random Effect Model versus Fixed Effect Model) to determine the most suitable model to be used in this study. The empirical results showed that GDP growth and annual inflation rate are positively related to non-performing loans, suggesting that private commercial banks should consider the macro economic factors before extending loans. A negative relationship of CAR and ROE with the volume of private commercial banks non-performing loans was also found. Contrary to previous studies, the findings also showed an insignificant relationship among real lending rate and NPLs of Ethiopian private commercial banks.*

*Keywords: Non-performing loans; Macroeconomic determinants; Bank specific determinants*

# Chapter One

# Introduction

## 1.1.Introduction

Financial system stability is one of the key fundamentals upon which economic growth is built. Financial sector in Ethiopia, is dominated by banking enterprises. Therefore, soundness of banking institutions is an essential consideration for financial system. Survival and soundness of the banking enterprise is exposed to different risks such as market risk, liquidity risk, operational risk and credit risk.

The greatest risk of all is credit risk (Dang, 2011). Credit risk is the probability of losses for a bank due to loan debtors unable to fulfill on time or completely their obligations as stated in the agreement with bank (Zurairah, 2010). The asset quality assessment should be done by performing the credit risk management and evaluating the quality of loan portfolio using trend analysis and peer comparison (Dang, 2011). Frost (2004) stresses that Non-performing loan is the most suitable proxy for asset quality measurement. The link between the non-Performing Loans and loss of banks, is a fact in literature of banking. Increase in NPLs is often referred as the result of failure of credit policy. By viewing other side, the global financial crisis's also proved that financial crisis is the effect of high NPLs rate in the banking sector (Dang, 2011). Hence, it is clear why NPLs are most crucial for banks. Not only for banks, are they very important to any country's economy. NPLs hamper economic growth and reduce the economic efficiency.

NPLs can arise from factors specific to the bank or macroeconomic conditions (Emmanuel, 2014). The aim of this study was to analyze the sensitivity of non-performing loans to bank specific and macroeconomic indicators in Ethiopian private commercial banks. In particular, it employed a regression analysis and a dataset covering Nine years (2005 to 2013) to examine the relationship between nonperforming loans rate and key macroeconomic and bank specific variables.

In this first chapter statement of the problem, general and specific objectives of the study, research hypothesis formulation, significance of the study and scope and limitations of

the study are discussed in detail. This study aims to fill the existing empirical research gap by analyzing the relationship between macroeconomic and bank specific variables and non-performing loans. Three macro-economic (gross domestic product, inflation rate and real lending rate) and two bank specific (capital adequacy ratio and return on equity) factors are used in this research. This study will help the banks' management, potential and existing shareholders, other stakeholders, policy makers of the country and those who want to conduct further study in this field.

### 1.2.Statement of the Problem

Commercial bank is an entity that acts as the middle person between two parties, lender and borrower. One of the main functions of commercial banks is accepting deposit and granting loans and advances, that perform their important role of channeling funds from people who have surplus funds to people who have deficit fund. The interest rate spread, which is the difference between the interest rate pay on deposits and the interest rate charged on the loans is the main source of a bank's income. Therefore, loan is one of the major service provided by the bank but it is also the most risky service because of the credit risk, which is directly related to non-performing loans a loan that borrower might not be paid back as they promised. NPLs create an adverse impact on the bank's balance sheet and income statement, overall financial institutions profitability and economic growth of a country. In this regard, to control the adverse impact of increasing non-performing loans in Ethiopian banking sector, the National Bank of Ethiopia has issued a directive which strictly requires all banks to maintain ratio of their non -performing assets below five percent in 2008. Basel standard of NPL ratio is also 5 percent.

Nonperforming loans (NPLs) has been high for long period and has started declining at a higher rate in the recent years. In the years 2001 to 2003, the ratio of NPLs has reached more than 50 percent and then started to decline to the extent of reaching less than 10 percent. However, the industry average of NPLs of private commercial banks over the sample period of 2005 to 2013 is still above the 5% of the Basel standard limit. This can be seen from DB, WB, NIB, CBO and Zemen bank data. The ratio of non-performing loans for CBO stood at 9.5% & 11.5% on 2009 & 2010 respectively, DB stood at 7.4% on 2009, WB stood at 7.7% on 2009, NIB stood at 9.1% & 7.3% on 2009 & 2010

respectively and Zemen Bank S.C stood at 8.8% on 2013 are relatively very high compared with the threshold set by NBE, industry average and Basel standard limit.

Virtually all research on the causes of bank and thrift failures find that failing institutions have large proportions of non-performing loans prior to failure, and those non-performing loans are a statistically significant predictor of insolvency (Berger & DeYoung, 1997). Bank failures come with massive effects and costs not only to Banks but also to the economy of a country at large. This, being the immediate reason of Banking crisis occurrences at various times indicates that assessment of non-performing loans and implementation of controlling mechanisms to avoid their occurrence is a continuous process which should be improved from time to time. However, credit risk management is indeed a very difficult and complex task in the financial industry because of the unpredictable nature of the macroeconomic factors coupled with the various microeconomic variables which are peculiar to the banking industry or specific to a particular bank (Garr, 2013). Therefore, identifying the factors that cause non-performing loans is key to the implementation of mechanisms that facilitate the avoidance of their occurrence. The causes for nonperforming loans vary in different countries. Theoretically there are so many reasons as to why loans fail to perform. Some of these include depressed economic conditions, high real interest rate, inflation, lenient terms of credit, credit orientation, high credit growth and risk appetite, and poor monitoring among others. The causes of nonperforming loans can be categorized in to Bank specific and Macroeconomic factors (Emmanuel, 2014).

Many studies have examined the causes of non-performing loans in several countries around the world; however, little research has gone to the study of the causes of NPLs in Africa (Onsarigo, et al., 2013). Like most Africa countries, in Ethiopia, to the knowledge of the researcher, there has not been much research which is conducted on determinants of loan defaults except the study made by Daniel (2010), Wondimagegnehu (2012), Tilahun and Dugasa (2014) and Habtamu (2015). Though the impact of macro-economic factors on NPLs are exhaustively assessed by different international studies, as to the knowledge of the researcher, all of the above studies made in Ethiopian case, considers only bank specific factors.

Different studies have assessed the bank specific & macro-economic determinants of NPLs in different countries. However, the results of those studies were inconsistent. This inconsistency of results might be attributable to the method of data analysis used by different researchers and difference in the economic condition of the countries in which banking sectors are operating. For instance; the study of Saba, et al. (2012) on the title of "Determinants of Nonperforming Loan on US Banking sector" found negative significant effect of lending rate and positive significant effect of real GDP per capita and inflation rate on NPL via OLS regression model. Similarly, the study of Louzis et al., (2010) examined the determinants of NPLs in the Greek financial sector using dynamic panel data model 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 insignificant effect on NPLs. However, Swamy (2012) examined the determinants of NPLs in the Indian banking sector by using panel data and found that GDP growth rate, inflation, capital adequacy and bank lending rate have insignificant effect on NPLs. Shingjergji (2013) who conducted study on "the impact of bank specific factors on NPLs in Albanian banks system" utilized OLS estimation model and found that ROE have significant & negative effect on NPLs. However, Ahmad and Bashir (2013) conducted a study on the "Bank Specific Determinants of Nonperforming Loans" by static panel data model and found that ROE has insignificant negative association with NPLs. Makri, et al. (2014) identify the factors affecting NPLs of Eurozone's banking systems through difference Generalized Method of the Moments (GMM) estimation. Accordingly, they found that ROA did not show any significant impact on NPL ratio. However, Selma and Jouini (2013) conducted a study on Italy, Greece and Spain for the period of 2004-2008 via panel data model and found a significant negative effect of ROA on NPLs. similarly, Boudriga, et al. (2009) conducted a study on the title "Problem loans in the MENA countries via random-effects panel regression model and found as ROA has significant negative effect on NPLs.

Given the fact that NPLs create an adverse impact on the bank and overall economy and assessment of non-performing loans and implementation of controlling mechanisms to avoid their occurrence is a continuous process, the industry average of private commercial banks NPL deviates from the Basel standard NPL limit, previous studies on

NPLs of Ethiopian banks, to the knowledge of the researcher, did not assess the impact of macroeconomic factors on NPLs and there is no empirical consensus among International studies, this study has assessed the impact of both macro-economic and bank specific factors on non-performing loans in Ethiopian private Commercial Banks.

## 1.3.Objectives of the study

### 1.3.1. General Objective

The study has a general objective of investigating the effect of bank specific and macro-economic factors on the non-performing loans of private commercial banks in Ethiopia.

### 1.3.2. Specific Objectives

The specific objectives of the study are;

1. To examine the impact of gross domestic products (GDP) on private commercial banks non-performing loans.
2. To examine the impact of inflation rate (INF) on private commercial banks non-performing loans.
3. To examine the impact of real lending rate (RLR) on private commercial banks non-performing loans.
4. To examine the impact of capital adequacy ratio (CAR) on private commercial banks non-performing loans.
5. To examine the impact of return on equity (ROE) on private commercial banks non-performing loans.

## 1.4.Research Hypothesis

The purpose of this study is to examine the determinants of nonperforming loans (NPLs) of private commercial banks in Ethiopia. The empirical studies made around the world demonstrate various outcomes on determinants of nonperforming loans of the financial sectors. Reviewed empirical literatures showed that there is no consensus among international researches on the sign of coefficient of estimate of selected bank specific and macroeconomic independent variables. Thus, the researcher has developed the following null hypothesis to estimate the significance of relationship between bank

specific and macroeconomic variables with nonperforming loans of private commercial banks in Ethiopia.

*$H_0$: There is no significant relationship between gross domestic product (GDP) and non-performing loans of private commercial banks in Ethiopia.*

*$H_0$: There is no significant relationship between inflation rate and non-performing loans of private commercial banks in Ethiopia.*

*$H_0$: There is no significant relationship between lending rate and non-performing loans of private commercial banks in Ethiopia.*

*$H_0$: There is no significant relationship between capital adequacy ratio (CAR) and non-performing loans of private commercial banks in Ethiopia.*

*$H_0$: There is no significant relationship between return on equity (ROE) and non-performing loans of private commercial banks in Ethiopia.*

**1.5.Significance of Study**

Lending and borrowing activities are the main purpose of financial institutions and it is the heart of economic cycle. If the lending and borrowing activities deteriorated due to the loan defaults ultimately it will affect all financial activities. By identifying the root causes of NPLs, the finding of this study will enable management of the banks to come out with practical policies aimed at improving the quality of their loan portfolios. It will also help the country policymakers to implement effective monetary policies concerning credits and therefore prevent the occurrence of non-performing loans in the economy. Apart from practical implications for commercial banks mangers and country policy makers, the study will extend the existing literatures by providing evidence on the determinants of NPLs in Ethiopian private commercial banking context by utilizing both macroeconomic and bank specific variables. Moreover, the study will play a significant role as a literature base on future researches of verifying the current findings, other aspects of NPLs of Ethiopian banks and other related topics in the banking sector.

### 1.6. Scope and limitation of the Study

The study principally focuses on non-performing loans and particularly on the bank specific and macro-economic factors affecting non-performing loans. The researcher relied mostly on secondary sources of information not dating older than fifteen years to satisfy the qualitative aspects of the study such as the literature review. For the quantitative analysis, the researcher collected data on Capital adequacy ratio, Return on Asset and Real Lending Rate from commercial bank's annual report, NPL data from National Bank of Ethiopia and data on Gross domestic product and Inflation rate from Ministry of Finance and Economic Cooperation.

In this study the researcher will only consider nine fiscal years i.e. from 2004/2005 to 2012/2013 for the NPL analysis of the following six selected private commercial banks; Awash International bank, Dashen Bank, Bank of Abyssinia, Wegagen bank, United bank and Nib International bank. The reason that the study did not include very recent data of 2014 & 2015 is that information for all private commercial banks was not available. Thus, this paper will show the trend of commercial banks but not become whole mirror for a wide period. In addition, since it is not possible to incorporate all factors that affect NPLs in one study, only three macro-economic and two bank specific factors are included in this study.

### 1.7.Organization of the paper

The paper has contained five chapters. The first chapter presented background of the study, statement of the problem, objectives, hypotheses, significance, and scope and limitations of the study. Discussion in chapter two focuses on literature review of important concepts that are relevant to the study. The third chapter deals with the methodologies, which include data source, sampling frame and sampling size, data collection instrument, data analysis method and research variables in the study. The fourth chapter discusses the empirical findings of the study. Based on the finding of the study, the Fifth chapter presents conclusion and recommendation of the study.

# Chapter Two

## Review of Related Literatures

### 2.1.Introduction

In the previous chapter, the main problems and objectives to be addressed in this study have been stated. This chapter deals with the related literatures of the study. The chapter discusses the evolution of the banking sub sector in Ethiopia, overview of non-Performing Loans (NPLs), non-performing loans classification and provisioning in Ethiopia and the macroeconomic and bank specific determinants of Non-Performing Loans.

### 2.2.Evolution of the Banking Sub Sector in Ethiopia

The National Bank of Ethiopia indicates that modern Banking in Ethiopia dates back to the year 1905 when the Bank of Abyssinia was established (NBE, 2010). Bank of Abyssinia was formed under a fifty year franchise agreement made with the National Bank of Egypt, which was owned by the British by then. To widen its reach in the country the Bank had expanded its branches to Dire Dawa, Gore and Dessie. It also had an agency and a transit office in Gambella and at the port of Djibouti respectively. After its formal liquidation on August 29, 1931 the Bank of Abyssinia was replaced by the Bank of Ethiopia. According to NBE (2010) Bank of Ethiopia, which was also known as Banque National Ethiopienne, was a national Bank and one of the first indigenous banks in Africa. The Bank of Ethiopia operated until 1935 and ceased to function because of the Italian invasion. During the five years of the Italian occupation (1936-41), many branches of the Italian Banks such as Banco d'italia, Banco de-Roma, Banco Di-Napoli and Banco Nazianali del lavoro were operational in the main towns of Ethiopia. After evacuation of Italians, the State Bank of Ethiopia was established on November 30, 1943 with a capital of one million Maria Theresa dollars. Pursuant to the Monetary and Banking Law of 1963 the State Bank of Ethiopia that had served as both a central and a commercial bank was dissolved and split into the National Bank of Ethiopia and Commercial Bank of Ethiopia Share Company. Accordingly, the central banking functions and the commercial banking activities were transferred to the National Bank of Ethiopia and the Commercial Bank of Ethiopia Share Company respectively.

Further, as per NBE (2010), due to change of government in 1974, and the command economic system which had prevailed in the country, the Commercial Bank of Ethiopia S.C. and other banks and financial institutions were nationalized on January 1st, 1975. The nationalized banks were re-organized and one commercial bank, the Commercial Bank of Ethiopia; two specialized banks- the Agricultural and Industrial Bank (AIB), renamed as the Development Bank of Ethiopia (DBE) and a Housing and Savings Bank (HSB) currently named as the Construction and Business Bank (CBB); and one insurance company, the Ethiopian Insurance Corporation (EIC) were formed. During the era of state socialism (1974-1991), Ethiopia's financial institutions were charged with executing the national economic plan; state enterprises received bank finance in accordance with the plan's priorities. This system based on the template of the Soviet Union, saw little need to develop the tools and techniques of financial systems (NBE, 2008). Following the change of Government in 1991 and the change of economic policy directions, financial institutions were re-organized to operate towards a market oriented policy framework. Proclamation No. 83/1994 which had allowed the establishment of private banks has marked the beginning of new era in the Ethiopian banking sector development. Commercial Banks both public and private are currently operational in line with Banking Proclamation No. 592/2008.

Following the enactment of the banking legislations in the country in the 1990s, a fairly good number of private banks have been established. For example, now, in the 2014/15 fiscal year the total number of banks already operational in the country is nineteen. Of these banks, sixteen are private and the other three are government owned. During 2010/11 there were a total of 829 commercial bank branches in the country (NBE, 2011). One branch of a bank on the average is estimated to serve 95,124 people in Ethiopia as at December 2010 (NBE, 2011). There still is also a sign of interest in establishing other new banks by different individuals and groups.

### 2.3.Theoretical review of Non-performing loans

In this section the definition of NPL, classification of NPLs, and impact of NPLs on the operation of commercial banks are discussed.

### 2.3.1. Definition of Non-Performing Loans (NPLs)

Loans and advances constitute the primary source of income by banks. As any business establishment a bank also seeks to maximize its profit. Since loans and advances are more profitable than any other assets, a bank is willing to lend as much of its funds as possible (Wondimagegnehu, 2012). However the bank should consider the credit risk that arises because the possibility that the expected cash flows from advances and securities held, might not be paid in full. Credit risk is dependent on the quality of assets, and is reflected through the volume of NPLs (Ekanayake & Azez, 2015). Different authors has defined the concept of non-performing loans in different available literatures. In general, loans that are outstanding in both interest and principal for a period of time contrary to terms and conditions spelt out in the loan agreement are considered as non-performing loans.

Under 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 (NBE, 2008). It further states that loans or advances with pre-established repayment programs are non-performing when principal and/or interest is due and uncollected for Ninety consecutive days or more beyond the scheduled payment date or maturity (NBE, 2008). Moreover, NBE directive no SBB/43/2008 classified non-performing loans into four categories; special mention, substandard, doubtful and Loss.

### 2.3.2. Non-performing Loans Classification

National bank of Ethiopia require all licensed banks to monitor and review their portfolio of credit and non-performing loan. Non-performing loans are classified into four grades of risk: (i) special mention; (ii) sub-standard; (iii) doubtful; and (iv) loss.

#### 2.3.2.1. Special mention

NBE directive no SBB/43/2008 classified the following non-performing loans and advance as special mention;

a) Loans or advance with pre-established repayment programs past due 30(thirty) days or more, but less than 90(ninety) days;
b) Overdrafts and loans or advances that do not have a pre-established repayment program, If:

I. The debt remains outstanding for 30 (thirty) consecutive days or more beyond the scheduled payment date or maturity, but less than 90 (ninety) days; or

II. The debt exceeds the borrower's approved limit for 30 (thirty) consecutive days or more, but less than 90 (ninety) days; or

III. Interest is due and uncollected for 30 (thirty) consecutive days or more; but less than 90 (ninety) days; or

IV. For overdrafts, the account has been inactive for 30 (thirty) consecutive days or more, but less than 90 (ninety) days or the account fails to show the One to four percent of the approved limit debit balance at least once over 360 days preceding the date of loan review.

**2.3.2.2. Substandard**

NBE directive no SBB/43/2008 classified the following non-performing loans and advance as substandard.

a) Loans or advances with pre-established repayment programs past due 90 (ninety) days or more, but less than 180 (one-hundred-eighty) days:

b) Overdrafts and loans or advances that do not have a pre-established repayment, if:

I. The debt remains outstanding for 90 (ninety) consecutive days or more beyond the scheduled payment date or maturity, but less than 180 (one hundred eighty) days; or

II. The debt exceeds the borrower's approved limit for 90 (ninety) consecutive days or more, but less than 180 (one hundred eighty) days; or

III. Interest is due and uncollected for 90 (ninety) days or more, but less than 180 (one hundred eighty) days; or

IV. For overdrafts, the account has been inactive for 90 (ninety) consecutive days or more, but less than 180 (one hundred eighty) days; or the account fails to show Five to nineteen percent of the approved limit debit balance at least once over 360 days preceding the date of loan review.

In addition to the above NBE directive no SBB/43/2008 categorized the following non-

performing loans and advances as substandard:

1) Renegotiated term loans unless equivalent of all past due interest is paid by the borrower in cash at the time of renegotiation and the following payments are made by the borrower on a consistent and timely basis in accordance with the restructured terms of the loan or advance:
    a. In the case of term loans with monthly or quarterly installment repayments, at least 3 (three) consecutive repayments;
    b. In the case of loans with semi-annual installment repayments, at least 2 (two) consecutive repayments;
    c. In the case of loans with annual installment repayments, at least one repayment;
2) Renegotiated non-performing overdraft facilities unless equivalent of all past due interest is paid by the borrower in cash at the time of renegotiation and the account shows at a minimum a nil balance at least once or a turnover rate of once the approved limit.
3) Renegotiated non-performing merchandize loans unless physical inventory of the merchandize taken by the bank at the time of renegotiation shows that the outstanding principal loan and interest thereof are fully covered and the safety margin determined following the inventory is at least not lower than the margin stated in the loan contract entered into by the bank and the borrower at the time of initial extension of the loan.

**2.3.2.3. Doubtful**

NBE directive no SBB/43/2008 classified the following non-performing loans and advance as doubtful:

a) Loans or advances with pre-established repayment programs: past due 180 (one hundred eighty) days or more, but less than 360 (three hundred sixty) days;
b) Overdrafts and loans or advances that do not have a pre-established repayment program, if:
    I. The debt remains outstanding for 180 (one hundred eighty) consecutive days or more beyond the scheduled payment date or maturity, but less than 360 (three hundred sixty) days; or

II. The debt exceeds the borrower's approved limit for 180 (one hundred eighty) consecutive days or more, but less than 360 (three hundred sixty) days; or

III. Interest is due and uncollected for 180 (one hundred eighty) consecutive days or more, but less than 360 (three hundred sixty) days; or

IV. For overdrafts, the account has been inactive for 180 (one hundred eighty) consecutive days or more, but less than 360 (three hundred sixty) days: or the account fails to show Twenty to forty nine percent of the approved limit at least once over 360 days preceding the date of loan review

**2.3.2.4. Loss**

NBE directive no SBB/43/2008 classified the following non-performing loans and advance as Loss:

a) Non-performing loans or advances with pre-established repayment programs past due to 360 (three hundred sixty) days or more;

b) Over drafts and loans or advances that do not have a pre-established repayment program, if:

I. The debt remains outstanding for 360 (three hundred sixty) consecutive days or more beyond the scheduled payment date or maturity; or

II. The debt exceeds the borrower's approved limit for 360 (three hundred sixty) days or more; or

III. Interest due and uncollected for 360 (three hundred sixty) days or more; or

IV. For overdrafts, the account has been inactive for 360 (three hundred sixty) consecutive days or more, or the account fails to show Fifty percent and above of the approved limit at least once over 360 days preceding the date of loan review.

**2.3.3. Non-performing Loans Provisioning**

National bank of Ethiopia directive requires all banks to maintain a provisions for Loan Losses account which shall be created by charges to provision expense in the income statement and shall be maintained at a level adequate to absorb potential losses in the loans or advances portfolio. In determining the adequacy of the provisions for Loan Losses Account, provisions may be attributed to individual loans or advances or groups

of loans or advances. The provisions for Loan Losses Account always have a credit balance. Additions to or reductions of the provisions for Loan Losses Account should be made only through charges to provisions in the income statement at least every calendar quarter.

Banks are required to maintain the following minimum provision percentages against the total outstanding principal balance of each loan or advance classified in accordance with the criteria for the classification of loans or advances.

Table 1 : Non-performing Loans Provisioning Percentage

| **Classification Category** | **Minimum Provision (percentages against the total outstanding principal balance)** |
|---|---|
| Pass | 1% |
| Special Mention | 3% |
| Substandard | 20% |
| Doubtful | 50% |
| Loss | 100% |

Source: NBE Directive no SBB/43/2008

### 2.3.3. The impact of NPL on the Operation of Commercial Banks

Non-performing loan is part of being in the banking business. The trick is how to keep it in control and predictable. A higher than expected NPL rate have serious consequences, affecting the banks, the customers, and the economy.

Onchomba (2014) outlined the below three major impacts of NPL on operation of commercial banks;

- **NPL reduces profitability**

The interest income generated from loans contribute considerably to the profitability performance of the commercial banks. However, when loans become default, it has a serious negative effect on the health and operations of the commercial banks. One of the reasons is that, in line with National bank of Ethiopia regulations, the lending institution has to make provision and charges for credit losses (bad debt/impairment) 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. This is because the loanable funds tend to deplete when repayment of loans delays or fail to come. Even if NPL might be eventually paid off by selling collaterals, this incurs a huge loss for the bank because of the time value of money and handling of NPL.

- **NPL hurts the bank's reputation**

Reputation is everything in the banking business. A lowered reputation will steer away big customers and forces them to look for other banks. This will surely result in lower deposit and consequently, lower lending.

- **NPL can cause insolvency**

Banks kept only some money deposits as a reserve; the rest is lent out. If the lowered reputation due to NPLs results in withdrawal of deposits of big customers, the bank will effectively be insolvent.

### 2.3.4. Bank specific hypothesis

In their paper, Berger and DeYoung (1997) investigate the existence of causality among loan quality, cost efficiency and bank capital using a sample of U.S commercial banks for the period 1985-1994. They codify and test four hypotheses concerning the flow of causality between these three variables; loan quality, cost efficiency and bank capital. Berger and DeYoung (1997) presented these four hypotheses as explained below;

#### i. Bad luck Hypothesis

External events precipitate an increase in problem loans for the bank. After the loans become past due or non-accruing, the bank begins to expend additional managerial effort and expense dealing with these problem loans. These extra operating costs include, but are not limited to

a. the additional monitoring of the delinquent borrowers and the value of their collateral,
b. the expense of analyzing and negotiating possible workout arrangements,
c. the costs of seizing, maintaining, and eventually disposing of collateral if default later occurs,

d. the additional costs of defending the bank's safety and soundness record to bank supervisors and market participants,
e. any additional precautions taken to preserve the high quality of loans that are currently performing, which becomes more crucial for a bank in a perilous financial situation, and
f. the diversion of senior management attention away from solving other operations problems. Most of these costs, especially the costs associated with loan workout and default, are incurred well after the increase in problem loans.

Thus, under the bad luck hypothesis, we expect increases in nonperforming loans to cause decreases in measured cost efficiency. Importantly, under the bad luck hypothesis, the extra expenses associated with problem loans create the appearance, but not necessarily the reality, of lower cost efficiency. Faced with an exogenous increase in nonperforming loans, even the most cost efficient banks have to purchase the additional inputs necessary to administer these problem credits.

**ii. Bad management hypothesis**

Low measured cost efficiency is a signal of poor senior management practices, which apply to both day-to-day operations and to managing the loan portfolio. Subpar managers do not sufficiently monitor and control their operating expenses, which is reflected in low measured cost efficiency almost immediately. Managers in these banks also do not practice adequate loan underwriting, monitoring, and control. As 'bad' managers, they may;

a. have poor skills in credit scoring and therefore choose a relatively high proportion of loans with low or negative net present values,
b. be less than fully competent in appraising the value of collateral pledged against the loans, and
c. have difficulty monitoring and controlling the borrowers after loans are issued to assure that covenants are obeyed. In contrast to the almost immediate reduction in measured cost efficiency, poor underwriting and monitoring practices lead to high numbers

of nonperforming loans only after some time passes, the loan portfolio becomes seasoned, and delinquencies begin to mount.

Thus, under the bad management hypothesis, low cost efficiency is expected to occur before or cause higher nonperforming loans. Note that this hypothesis has the opposite temporal ordering from that predicted by the bad luck hypothesis, but both hypotheses predict that nonperforming loans will be negatively associated with cost efficiency.

**iii. Skimping hypothesis**

The amount of resources allocated to underwriting and monitoring loans affects both loan quality and measured cost efficiency. Here, the critical decision of the bank lies in the tradeoff between short-term operating costs and future loan performance problems. A bank maximizing long-run profits may rationally choose to have lower costs in the short run by skimping on the resources devoted to underwriting and monitoring loans, but bear the consequences of greater loan performance problems and the possible costs of dealing with these problems in the future. The reduced effort devoted to screening loan customers, appraising collateral, and monitoring and controlling borrowers after loans are issued makes the bank appear to be cost efficient in the short run because fewer operating expenses can support the same quantity of loans and other outputs. The stock of nonperforming loans remains unaffected in the short run, but as time passes, a higher proportion of borrowers become delinquent on their loans and the inattention to the loan portfolio becomes apparent. Thus, under the skimping hypothesis, the causality between measured cost efficiency and nonperforming loans has the same temporal ordering as the bad management hypothesis, but has the opposite sign. Skimping implies a positive causation from measured efficiency to problem loans.

**iv. Moral hazard hypothesis**

Moral hazard is the classical problem of excessive risk-taking when another party is bearing part of the risk and cannot easily charge for or prevent that risk-taking. Under this hypothesis, banks with relatively low capital respond to moral hazard incentives by increasing the riskiness of its loan portfolio, which results in higher nonperforming loans on average in the future. Thus, under the moral hazard hypothesis, we expect that low financial capital will cause high nonperforming loans. Because banks with ample capital likely do not face significant moral hazard incentives, we test the moral hazard

hypothesis only for a subsample of banks with equity-to-asset ratios below the sample median. Although the moral hazard hypothesis does not describe the relationship between measured cost efficiency and problem loans, we include it for several reasons. First, moral hazard gives an alternative explanation for nonperforming loans, so the effects of measured cost efficiency on nonperforming loans could be biased if the potential effects of capital were neglected. Second, moral hazard effects can magnify the effects of the other three hypotheses, and any of those hypotheses could be the primary cause of reduced capital and moral hazard incentives. Finally, as a leading theory of problem loans and bank failures, the moral hazard hypothesis has different policy implications than the other hypotheses.

Berger and DeYoung (1997) further stated that these four hypotheses are not mutually exclusive. In an extreme case, all four hypotheses could affect the same bank at the same time. For example, bad luck could befall a poorly managed bank that also happens to be skimping on loan monitoring expenses. Any loss of capital as a result of the bad luck, bad management, and skimping might cause the bank to respond to moral hazard incentives and take increased risks. Similarly, banks responding to moral hazard incentives may take increased risks by skimping.

### 2.3.5. Theories of Non-performing Loans

Muriithi (2013) discussed the below four theories of NPL in detail as follow.

#### 2.3.5.1.Asymmetry Theory

The theory of asymmetric information tells us that it may be difficult to distinguish well from bad borrowers, which may result into adverse selection and moral hazards problems. The theory explains that in the market, the party that possesses more information on a specific item to be transacted is in a position to negotiate optimal term for the transaction than the other party. The party that knows less about the same specific item to be transacted is therefore in a position of making either right or wrong decision concerning the transaction. Adverse selection and moral hazards have led to significant accumulation of Nonperforming loan in banks (Berger and DeYoung, 1997).

#### 2.3.5.2.Agency Theory

According to the Agency theory, the principal agency problem can be reduced by better monitoring such as establishing more appropriate incentives for managers. In the field of corporate risk management agency issue have been shown to influence managerial attitudes towards risk taking and hedging. This Theory also explains a possible mismatch of interest between shareholder management and debtholders due to asymmetries in earning distribution, which can result in the firm taking too much risk or not engaging in positive net value project. Consequently, agency theory implies that defined hedging policies can have important influence on firm value.

#### 2.3.5.3.Transaction Cost Theory

Transaction cost theory is based on convexities in transaction technologies. Here, the financial intermediaries act as coalitions of individual lenders or scale or scope in the transaction technology. Transaction cost theory has proven an essential framework for decision on the vertical boundaries of the firm. Transaction costs are the cost associated to the division of work. Transaction occurs when a good or service is transferred. Variables that describe a transaction are among others, the specificity, the uncertainty, and the frequency of the transaction, whether an asset or a service is only or much more valuable in the context of a specific transaction.

#### 2.3.5.4.Stakeholder theory

Stakeholders' theory, developed originally by Freeman in 1984 as a managerial instrument, has since evolved into a theory of the firm with high explanatory potential. Stakeholder theory focuses explicitly on equilibrium of stakeholder's interests as the main determinant of corporate policy. The most promising contribution to risk management is the extension of implicit contracts theory form employment to other contracts, including sales and financing. To certain industries, particularly high-tech and services, consumer trust in the company being able to continue offering its services in the future can substantially contribute to company value. However, the value of these implicit claims is highly sensitive to expected costs of financial distress and bankruptcy. Since corporate risk management practices lead to a decrease in these expected costs,

company value rises. Therefore stakeholder theory provides a new insight into possible rationale for risk management. However, it has not yet been tested directly.

### 2.4.Empirical review of non-performing loans

In this section prior empirical literatures including definition of variables and their relationship of explanatory variables with the dependent variable are presented.

#### 2.4.1. The Determinants of Non-Performing Loans

The literature on the determinants of non-performing loans identifies two sets of factors to explain NPLs. The two concerns of the credit risk or the non-performing loans are (1) macroeconomic factors and (2) bank specific factors (Zurairah, 2010). The first group i.e. macroeconomic factors focuses on external events which are likely to affect the borrowers capacity to repay their loans, while the second group, which looks more at the variability of NPLs across banks, attributes the level of non-performing loans to bank-level factors. Empirical evidence, however, finds support for both sets of factors.

Skarica (2013) conducted a study on the determinants of NPLs in Central and Eastern European countries. In the study, Fixed Effect Model and seven Central and Eastern European countries for 2007-2012 periods was used. The study utilized loan growth, real GDP growth rate, market interest rate, Unemployment and inflation rate as determinants of NPLs. The finding reveals as GDP growth rate and unemployment rate has statistically significant negative association with NPLs with 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 strong impact on the financial stability. The finding also reveals as inflation has positive impact with justification as inflation might affect borrowers' debt servicing capacities.

Makri et al. (2014) identify the factors affecting NPLs of Euro zone's banking systems for 2000- 2008 periods before the beginning 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 (FISCAL), public debt, unemployment, loans to deposits ratio, return on assets, and return on equity and capital adequacy ratio. The study utilized difference Generalized method of the Moments

(GMM) estimation and found as real GDP growth rate, ROA and ROE had negative whereas lending, unemployment and inflation rate had positive significant effect on NPLs. However, ROA & loan to deposit ratio, inflation, and budget deficit did not show any significant impact on NPL ratio. Similarly, Carlos (2012) on macroeconomic determinants of the Non-Performing Loans in Spain and Italy found as inflation rate has insignificant effect on NPLs.

Selma 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 variables (GDP growth rate, unemployment rate and real interest rate) and bank specific variables (return on assets, loan growth and the loan loss reserves to total loans). They apply Fixed Effect model and found a significant negative relationship of ROA & GDP growth rate, and also positive relationships of unemployment rate, the loan loss reserves to total loans and the real interest rate with NPLs. For a significant positive association between NPLs and real interest rate, they justify that when a rise in real interest rates can immediately leads to an increase in non-performing loans especially for loans with floating rate since it decrease the ability of borrowers to meet their debt obligations. In addition, a significant negative relationship between ROA and the amount of NPLs justify that a bank with strong profitability has less incentive to generate income and less forced to engage in risky activities such as granting risky loans.

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 each 16 countries. The study includes loan growth rate, inflation, unemployment rate and GDP growth rate as explanatory variables of the study. The study was used fixed effect/ dynamic model and found as inflation has positive whereas loan growth rate, GDP growth rate have negative significant effect on the occurrences of NPLs. However, the study found as unemployment rate has no significant effect on NPLs.

Ahmed and Bashir (2013) conducted a study on the "Macroeconomic Determinants of Nonperforming Loan of Banking Sectors in Pakistan": The study was conducted on 30 commercial banks from total of 34 banks in 1990-2011periods. The main aim of the

study was to investigate impact of inflation, credit growth, GDP growth rate, Unemployment rate, consumer price index and lending/interest rate, on nonperforming loan. They found negative effect of lending rate and GDP growth rate on NPLs. Their justification for negative association between lending rate and NPLs implies that as lending rate increase, individuals with funds starts saving with the banks to earn on their funds but investors with the profitable projects feel reluctant to borrow and invest. Besides, existing borrowers pay back their loans to keep their credit rating good as to get loans in the future at discount rates. Similarly, on their study of banks specific factor of NPLs of banking sectors in Pakistan from 2006-2011 in 2013, they found positive significant effect of ROA but insignificant effect of ROE on NPLs. Their justification for positive significant association between ROA and NPLs implies that in order to increase the short term earnings, banks management portray wrong picture to the investors relating the future profitability and positive return prospects. Consequently, investors start borrowing from the banks and invest in the less profitable projects. This results in the current good performance and profitability of the banks but because of the wrong forecasting, returns on the investments are not according to the investors' expectation, resulting in the inability of the investors in repayment of loans thus leading to the growth in 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 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 positive significant effect whereas interest rate and GDP per capital has negative significant association with NPLs.

Louzis et al. (2010) conduct study to examine the determinants of NPLs in the Greek financial sector using fixed effect model from 2003-2009 periods. The variables included were ROA, ROE, solvency ratio, loan to deposit ratio, inefficiency, credit growth, lending rate and size, GDP growth rate, unemployment rate and lending rates. The finding reveals that loan to deposit ratio, solvency ratio and credit growth has no significant effect on NPLs. However, ROA and ROE has negative significant effect

whereas inflation and lending rate has positive significant effect on NPLs. It justifies that performance and inefficiency measures may serve as proxies of management quality.

Shingjergji (2013) conducted study on the "impact of bank specific factors on NPLs in Albanian banking system". In the study, capital adequacy ratio, loan to asset ratio, net interest margin, and return on equity were considered as a determinant factors of NPLs. The study utilized simple regression model for the panel data from 2002 to 2012 period and found as capital adequacy ratio has negative but insignificant whereas ROE and loan to asset ratio has negative significant effect on NPLs. Besides, total loan and net interest margin has positive significant relation with NPLs. The study justifies that an increase of the CAR will cause a reduction of the NPLs ratio. Besides, an increase of ROE will determine a reduction of NPLs ratio.

Besides, Swamy (2012) conduct study to examine the macroeconomic and indigenous determinants of NPLs in the Indian banking sector using panel data 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, ratio of priority sector`s loan to total loan and ROA. The study found that real GDP growth rate, inflation, capital adequacy, bank lending rate and saving growth rate had insignificant effect; whereas loan to deposit ratio and ROA has strong positive effect but bank size has strong negative effect on the level of NPLs.

Detailed review of literature on the five dependent variables used in this study is discussed below.

#### 2.4.1.1. Macroeconomic factors

Banks has a major role in economic activity of every country through provision of different financial services. In addition to banks influence on economic activities, macroeconomic factors also affect activities of commercial banks in a given country. Macroeconomic variables, which were found to affect non-performing loans in literatures include the GDP, exchange rate, interest rate, and inflation and others. The following macroeconomic factors are reviewed from different banking area studies. The choice of GDP, unemployment, interest rate and other macroeconomic factors as determinants of NPLs is justified by the theoretical literature of life cycle consumption models.

(Lawrence, 1995) (As cited in Louize et al, 2012), examines such a model and explained that borrowers with low incomes have higher rates of default. This is explained by their increased risk of facing unemployment and being unable to pay. Two macro- economic variables used in this study are discussed below in detail.

**a. Gross Domestic Product**

Most of the studies under review use Gross domestic product as the main macroeconomic indicator of non-performing loans. According to Jakubik (2007) gross domestic product (GDP) is a measurement of the cyclical position of the economy. The association between the real GDP and non-performing loans is still a subject of debate considering that there are findings, which have found that there is a positive, negative and no relationship, though most of the studies favor towards the negative relationship. Several empirical studies have found a negative association between NPL and real GDP growth (Fofack, 2005).

Jung, et al. (2012) found out that the GDP is statistically significant and negatively related to NPL. The non-performing loan will decrease when there is an upturn in economic growth for all the three types of loan (real-estate, commercial and industrial, and consumer) included in his study in both Pre-financial Crisis Period and during financial Crisis Period of United States of America. This result points to the conclusion that a strong economic cycle influences the business' ability to repay its loans. During economic gain period, the ability to repay a loan increases but when it comes to the recession, their ability to repay the loan will tends to be lower compared to the period of economic expansion. This shows that the ability of repayment of loan depend on the phase of the economic cycle. Hence, when there is a slowdown in economic growth or lower GDP growth, non-performing loan will increase.

Moreover, Delia, et al. (ND) in their paper macroeconomic determinants of non-performing loans in emerging markets: evidence from Central and Eastern Europe, states that there is an inversely proportional relationship between GDP growth rate and NPLs i.e. when GDP growth decreases, bank credit risk will increase. Like United States of America, The result of the study in Central and Eastern Europe shows that a decrease in

the growth rate of GDP will lead to an increase in the banking credit risk and during economic crisis the level of NPLs increases substantially.

Furthermore, Onchomba (2014) show that GDP growth variable is significant and negatively related to the Nonperforming loans in Kenyan mortgage firms. Their study revealed that increase on GDP growth rates would lead to decrease in level of Nonperforming loans experience by the mortgage firms. The study revealed that there exists a significant negative relationship between Growth of GDP and non-Performing Loan in mortgage firms.

Zribi and Boujelbène (2011) also indicate that gross domestic product will affect the bank credit risk. The overall effect of GDP growth should consider as the macroeconomic variable in order to determine the bank credit risk. They provide an analysis for Tunisia which determines a panel model which examine the ten commercial banks that cover the period from year 1995 to year 2008. They found that there is a negative relationship between GDP growth and bank credit risk.

As per the above studies, the GDP growth rate whether it is high or low is relatively a factor for the ability of loan repayment on the phases of economy. The above researchers support that, during the economic growth in the country, the higher level of GDP growth causes a higher level of income. Due to that, it will improve the ability of the borrower to pay their debts which will contribute to lower down the non-performing loan and bad debts in the bank. They also said, when there is economy downturn, the level of non-performing loan increases. Borrower tends to have less flow of income when the economy downturn, therefore their ability of repaying the loan will be lower which caused the non-performing loan increased. Their results show that GDP growth is negatively related to the NPL.

On the other hand, some researcher found out that there is a positive relationship between GDP and bank credit risk. The study of Aver (2008) on Slovenian banks credit risk found that there is positive relationship between GDP and bank credit risk for the reason that banks are well prepared during unfavorable economy and market situation. Poudel's (2013) study on the macroeconomic determinants of bank credit risk in the Nepalese

banking sector supports the above argument. His finding shows that when GDP growth is low, bank tends to be more careful on selecting the loan borrower and qualifying them based on their creditworthiness and credit condition. Therefore, the volume of credit during low economic growth tends to be reduced. Besides, bank will also strict in categorized their client and debtor during the economy downturn so that the bank can control the amount of non-performing loan which can contribute to bank credit risk. The association between the real GDP and non-performing loans is still a subject of debate considering that the above contradictory findings.

**b. Inflation rate**

Economists define Inflation as an increase in general price level of goods and in an economy up to a certain extent when a unit of currency buys fewer goods and services. It is an increase in the amount of money in circulation. There is an empirical evidence for both significant (positive & negative) and insignificant relationship between the inflation in the economy and non-performing loans. Fofack (2005), in his study of identifying variables that led to increases in NPLs in sub-saharan Africa regional countries found inflation as a significant determinants of NPLs in some countries and not significant determinants of NPLs in other countries. Higher inflation rates lead to unpredictability of business profits. This is linked to an increase in the cost of goods and services that form the price index which positively influences peoples' willingness to take risks and there likeliness to default on loan repayment (Beck, et al., 2013). Moreover increased inflation can also weaken the loan payment capacity of the borrowers by reducing the real income. (Hess, et al. 2008) has also found a positive relationship between inflation growth rate and non-performing loans of 32 Australia banks for a period that goes from 1980 – 2005. In contrast to the above studies, the study conducted by Skarica (2013) on the determinants of NPLs in Central and Eastern European countries found as inflation had negative and significant impact on NPLs.

On the other hand, Melecky, et al., (2013) in their study of the responses of non-performing loans to macroeconomic fundamentals at the aggregate and sectoral level found that inflation is not statistically significant macroeconomic determinant for non-performing loan at the aggregate economy level. In addition to the above, using regression analysis Kabra (2010) reported that inflation rate was not found to be a useful

factor causing NPLs in India. Moreover, in their analysis of Malaysian NPLs, Asari, et al., (2011) reported that Inflation rate did not influence NPLs in both short run and long run.

So according to different literatures the relationship between inflation and non-performing loans can be positive or negative depending on the economy of operations.

#### 2.4.1.2. Bank specific factors

The existence of non-performing loans for some borrowers under the same macro environment shows that macroeconomic factors, which are viewed as exogenous forces influencing the banking industry are not the exclusive determinants of NPLs. On contrary, the distinctive features of the banking sector and the policy choices of each particular bank with respect to their efforts for maximum efficiency and improvements in their risk management are expected to exert a decisive influence on the evolution of NPLs. (Onchomba, 2014). Three bank- specific variables used in this study are discussed below in detail.

##### a. Capital Adequacy Ratio

The difference between total assets and total liabilities is called capital. It is the amount of own fund available to support the bank's business and act as a buffer in case of adverse situation. It shows ability of the firm that liability could be privileged. Capital adequacy is the level of capital required by the banks to enable them withstand the risks such as credit, market and operational risks they are exposed to in order to absorb the potential loses and protect the bank's debtors. Capital adequacy is a measure of the overall financial strength of a bank. It is vital for maintaining soundness of the banking system since it acts as a cushion against panic or bank run or uncertainties (Keovongvichith, 2012). Capital adequacy is a measure of the overall financial strength of a bank. The adequacy of capital is judged on the basis of the ratio of total capital equity to total assets (capital/asset).

It is widely accepted in literature that low capital adequacy ratio is associated with higher probability of loans default, because it induces the bank managers to involve in more risky projects. The confirmation of this statement was found in (Berger and DeYoung, 1997) USA banks analysis result of thinly capitalized banks take increased portfolio risk,

which results in higher levels of problem loans in the future, which supports moral hazard theory developed by them. However, Louzis *et al.* (2010) in his study examined the determinants of NPLs in the Greek financial sector using dynamic panel data model and found as capital adequacy ratio had insignificant effect on NPLs.

Ahmad and Ariff (2007) in their multi-country study of bank credit risk determinants reported that in Japan, Malaysia, and Mexico, capital is significantly positively related to credit risk. They attribute the reason for their finding to the requirement from banks to increase their capital as a cushion to absorb potential losses that might arise from an increase in credit risk. On the other hand, the researchers report a significant negative relationship between bank credit risk and capital in Australia and India. This result shows that relationship between capital and bank credit risk is controversial and not uniform in each country.

**b. Return on Equity (ROE)**

Return on equity is defined as the ratio of net profit after tax to total equity. A number of authors consider return on equity as a measure of cost efficiency in explaining the causality from cost efficiency and/or bank performance to non-performing loans (Klien, 2013) and (Louize et al, 2010). Different hypothesizes shows cost efficiency and bank performance can be either positively or negatively correlated with NPLs. (Berger & DeYoung, 1997) stated that cost efficiency is positively or negatively associated with increases in future NPLs under bad management and skimping hypothesis respectively. For the negative relationship aspects, if bank is inefficient the amount of credit risk measured by increase in nonperforming loan will increase because they might have problem in monitoring the internal cost of bank. If there have some unexpected event happened and out of bank's control, bank need to spend extra money to solve the problem, it will create low cost efficiency. If the bank decide not to spend enough resources to ensure high loan quality, the bank will become efficient. However the nonperforming loan might become higher. So, the relationship between bank efficiency and credit risk can be either positive or negative. (Louize et al, 2012) hypothesizes that Banks' performance is negatively or positively related with future NPLs under bad management II and Procyclical credit policy hypothesis respectively.

Different authors has found a positive and negative relationship between return on assets (as a measurement of performance and cost efficiency) and NPLs. Godlewski (2004) found that the impact of banks' profitability as measured by return on asset is negative on the level of NPL ratio. Messai, et.al. (2013) also found a significant and negative relationship between the return on assets (ROA) and the amount of NPLs. This negative result supports the fact that a bank with strong profitability has less incentive to generate income and therefore less constrained to engage in risky activities such as granting risky loans. Instead, inefficient banks are obliged to grant credits considered risky and subsequently achieve high levels of impaired loans.

On contrary, Garciya-Marco and Robles-Fernandez (2008), using a panel of 129 banks applied in Spain for the period 1993-2000, indicate that high levels of profitability are followed by a greater future risk. They argue that the policy of profit maximization is accompanied by high levels of risk. The creation of higher-risk and lower quality loans to improve reported short term financial performance, might lead the bank to lose long term profitability. Then, the return on equity will be positively correlated to NPLs.

### 2.5. Empirical Studies on the determinants of non-performing loans in Ethiopian Banks

In the context of Ethiopia, there are few studies that examine factors affecting NPLs of commercial banks. To the knowledge of the researcher there are four studies conducted on determinants of loan defaults. These studies are the work of Wondimagegnehu (2012), Daniel (2010), Tilahun and Dugasa (2014) and Habtamu (2015). This particular section provides a detailed review of those related studies conducted in the context of Ethiopia.

Wondimagegnehu (2012) investigated the determinants of NPLs in the context of Ethiopian Commercial Banks. The broad objective of this research was to identify bank specific determinants of non-performing loans. To achieve this broad objective, the study used mixed research approach. More specifically, the study used survey of employees of banks, structured survey of documents of bank reports and unstructured interview of senior bankers. The findings of the study showed that, most likely factors that affect occurrences of non-performing loans in Ethiopian Private commercial banks are 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 unintended purpose, and over/under financing by banks. In addition the study had carried out tests to assess the correlation of independent variable such as deposit, loans, and total asset and dependent variable NPL ratio. The result showed that at 0.05 level of significant, there were no statistically significant relationship between all independent variables and NPL. Based on the finding of the study, the researcher suggested that banks should put in place a vibrant credit process that ensures proper customer selection, robust credit analysis, authentic sanctioning process, proactive monitoring and clear recovery strategies for sick loans; formulate a clear policy framework that addresses issues of conflict of interest, ethical standard and check and balance in credit process; organizational capacity enhancement of banks; deliberate effort to develop culture of the public towards credit and its management by banks and ensuring prudent policies that govern bank loans.

In another study titled "Assessment of factors affecting non-performing loans: The case of Ethiopian Private Banks", Habtamu (2015) assessed bank specific factors affecting occurrence of NPLs in Ethiopian private banks. A survey study research design of six private Banks was employed in his paper. Interviews and questionnaires to bank officers who involve in lending activities for at least five years were used to collect data for the study. The data was carefully coded and entered to SPSS software and analyzed by descriptive statistics. Accordingly the findings of the study showed that the major factors affecting NPLs were poor credit assessment, poor loan follow up, underdeveloped credit culture, lenient credit terms and conditions, knowledge limitation, compromised integrity, unfair competition among banks, fund diversion for unintended purpose and shareholders influences. On the other hand the research found that credit growth, and bank size have no or very minimal relationship with occurrence of NPLs. Findings of Habtamu study further indicated that non-performing loans have negatively affected the performance of Ethiopian private banks in terms of credit crunch and profitability. The study of Wondimagegnehu (2012) and Habtamu (2015) is quite similar except that the first one focuses on all commercial banks and the second one only on private commercial banks.

Daniel (2010) had conducted a research titled "privately owned commercial banks in Ethiopia: issues of non-performing loans". The main focus of the study was on the non-performing loan management of private commercial banksin Ethiopia. To achieve this major objective the researcher examined trend of NPLs, nature of NPLs, proportion of NPLs with total loan and advance, and determinants of non-performing loans. The research has identified moral hazard of the borrowers, ineffective monitoring, and operational loss of the borrower were the reasons for high NPLs in private commercial banks in Ethiopia during the sample period.

In a study titled "Bank- specific determinants of credit risk: empirical evidence from Ethiopian Banks" Tilahun and Dugasa (2014) examined the bank specific determinants of credit risk in Ethiopian commercial banks. The quantitative research approach was adopted for the study. A balanced panel data of ten commercial banks both state owned and private owned for the period 2007 through 2011 has been analyzed using random effects GLS regression. The regression results revealed that credit growth and bank size have negative and statistically significant impact on credit risk. Whereas, operating inefficiency and ownership have positive and statistically significant impact on credit risk. Finally, the results indicate that profitability, capital adequacy and bank liquidity have negative but statistically insignificant relationship with credit risk.

### 2.6. Conclusions and knowledge gap

The empirical literatures that are discussed so far showed that, banks NPLs are determined by both macroeconomic and bank specific factors. However, Most of the literatures that are discussed so far appeared to have focused on studies that were conducted in the banking sector of different countries outside Ethiopia. This is because only few studies have assessed the determinants of NPLs, despite the fact that several studies were conducted by different researchers on the Ethiopian Banking sector. In most of the studies, NPLs are only considered as additional explanatory variable and not deeply investigated. Consequently, the Banking sectors in Ethiopia have so far received inadequate attention in the literature review of NPLs.

In the context of Ethiopia, the related studies conducted by Wondimagegnehu (2012), Daniel (2010), Tilahun and Dugasa (2014) and Habtamu (2015) assessed the

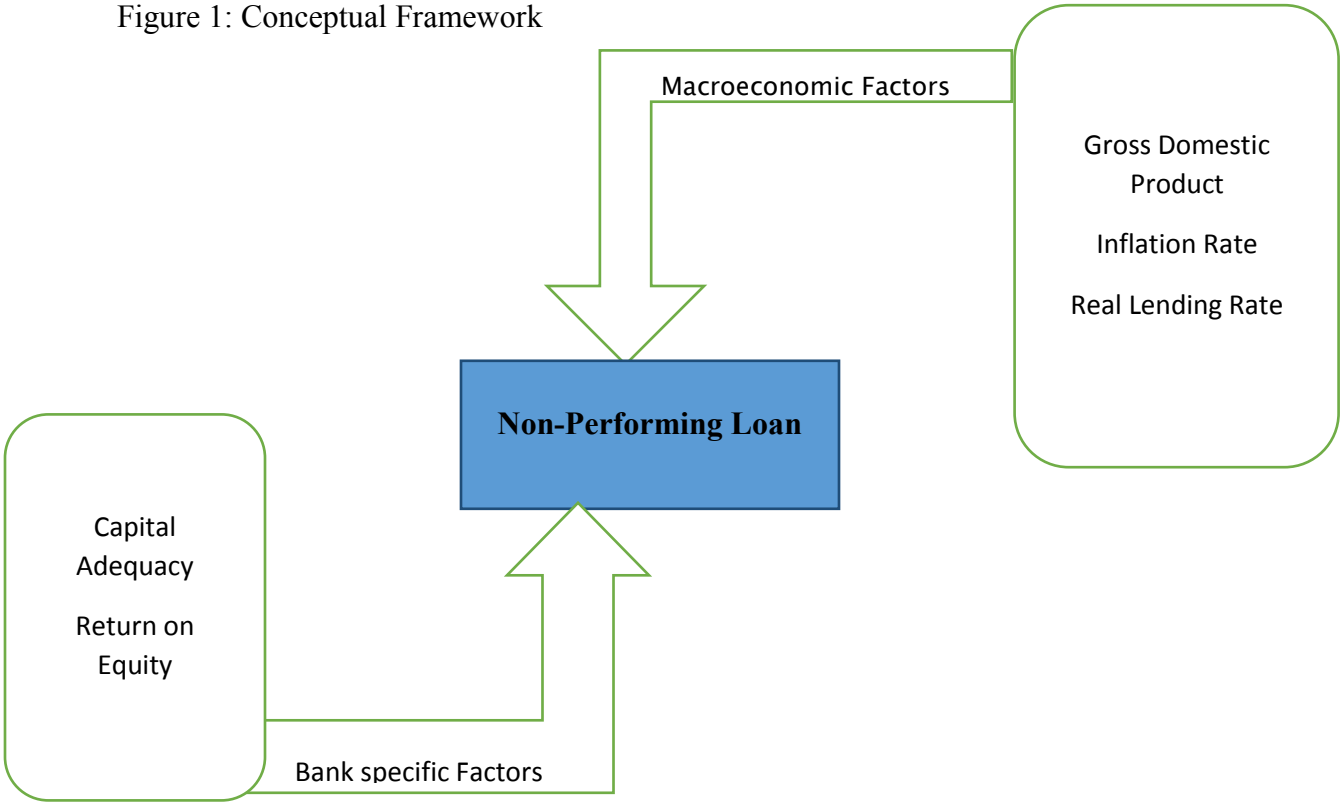
determinants of NPLs in Ethiopian commercial banks by using bank-specific variables. Accordingly, as per the knowledge of the researcher, all the studies conducted in Ethiopian banking sector clearly failed to identify macroeconomic determinants of NPLs.

In general, the lack of sufficient research on the determinants of NPLs in Ethiopian banking sector and the focus of the existing studies being only on the banks specific determinants of NPLs initiates this study. Hence, the purpose of this study is to investigate the determinants of NPLs in Ethiopian commercial banking sector by utilizing an econometrics model so as to estimate both the macroeconomic and bank specific determinants of NPLs of private commercial banks in Ethiopia which is proposed to fill the existing knowledge gap.

### 2.7. Conceptual Framework for the Study

From the literature review, discussed above, the researcher constructed the following conceptual framework to summarize the main focus and scope of this study in terms of dependent and independent variables included.

Figure 1: Conceptual Framework




Source: Developed for the research

# Chapter Three

# Research Methodology

## 3.1. Introduction

In chapter three, the Research Design, Sampling Design, Data Collection Methods, model specification and Data Analysis are discussed in details. All the elements in this chapter are constructed based upon the purpose of the research which is identifying the bank specific and macro determinants of non-performing loans. Secondary data will be used for this research. Data will be gathered from national bank of Ethiopia, Ministry of Finance and Economic Cooperation and commercial banks in Ethiopia covering the time period of 2005 to year 2013.

## 3.2. Research Design

The main objective of this study is to examine the economic and bank specific factors on bank credit risk in Ethiopia for the period of year 2005 to year 2014. This is an explanatory research that adapts a quantitative research design by using a secondary data.

Schindler and Cooper (2001) discussed that explanatory studies unlike descriptive studies, go beyond observing and describing the condition and tries to explain the reasons of the phenomenon. Explanatory research is devoted to finding causal relationships among dependent and independent variables. It does so from theory-based expectations on how and why variables should be related. Hypotheses could be basic (i.e., relationships exist) or could be directional (i.e., positive or negative). The quantitative data gathering methods are useful especially when a study needs to measure the cause and effect relationships evident between pre-selected and discrete variables (Addisu, 2011). The justification for this method is that it will assist the researcher to explain the reasons behind the phenomenon of NPLs in Ethiopia. The other advantage is that it will go beyond the description of the situation in the industry about NPLs because this information is readily available on annual reports and literatures. This explanatory method will allow the researcher to use theory-based expectations on how and why variables should be related.

### 3.3. Population and Sampling Design

#### 3.3.1. Target Population

A population is the total collection of elements about which the researcher makes some inferences. The collection of all possible observations of a specified characteristic of interest is called a population while a collection of observations representing only a portion of the population is called a sample. In this study, the target population is the banking sector in Ethiopia. The target population for this study was all private commercial banks that were registered by NBE and operational in the country. Currently, the country has sixteen private commercial banks licensed and registered by the NBE.

Table 2: List of private commercial banks in Ethiopia

| **No** | **Name of Banks** | **Year of Establishment** |
|---|---|---|
| 1 | Awash International Bank | 1994 E.C |
| 2 | Dashen Bank | 1995 E.C. |
| 3 | Bank of Abyssinia | 1996 E.C. |
| 4 | Wegagen Bank | 1997 E.C. |
| 5 | United Bank | 1998 E.C |
| 6 | Nib International bank | 1999 E.C. |
| 7 | Cooperative Bank of Oromia | 2004 G.C. |
| 8 | Lion International Bank | 2006 G.C. |
| 9 | Zemen Bank | 2008 G.C |
| 10 | Oromia International Bank | 2008 G.C. |
| 11 | Buna International Bank | 2009 G.C. |
| 12 | Berhan International Bank | 2009 G.C |
| 13 | Abay Bank S.C | 2010 G.C |
| 14 | Addis International Bank S.C | 2011 G.C |
| 15 | Debub Global Bank S.C | 2012 G.C |
| 16 | Enat bank | 2012 G.C |

Source: National Bank of Ethiopia

### 3.3.2. Sampling Design and Size

The sampling technique selected for this research is purposive sampling. Particularly, the researcher used criterion sampling in which the banks service year is set as a criteria and all private commercial banks that meet this criterion are selected as a sample. From all private commercial banks listed by NBE, sample of the below listed six banks that has been in business before 2005 are drawn based on the above criterion. The major limitation of purposive sampling is making description rather than generalization (Dawson 2002). The researcher considers that the sample size is sufficient to make sound conclusion about the population as far as it covers around 40% of the total population. Moreover, the big portion of total loans and non-performing loans of private commercial banks is found in the banks selected as sample i.e. banks established before 2005 G.C.

Table 3: List of banks selected for this research (Sample Banks)

| **No** | **Name of Banks** | **Year of Establishment** |
|---|---|---|
| 1 | Awash International Bank | 1994 E.C |
| 2 | Dashen Bank | 1995 E.C. |
| 3 | Bank of Abyssinia | 1996 E.C. |
| 4 | Wegagen Bank | 1997 E.C. |
| 5 | United Bank | 1998 E.C |
| 6 | Nib International bank | 1999 E.C. |

Source: Developed for the research

The researcher has taken six banks and ten years data after balancing the number of banks and years covered. If more than ten years data were taken the number of banks would be reduced which would negatively affect making generalizable conclusion to all private commercial banks. If less than ten years data were taken the length of the study period would be shorten which would negatively affect making sound conclusion about the population. Beside, taking smaller period data would result in the violations of assumptions of classical linear regression model.

### 3.4. Model Specification

The aim of this research was to investigate the relationship between gross domestic product (GDP), inflation rate (INF), capital adequacy ratio (CAR), return on equity (ROE) and real lending rate (RLR) with non-performing loan. The variables are taken from different papers discussed in the empirical literatures taking into consideration the availability of data. The regression model of this study is estimated in the following form:

$$NPL = \beta_0 + \beta_1 GDP + \beta_2 INF + \beta_3 RLR + \beta_4 CAR + \beta_5 ROE + \varepsilon$$

Source: Developed for the research

### 3.5. Operationalization of Variables

Table 4 sets dawn the exact definitions and measurement of each variable used in the study.

Table 4 : Definition &Measurement of variables

| Variables | | Definition | Measurement |
|---|---|---|---|
| Dependent Variable | | | |
| NPLs | Non-Performing loans | Non-Performing Loans are loans that are past due. | Ratio of non-performing (overdue) loans to total gross loan |
| Independent Variables | | | |
| GDP | Gross Domestic Products | Gross Domestic Product is the market price of all goods and services produced in a country. | Real GDP growth (annual %) |
| INF | Inflation rate | Inflation rate is the general increase in price of commodities. | Consumer Price Index (CPI) |
| CAR | Capital Adequacy Ratio | Capital Adequacy is a reserve of capital maintained by banks to protect themselves during adverse situation. | Ratio of total capital to total asset |
| ROE | Return on Equity | Return on Equity is a profit earned by shareholders for the | Ratio of net income to total equity |

| | | | |
|---|---|---|---|
| | | total amount of shareholder equity invested. | |
| RLR | Real Lending rate | Real lending rate is a rate at which interest is paid by a debtor for the use of money that they borrow from a lender. | The average lending rate of banks |

Source: Developed for the research

### 3.6. Data Collection Methods

Data collection plays an important role in a research as it is the most essential information for a study. Besides, the accuracy of a result is based on the precision of the data and this study used the data collected for analyzing purpose. Basically, data can be categorized into two which are primary data and secondary data. Data can be presented in term of words, numbers, figures or diagrams.

Primary data are information that has not been published. In other words, it is the first-hand-data. The methods for collecting primary data are surveying, experiment, testing or observations. Most of the researchers choose to use primary data instead of secondary data due to it more credibility as it is based on the target population. On the other hand, secondary data are information that has been published or available to public. Secondary data can be collected from books, newspapers, journals, and electronic sources such as website, e-journals and etc. Secondary data are less time consuming and costly compared to primary data. This is because the information is collected from previous study by other researchers.

The objective of the study is to investigate the effect of three economic (external) and two bank-specific (internal) factors influencing the bank credit risk. The economic factors consist of real lending rate, inflation and gross domestic product (GDP), while the bank-specific factors consist of capital adequacy ratio and return on equity. Secondary data is used in the study in order to determine the effect of the factors on non-performing loans of commercial banks in Ethiopia. The economic variables i.e. inflation and gross domestic product (GDP) were obtained from Ministry of Finance and Economic Cooperation while the remaining variables i.e. real lending rate, capital adequacy ratio,

return on equity and NPL were obtained from the annual report of commercial banks and national bank of Ethiopia.

Table 5: Data Sources

| **Types of Data** | **Sources** |
|---|---|
| **Economics (External) Factors** | |
| Gross Domestic Products (GDP) | Ministry of Finance and Economic Cooperation (MOFEC) |
| Inflation rate | Ministry of Finance and Economic Cooperation (MOFEC) |
| **Bank-Specific (Internal) Factors** | |
| Capital adequacy ratio (CAR) | Annual Report of Commercial Banks |
| Return on Asset (ROA) | Annual Report of Commercial Banks |
| Real Lending Rate | Annual Report of Commercial Banks |
| **Dependent Variable** | |
| Non-Performing Loan Ratio (NPLR) | NBE |

Source: Developed for the research

### 3.7. Data Analysis

First, the researcher collected the needed data from national bank of Ethiopia, Ministry of Finance and Economic Cooperation and commercial banks according to the description set in the above table. After that, collected data was rearranged, edited and calculated in order to become complete data that is needed for this study. Next, the collected panel data was analyzed using descriptive statistics, and multiple linear regression analysis. The descriptive statistics (Mean, maximum and minimum values and standard deviations) was used to analyze the general trends of the data from 2005 to 2013. A multiple linear regression model was used to determine the relative importance of each independent variable in explaining the variation of NPLs in Ethiopian private commercial banks. The multiple linear regressions model was conducted by the ordinary listing square (OLS) method using EVIEWS4 9 econometric software package.

### 3.7.1. Ordinary Least Square

According to Brooks (2008), ordinary least squares (OLS) or linear least squares is a method to estimate the slope and intercept in a linear regression model. This study used an ordinary least squares (OLS) regression to estimate the linear equation. The rational for choosing OLS is that, if the Classical Linear Regression Model (CLRM) assumptions hold true, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators (Brooks, 2008). In addition, as noted in Petra (2007) OLS outperforms the other estimation methods when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS. Thus, the following section discussed the CLRM assumptions.

According to Brooks (2008), the assumptions of ordinary least squares are:

1) The errors have zero mean.
2) The variance of the errors is constant and finite over all values.
3) The errors are linearly independent of one another.
4) There is no relationship between the error and corresponding x variate.

### 3.7.2. Diagnostic Analysis

Diagnostic checking is done to test whether the sample is consistent with the following assumptions:

1) The model is correctly specified
2) There is no relationship between independent variables (No multicollinearity).
3) There is no relationship among the error term at the period t and the error term at period before t (No autocorrelation problem)
4) The error term is constant across the number of observations (Homoscedasticity).
5) The error term is normally distributed.

If all the above assumptions are consistent with the sample, E-view result will be accurate and reliable. The following tests are done in this research to test the above assumptions.

#### 3.7.2.1. Heteroscedasticity

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

underestimate the variances and standard errors. There are several tests to detect the Heteroscedasticity problem, which are Park Test, Glesjer Test, Breusch-Pagan-Goldfrey Test, White's Test and Autoregressive Conditional Heteroscedasticity (ARCH) test. In this study, the popular white test was employed to test for the presence of heteroscedasticity. The hypothesis for the Heteroscedasticity test was formulated as follow:

$H_0$: There is no Heteroscedasticity problem in the model.

$H_1$: There is Heteroscedasticity problem in the model.

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if p-value is less than significance level. Otherwise, do not reject $H_0$.

#### 3.7.2.2. Autocorrelation

According to Brooks (2008), when the error term for any observation is related to the error term of other observation, it indicates that autocorrelation problem exist in this model. In the case of autocorrelation problem, the estimated parameters can still remain unbiased and consistent, but it is inefficient. The result of T-test, F-test or the confidence interval will become invalid due to the variances of estimators tend to be underestimated or overestimated. Due to the invalid hypothesis testing, it may lead to misleading results on the significance of parameters in the model. In this study to test for the existence of autocorrelation, the popular Breusch-Godfrey Serial Correlation LM Test was employed.

$H_0$: There is no autocorrelation problem in the model.

$H_1$: There is autocorrelation problem in the model.

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if p-value less than significance level. Otherwise, do not reject H0.

#### 3.7.2.3. Multicollinearity

According to Brooks (2008), Multicollinearity will occur when some or all of the independent variables are highly correlated with one another. If the multicollinearity occurs, the regression model is unable to tell which independent variables are influencing the dependent variable. The consequences of Multicollinearity are large variances and covariance of OLS estimators, wider confidence interval, insignificant t ratio, high $R^2$ but

few significant t ratio, sensitivity of OLS estimators and their standard errors to small changes in data. There is no one unique method to detect the multicollinearity problem, it only have some rules of thumb, which are high $R^2$ but few significant t ratio, high pair wise correlation coefficient and Variance Inflation Factor (VIF) or Tolerance (TOL). This study used high pair-wise correlation coefficients method to test the presence of multicollinearity problem in a regression model. Because it can see the correlation of independent variables between each other one by one. If the correlation coefficient was higher than 0.8, the model would be considered as it consists of serious Multicollinearity problem Guajarati (2004).

#### 3.7.2.4. Normality

Normality tests are used to determine if a data set is well-modeled by a normal distribution. With the normality assumption, ordinary least square estimation can be easily derived and would be much more valid and straight forward. This study used JarqueBera Test (JB test) to find out whether the error term is normally distributed or not. The hypothesis for the normality test was formulated as follow:

$H_0$: Error term is normally distributed

$H_1$: Error term is not normally distributed

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if p-value of JB test less than significance level. Otherwise, do not reject $H_0$.

#### 3.7.2.5. Model Specification

According to Brooks (2008), Specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form, so that regression model will be wrongly predicted. If the omitted variable is correlated with the included variable, the estimators are biased and inconsistent. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent. Ramsey RESET test was used to see whether the developed model is correctly regressing.

$H_0$: the model is correctly specified

$H_1$: the model is not correctly specified

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if p-value is greater than significance level. Otherwise, do not reject H0.

### 3.8. Conclusion

Chapter three included the methodology used to perform data analysis in Chapter four. This study employed quantitative and secondary data and Ordinary least square method to test the relationship between macroeconomic factors and bank specific factors with NPLs in private commercial banks of Ethiopia. Besides that, diagnostic tests was conducted to confirm the reliability of the results. Chapter four will show out in details regarding the hypothesis testing and diagnostic tests carried out for the collected data.

# Chapter Four

## Results and Discussion

### 4.1. Introduction

In the preceding chapter the research design employed in this study is presented and discussed in detail. The purpose of this chapter is to present results and analysis of data involved in this study. Accordingly, the descriptive statistics of all the variables used in this study and the results of hypothesis testing i.e. the estimated parameters of the regression equation, their significance, the connection between the independent variables and dependent variable according to the sign and the value of the parameters for the regression model are presented and discussed in detail.

### 4.2. Descriptive statistics

The summary of descriptive statistics that was intended to give general descriptions about the data (both dependent and independent variables) is presented in Table 6. The total number of observation for each variable was 54 (i.e., data for 6 banks for the period from the year 2005 to 2013). Accordingly, mean, median, standard deviation, minimum and maximum values of each variable were used so as to show the overall trend of the data over the period under consideration.

Table 6: Summary of descriptive statistics for dependent and independent variables

| **Variables** | **Observations** | **Mean** | **Median** | **Max** | **Min** | **Standard Deviation** |
|---|---|---|---|---|---|---|
| NPLs | 54 | 5.598519 | 5.145000 | 12.87000 | 0.300000 | 3.061371 |
| GDP | 54 | 10.83999 | 11.18716 | 12.64421 | 8.839516 | 1.119481 |
| INF | 54 | 18.47593 | 17.70000 | 36.40000 | 2.800000 | 10.98304 |
| RLR | 54 | 11.66667 | 11.90000 | 12.30000 | 10.50000 | 0.672506 |
| CAR | 54 | 0.123129 | 0.116020 | 0.192177 | 0.071022 | 0.031148 |
| ROE | 54 | 23.32741 | 23.66500 | 35.67000 | 2.470000 | 6.354208 |

*Note: Non-performing loans (NPLs), Growth domestic product (GDP), Inflation (INF), Real lending rate (RLR), Capital adequacy ratio (CAR), Return on equity (ROE)*

Source: Financial statements of banks, NBE reports, MoFEC reports and own computation

As can be seen from table 6, for the total sample, the mean of NPLs was 5.6% with a minimum of 0.30% and a maximum of 12.9%. This indicates that, from the total loans that Ethiopian private commercial banks disbursed, an average of 5.6% were being default or uncollected over the sample period. 5.6% average NPL ratio is higher than the Basel standard limit of NPLs ratio which is 5%. The lowest NPLs ratio that Ethiopian private commercial banks experienced over the sample period was 0.30%. On the other extreme, the highest NPLs ratio of Ethiopian private commercial banks was 12.9%. The disparity between the minimum 0.30% and the maximum 12.9% of NPLs indicate the margin that NPLs ratio of Ethiopian private commercial banks ranged over the sample period. The standard deviation (3.07%) of NPLs shows the variation of NPLs among Ethiopian private commercial banks.

Regarding bank specific independent variables, as stated in the above table, table 6, from the total of 54 observations over the sample period of 2005 to 2014, the highest return on equity percentage was 35.7% and the lowest return on equity percentage was 2.5%. That means, the most profitable bank of the sample private commercial banks earned 36 cents of net income from a single birr of equity investment and the minimum profit earned by one of the sample banks was a net profit of 2.5 cents on each birr of equity investment. The mean return on equity percentage of 23.3% showed that, Ethiopian private commercial banks earned 23 cents on average for each 1 Birr capital investment over the sample period. Return on equity revealed the highest standard deviation (6.35%) from its mean compared to other bank specific variable, CAR. This indicates the existence of high variation among Ethiopian private commercial banks in terms of their return to capital investment. The mean value for capital adequacy ratio (CAR) was 12.3% whereas the maximum level was 19.2% and minimum one was 7.1% with a standard deviation of 3.1%.

Among macroeconomic variables employed in this study inflation had a higher standard deviation which was 10.98%. This implies that inflation rate in Ethiopia during the study period remains somewhat unstable. On the other hand, the mean of the real lending rate of Ethiopian private commercial banks was 10.5% with a standard deviation of 0.67%. The standard deviation of RLR was the lowest of all the variables used in this study. This indicates that the RLR of Ethiopian private commercial banks was highly stable over the sample period. In addition, the average real GDP growth in Ethiopia for the sample period was 10.8%, with a standard deviation of 1.1% implies the economic growth in Ethiopia during the sample period remains stable as compared to the inflation rate.

### 4.3. Test results for the classical linear regression model assumptions

As mentioned in the methodology part of this study, as far as the assumptions of classical linear regression model hold true, the coefficient estimators of both α (constant term) and β (independent variables) that are determined by ordinary least square (OLS) will have a number of desirable properties, and usually known as Best Linear Unbiased Estimators (BLUE). Hence, the following sections discuss results of the diagnostic tests (i.e., heteroscedasticity, autocorrelation, multicollinearity, normality and model specification test) that ensure whether the data fits the basic assumptions of classical linear regression model or not.

#### 4.3.1. Heteroskedasticity

When the scatter of the errors is different, varying depending on the value of one or more of the independent variables, the error terms are heteroskedastic Brooks (2008). Heteroscedasticity test is very important because if the model consists of heteroskedasticity problem, the OLS estimators are no longer BEST and error variances are incorrect, therefore the hypothesis testing, standard error and confident level will be invalid. . A white' test has been made, to ensure that this assumption is no longer violated. The hypothesis for the heteroskedasticity test was formulated as follow;

$H_0$: There is no heteroskedasticity problem.

$H_1$: There is heteroskedasticity problem.

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if P value is less than significant level 0.05. Otherwise, do not reject $H_0$.

Table 7: Result of Heteroskedasticity Test: white

| White Test | P-value | Decision Rule |
|---|---|---|
| F-statistic | 0.1355 | Do not Reject the $H_0$ |
| Obs*R-squared | 0.1660 | Do not Reject the $H_0$ |
| Scaled explained SS | 0.9378 | Do not Reject the $H_0$ |

Source: Own computation (Developed for the research)

As shown in table 7, all versions of the white test statistic (F-statistic, Chi-Square and Scaled explained SS) gave the same conclusion that there was no evidence for the presence of heteroscedasticity in this particular study. Since the p-values of 0.1355, 0.1660 and 0.9378 for F-statistic, Chi-Square and Scaled explained SS respectively were in excess of 0.05, the null hypothesis should not be rejected.

### 4.3.2. Autocorrelation

It is assumed that the distribution errors are uncorrelated with one another and that the errors are linearly independent of one another. Autocorrelation error occurs when there is a serial correlations between residuals and their own past values. In this study, BreuschGodfrey Serial Correlation LM Test is used to carry out the autocorrelation test. The p-value is obtained to examine whether the autocorrelation problem occurs in the model. If the p-value is more than 5% significant level, it implies that there is no autocorrelation problem in the model. The hypothesis for the model specification test was formulated as follow;

$H_0$: There is no autocorrelation problem.

$H_1$: There is autocorrelation problem.

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if P value is less than significant level 0.05. Otherwise, do not reject $H_0$.

Table 8 : Result of Autocorrelation Test: BreuschGodfrey Serial Correlation LM Test

| | P-value | Decision Rule |
|---|---|---|
| Breusch-Godfrey Serial Correlation LM Test | 0.4470 | Do not Reject the $H_0$ |

Source: Own Computation (Developed for the research)

From table 8, it can be concluded that this research do not reject null hypothesis ($H_0$), since the p value is 0.4470, which is greater than significance level of 0.05. Thus, it can be concluded that the model does not consists of autocorrelation problem.

### 4.3.3. Multicollinearity

According to Brooks (2008), multicollinearity will occur if some or all of the independent variables are highly correlated with one another. It shows the regression model has difficulty in explaining which independent variables are affecting the dependent variable. If multicollinearity problem is too serious in a model, either additional important variable should be added or unimportant independent variable should be dropped. This study uses high pair-wise correlation coefficients method to detect the existence of multicollinearity high pair-wise correlation coefficients method see the correlation of independent variables between each other one by one. According to Guajarati (2004), if the correlation coefficient is higher than 0.8, it is considered as the model consists of serious multicollinearity problem.

Table 9: Results of multicollinearity Test: High Pair-Wise Correlation Coefficients

| | GDP | INF | RLR | CAR | ROE |
|---|---|---|---|---|---|
| GDP | 1.000000 | -0.553136 | -0.554680 | -0.276736 | 0.111223 |
| INF | -0.553136 | 1.000000 | 0.354070 | 0.164488 | -0.079144 |
| RLR | -0.554680 | 0.354070 | 1.000000 | 0.233596 | -0.092229 |
| CAR | -0.276736 | 0.164488 | 0.233596 | 1.000000 | -0.391258 |
| ROE | 0.111223 | -0.079144 | -0.092229 | -0.391258 | 1.000000 |

Source: Own computation (Developed for the research)

Table 9 showed that there is no strong pair-wise correlation between the explanatory variables (GDP, INF, RLR, CAR, and ROE). As a rule of thumb, inter-correlation among the independent variables above 0.80 signals a possible multicollinearity problem. In this study the highest correlation coefficient is -0.554680 between gross domestic product and real lending rate of banks. Thus, it can be concluded that almost all variables have low correlation power which implies no multicollinearity problem in the explanatory variables selected to determine non-performing loans of private commercial banks.

### 4.3.4. Normality

Normality test is used to determine whether the error term is normally distributed. Brooks (2008) noted that the Jarque-Bera statistic would not be significant for disturbance to be normally distributed around the mean. The purpose of the Jarque-Bera test is to make sure that the data set is well-modeled by a normal distribution. The hypothesis for the normality test was formulated as follow:

$H_0$: Error term is normally distributed

$H_1$: Error term is not normally distributed

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if P value of JB less than significant level 0.05. Otherwise, do not reject $H_0$.

Table 10: Result of Normality Test: Bera-Jarque test

| | Probability (P-value) | Decision Rule |
|---|---|---|
| JarqueBera Test | 0.209137 | Do not Reject the $H_0$ |

Source: Own computation (Developed for the research)

Table 10 indicated that distribution of the panel observation is symmetric about its mean. The Jarque-Bera statistic has a P-value of 0.21 implies that the p-value for the Jarque-Bera test is greater than 0.05 which indicates that there was no evidence for the presence of abnormality in the data. Thus, the null hypothesis

that the data is normally distributed should not be rejected since the p-value was considerably in excess of 0.05.

### 4.3.5. 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;

$H_0$: The model specification is correct.

$H_1$: The model specification is incorrect.

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if P value is less than significant level 0.05. Otherwise, do not reject $H_0$.

Table 11: Result of model specification Test: Ramsey-RESET test

| | Test statistic value | Decision Rule |
|---|---|---|
| Ramsey-RESET test | Prob. F test = 0.0606 | Do not Reject the $H_0$ |

Source: Developed for the research

From table 11, it can be concluded that this research do not reject null hypothesis ($H_0$), since the p value is 0.0606, which is greater than significance level of 0.05. Thus, it can be concluded that the model specification is correct from year 2005 to 2013. Overall reliability and validity of the model was enhanced further by the Prob (F-statistic) value of 0.000000.

### 4.4. Model Selection (Random Effect versus Fixed Effect Models)

The econometrics model used to examine the impact of bank specific and macro-economic factors on nonperforming loans of commercial banks in Ethiopia is a panel data regression model which should be either fixed-effects or random-effect model. To determine whether the fixed effects are necessary or not this study run the Hausman specification test as recommended by brooks (2008) and others. The hypothesis for the model selection test was formulated as follow;

$H_0$: Random effects model is appropriate.

$H_1$: Fixed effects model is appropriate.

$\alpha = 0.05$

Decision Rule: Reject $H_0$ if P value is less than significant level 0.05. Otherwise, do not reject $H_0$.

Table 12: Result of model selection Test: Hausman specification test

| | P-value | Decision Rule |
|---|---|---|
| White Test | 1.0000 | Do not Reject the $H_0$ |

Source: Developed for the research

As shown in Table 12, the Hausman specification test for this study has a p-value of 1.0000 for the regression models. This indicates that p-value is not significant and then the null hypothesis is not rejected justifying as random effect model is appropriate for the given data set in this study. The p-value of F-test 0.000000 is less than the significant level at 0.05, therefore, there is a sufficient evidence to conclude that this model is significant.

### 4.5. Discussion of Regression results

The empirical evidence on the determinants of Ethiopian private commercial banks' non-performing loan is studied based on balanced panel data, where all the variables are observed for each cross-section and each time period. The study has a time series segment spanning from the period 2005 up to 2013 and a

cross section segment which considered six private commercial banks, namely, Awash International Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank and Nib International Bank. To test the relationship between these private commercial banks non-performing loans and identified non-performing loans determinant variables the following linear regression model is developed.

$$NPL = \beta_0 + \beta_1 GDP + \beta_2 INF + \beta_3 RLR + \beta_4 CAR + \beta_5 ROE + \varepsilon$$

The definition of all individual variables included in the above equation is discussed in the methodology part of the study.

Table 13: Result of Ordinary Least Square (OLS) Model

| **Independent Variable** | **Coefficient Value** | **P-Value** | **Sign** |
|---|---|---|---|
| Gross domestic product (GDP) | 1.907705 | 0.0000*** | Positive |
| Inflation rate (INF) | 0.078176 | 0.0128*** | Positive |
| Real lending rate (RLR) | -0.299525 | 0.5514 | Negative |
| Capital adequacy ratio (CAR) | -30.46999 | 0.0365** | Negative |
| Return on equity (ROE) | -0.123693 | 0.0290** | Negative |
| R-squared | | 0.580919 | |
| Adjusted R-squared | | 0.537264 | |

Source: Developed for the research

Notes: *** significant at 1%, ** significant at 5%

The developed model by Ordinary Least Square (OLS) model:

NPLt= 6.393728 + 1.907705 GDP + 0.078176 INF -0.299525 RLR -30.46999CAR -0.123693 ROE

Table 13 showed the empirical result tested by Ordinary Least Square (OLS) from E-views software. The R-squared of this model is 0.580919, which means that

58% of the total variation of Ethiopian private commercial banks credit risk is explained by the total variation of gross domestic product, inflation rate, real lending rate, capital adequacy ratio and return on equity. Whereas, the adjusted R-squared is 0.537264, which means that 53% of the total variation of Ethiopian private commercial banks credit risk is explained by the total variation of gross domestic product, inflation rate, real lending rate, capital adequacy ratio and return on equity, by taking into account the number of independent variables and sample size. Although, the remaining 42% and 47% of the change is explained by other factors which are not included in this study model, both the R-squared and the Adjusted R-squared values in this study are found to be sufficient enough to infer that the fitted regression line is very close to all of the data points taken together (has more explanatory power). For panel data, R-Squared greater than 20% is still large enough for reliable conclusions (Cameron Trivedi, 2009; Hsiao, 2007, cited in Nyamsogoro, 2010).

The dependent variable being regressed is non-performing loan of private commercial banks which is measured by non – performing loan to total loan ratio. The macroeconomic explanatory variables (gross domestic product and inflation) and bank specific variables (capital adequacy ratio and return on equity) are found to be a significant regressors of nonperforming loans in private commercial banks of Ethiopia. On the other hand the findings revealed that, there was no significant association among real lending rate and NPLs in Ethiopian private commercial banks. The following section demonstrates the impact of each explanatory variables on Ethiopian private commercial banks NPL.

### 4.5.1. Gross Domestic Product

Hypothesis testing of the relationship between gross domestic product (GDP) and Ethiopian private commercial banks NPL:

$H_0$: Gross Domestic Product does not have a significant effect on private banks NPL.

$H_1$: Gross Domestic Product has a significant effect on private banks NPL.

Conclusion: Reject $H_0$ since there is a positive significant relationship between gross domestic product (GDP) and non-performing loans. The E-view result on the above table, table 13, showed that the coefficient of gross domestic product (GDP) is positive. According to the regression result beta is 1.907705 and is highly significant (0.0000) at 99%. This means that an increase by 1% of GDP growth will result in 1.91% increase of NPLs ratio, holding other variables constant.

The expected positive coefficient estimate of GDP is inconsistent with Jakubik (2007), Louzis et al. (2012), Zribi and Boujelbène (2011), Fofack (2005), Park and Zhang (2010), Hess, et.al. (2008), Khemja and Pasha (2009) and Chaibia and Ftiti (2015) result of GDP is negatively and significantly related to non-performing loan of private commercial banks. The justification provided in the empirical literature of negative association between GDP and NPLs is that higher positive level of real GDP growth habitually entails a higher level of income which improves the capacity of the borrower to pay its debts and contributes to reduce bad debts. However, this research result is also consistent with the research of Shingjrgi (2013), Poudel (2013), and Aver (2008). According to these papers it can be explained that during the economy downturn the bank tends to be more careful and alert in selecting the loan borrower by qualifying them based on their credit condition. In conjunction, the bank will reduce the volume of credit when they found out that the economic growth is low. Besides, the banks will strict in categorized their client and debtor during the economy downturn in order to control the non-performing loan to be increased. Therefore, this result indicates that Ethiopian private commercial banks gave more attention to non-performing loans and are strict on providing loan only during a period of low GDP growth, in order to ensure that the bank will not be exposed to the credit risk and they are flexible during high GDP growth periods.

### 4.5.2. Inflation rate

Hypothesis testing of the relationship between inflation rate and Ethiopian private commercial banks NPL:

$H_0$: Inflation rate does not have a significant effect on private banks NPL.

$H_1$: Inflation rate has a significant effect on private banks NPL.

Conclusion: Reject $H_0$ since there is a positive and significant relationship between Inflation rate (INF) and non-performing loans of private commercial banks. The E-view result on the above table, table 13, showed that the coefficient of Inflation rate (INF) is positive. According to the regression result, beta is 0.078176 and is highly significant (0.0128) at 99%. This means that an increase of inflation by 1%, on average, will result in 0.07% increase of NPLs ratio, holding other variables constant.

The expected positive coefficient estimate of INF and NPLs is inconsistent with Bucur and Dragomirescu (2014), Turan and Koskija (2014) and Nkusu (2011). Nkusu (2011), in his study on banking sectors of emerging markets found that higher inflation can enhance the loan payment capacity of borrower by reducing the real value of outstanding debt and this will result on the negative relationship between inflation and non-performing loans. However, this research result is also consistent with the result of Fofack (2005), Emmanuel (2014), Khemraj and Pasha (2009), Farhan and Sattar (2012), Gunsel (2012) and Badar & Javid (2013) which prove that inflation is significantly and positively related to the bank's non-performing loan. According to these papers, the increase in non-performing loans during inflation period is explained that during high inflation growth period low quality lending will increase because banks will be in difficulty to evaluate the credit risk of borrowers and cost of borrowing (which by implication decrease the borrower's ability to repay) will increase because monetary regulators will increase interest rate to control the inflation. The positive relationship between NPLs and inflation in Ethiopia private commercial banks indicates that increased inflation has weaken the loan payment capacity of the borrowers by reducing the real income and the low quality lending increases during high inflation period.

### 4.5.3. Real Lending Rate

Hypothesis testing of the relationship between real lending rate and non-performing loans:

$H_0$: Real lending rate does not have a significant effect on private banks NPL.

$H_1$: Real lending rate has a significant effect on private banks NPL.

Conclusion: Do not reject $H_0$ since there is no significant relationship between Real lending rate and private banks NPL. According to the regression result, beta is -0.299525. The P-value of 0.5514, which is considerably in excess of the acceptable 0.05 level of significance showed that the relationship is not statistically significant.

The E-view result on the above table, table 13, showed that the coefficient estimate of real lending rate (RLR) is negative. Although, the negative sign is consistent with the result of Turan and Koskija (2014) study on non-performing loans in Albania, it is against the international results from which is concluded that there exists a positive relationship between nonperforming loans and loan interest rate. According to the researchers, Fofack (2005), Nkusu (2011), Onsarigo, et al., (2013), Louzis et al., (2011) and Jimenez and Saurina (2007), they argue that high increase in interest rate weakens loan payment capacity of the borrower. The above researchers proved that expected sign of interest rate is positive and insignificant to nonperforming loan. Moreover, Angeloni and Fala (2009) examines that reduction in interest rate will lower down the bank's funding cost and hence the creditor have more ability to repay the loan.

### 4.5.4. Capital Adequacy Ratio (CAR)

Hypothesis testing of the relationship between capital adequacy ratio and non-performing loans:

$H_0$: Capital adequacy ratio does not have a significant effect on private banks NPL.

$H_1$: Capital adequacy ratio has a significant effect on private banks NPL.

Conclusion: Reject $H_0$ since there is a negative significant relationship between capital adequacy ratio (CAR) and non-performing loans. The E-view result on the above table, table 13, showed that the coefficient of capital adequacy ratio (CAR)

is positive. According to the regression result beta is -30.46999 and is highly significant (0.0365) at 95%. This means that an increase by 1% of capital adequacy ratio will result in 30.21% decrease of NPLs ratio, holding other variables constant. The magnitude of the coefficient estimate (-30.47) for CAR was the largest of all the variables used in the model, which indicates that, CAR had a great impact in explaining the variation of NPLs in Ethiopian private commercial banks.

The expected negative coefficient estimate of capital adequacy ratio and NPLs is inconsistent with the result of Ahmad and Ariff (2007) and Malick, et.al. (2014). The justification provided in the empirical literature on positive significant association between CAR and NPLs is that high capital adequacy ratio leads banks to involve in high risky activities, create risky loan portfolios, and therefore high NPL rates. However, this research result is consistent with moral hazard hypothesis developed by Berger and DeYoung (1997). The result indicates that higher capital requirement protects Ethiopian private commercial banks from providing loans to more risky projects. The capital increase improves the bank ability to cope with financial shocks. During the study period when Ethiopian private commercial banks hold higher amount of capital, they had low non-performing loan and when they hold lower amount of capital, they had high non-performing loan. The confirmation of statistically significant negative relationship was also found in Berger and DeYoung (1997), Emmanuel (2014), Salas and Saurina (2002), Boudriga, et.al. (2009) and Franco, et.al. (2011).

#### 4.5.5. Return on Equity (ROE)

Hypothesis testing of the relationship between Return on equity and non-performing loans:

$H_0$: Return on equity does not have a significant effect on private banks NPL.

$H_1$: Return on equity has a significant effect on private banks NPL.

Conclusion: Reject $H_0$ since return on equity and Ethiopian private banks NPLs have negative and significant relationship. The E-view result on the above table,

table 13, showed that the coefficient of Return on Equity (ROE) is negative. According to the regression result, beta is -0.123693 and is significant (0.0290) at 95%. This means that an increase of return on equity by 1%, on average, will result in 0.12% reduction of NPLs ratio, holding other variables constant.

The expected negative coefficient estimate of ROE indicated that profitable Ethiopian private commercial banks are less engaged in risky activities as they have less pressure to create revenues and ultimately resulted with lower volume of NPLs. This result is consistent with bad management hypothesis and borrower diversification hypothesizes, which states worse performance is positively associated with increases in nonperforming loans and lending money to a diversified range of borrower's banks can successfully reduce their non-performing loans, respectively. Park and Zhang (2010), Barth, et.al. (2002), Malick, et.al. (2014) and Fofack (2005) have empirically confirmed the bad management hypothesis, whilst, Salas and Saurina (2002) have found empirical confirmation for the borrower diversification hypothesis. The negative relationship between ROE which is used as a proxy for management efficiency and NPLs of Ethiopian private commercial banks indicates that Good management does not issue the loans to the riskier borrowers and this decreases the threat of non-performing loans.

However, the expected negative sign between bank performance as measured by ROE and private commercial banks NPLs result is inconsistent with the result of Rajan (1994). Rajan (1994) found a positive correlation between return on equity and NPLs. This is because the banks create higher-risk, lower quality loans to achieve short term profitability at the expense of long term profitability.

# Chapter Five

## Conclusions and Recommendations

The previous chapter presented the analysis of the findings and discussions of the study. The purpose of this chapter is to discuss the conclusions and recommendations. Accordingly, the chapter is organized in two sections, the first section presents the conclusions of the study and the second section presents the recommendations provided based on the findings of the study.

### 5.1. Conclusions

The broad objective of this research was to investigate bank specific and macroeconomic determinants of NPLs in Ethiopian private commercial banks. To achieve this broad objective, the study used quantitative research approach. To this end, data collected from MoFEC, NBE and a sample size of six Ethiopian private commercial banks over the period of 2005 to 2013 were analyzed using descriptive statistics, and multiple linear regression analysis.

The descriptive analysis of the study confirmed that the average NPL ratio in the sample private commercial banks during 2005-2013 is 6 percent, while the Basel standard limit of such ratio is 5 percent.

The regression analyses were made in line with the specific research objectives and stated hypotheses formulated in the study. In doing so, previous studies on determinants of NPLs have been reviewed and as per the literature NPLs of banks usually expressed as a function of internal and external determinants. The internal determinants refer to those factors which characterized individual banks and usually associated with the specific policy choices of a particular bank. The bank specific factors which the literature proposes as important determinants of NPLs are: capital adequacy ratio, credit to deposit ratio, return on equity, bank size, loan growth, solvency ratio, and ownership structure.

On the other hand, the external determinants are variables that are not related to the each bank management but reflect the economic 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, real interest

rate, real effective exchange rate (REER), annual unemployment rate, broad money supply (M2) and GDP per capital.

Accordingly, in this study, two bank specific variables i.e., capital adequacy ratio and return on equity and three macroeconomic variables i.e., real GDP growth, annual inflation rate, and real interest rate were included. Consequently, the empirical findings of this particular study suggested the following conclusions.

First, among macroeconomic variables, real GDP growth and annual inflation rate were found to be statistically significant determinants of NPLs in Ethiopian private commercial banks. The findings suggested that both GDP and INF had a significant positive relationship with NPLs which indicates that the quality of lending by private commercial banks decreases during high economic growth and inflation period. In addition, the positive association of inflation with the levels of NPLs reported by Ethiopian private commercial banks showed that the reduction of the real income of borrowers has weaken the loan payment capacity of the borrowers. The findings also suggested an insignificant relationship among real lending rate and NPLs of Ethiopian private commercial banks. In fact, the result of real lending rate of Ethiopian private commercial banks showed a positive relationship with NPLs. However, the association was statistically insignificant since the p-values for RLR is in excess of 5%. Hence, real lending rate of Ethiopian private commercial banks is not found to be important determinants of NPLs in Ethiopia commercial banks during the sample period of 2005 - 2013.

Second, with respect to the bank specific variables, both variables used in this study i.e., CAR and ROE were found to be a major determinant of NPLs in Ethiopian private commercial banks with 5% significance level. The relationship of both CAR and ROE with the volume of private commercial banks non-performing loans is negative. The negative association between ROE and NPLs, which was in favor of bad management hypothesis showed that as the profitability of banks increases, the likelihood that managers engaged in risky lending activity decreases and ultimately reduce NPLs. Capital adequacy ratio had also a negative association with NPLs of private commercial banks. This indicates that loan default decreases as the level of capital increases. Higher

capital adequacy ratio reduce the level of non-performing loans. The magnitude of the coefficient estimate of CAR is higher than all other independent variables employed in the study, which showed that, CAR had a great impact in explaining the variation of NPLs in Ethiopian private commercial banks.

The study concludes that gross domestic product, annual inflation rate, capital adequacy ratio and return on equity of the bank can be used to forecast for Non-performing Loans among private commercial banks in Ethiopia. The study, therefore, submits that Ethiopian private commercial banks could improve their credit risk management by formulating policies around these factors.

### 5.2. Recommendations

The findings of the study showed that GDP growth rate, inflation rate, capital adequacy ratio and return on equity were the significant drivers of NPLs in Ethiopian private commercials banks during the study period. Hence, focusing and taking the necessary action on these indicators could reduce the probability of nonperforming loans in Ethiopian private commercial banks.

Based on the findings of the study the following possible recommendations are forwarded:

1. There is need for private commercial banks to consider (give more consideration if they used to consider before) the macro economic factors when extending loans, as it was found significant relationship between macro-economic factors and NPLs.
2. There is need for Private commercial banks to be more careful when providing new loans during economic growth periods, as it was found that an increase in GDP will lead to increase in non-performing loans among private commercial banks in Ethiopia. Private commercial banks should put in place a vibrant credit process which assesses repayment capacity of borrowers, feasibility of projects and experience of the management of borrowing companies particularly during high economic growth period.
3. There is need for the government to reduce the strains to the general economy in order not only to facilitate economic growth but also to enhance the minimization

of NPLs. The government as well as other stakeholders in the economy should acknowledge the threat that non-performing loans pose not only to the banking sector but also to the general economy. The government must take into account that NPLs can contribute to the collapse of the banking sector and to the entire economy. Furthermore, the government should implement policies that take into account NPLs. The result of this study more specifically indicates that the government should come up with strategies aimed at reducing the inflation rate in the country as it was found that an increase in inflation rate will lead to increase in non-performing loans among private commercial banks in Ethiopia.

4. The finding of the study which is negative relationship between CAR and NPLs, recommends that there is need for NBE, regulatory body of banks, to ensure that private commercial banks in Ethiopia operate within the adequate level of capital so as to control the level of non-performing loans in the banking industry.

**Future Research Recommendations**

This study examined the nonperforming loans of private commercial banks in Ethiopia by using selected macroeconomic and bank specific variables. However, there are so many variables not included in this study. Thus, it is recommended for future researchers to further assess determinants of non-performing loans by incorporating additional bank specific and macro-economic factors. It is also recommended for future researchers to study the determinants of NPLs in different economic sectors.

## References


Addisu M., 2011. *Compliance cost of individual income tax payers in Addis Ababa.* College of Business and Economics, Addis Ababa University.

Ahmad N.H. and Ariff M., 2007. Multi-country study of bank credit risk determinants. *International Journal of Banking and Finance*, 5 (1), pp. 134-152.

Ahmed F. and Bashir T., 2013. Explanatory power of macroeconomic variables as determinants of non-performing Loans: evidence from Pakistan*, World Applied Sciences Journal*, 22 (2), pp. 243-255.

Angeloni I, Faia E. and Duca M., 2010. *Monetary policy and risk taking*. Mimeo, University of Frankfurt.

Aver, B., 2008. An empirical analysis of credit risk factors of the Slovenian banking system: managing global transitions, 6 (3), pp. 317-334.

Badar M. and Javid A.Y., 2013. Impact of macroeconomic forces on nonperforming loans: an empirical study of commercial banks in Pakistan, *Wseas Transactions on Business and Economics*, 10 (1), pp. 40-48.

Barth J.R, Dopico L.G, Nolle D.E. and Wilcox J.A., 2002. Bank safety and soundness and the structure of bank supervision: a cross-country analysis, *International Review of Finance*, 3 (3), pp. 163-188.

Beck R, Jakubik P. and Piloiu A., 2013. Non-performing loans: What matters in addition to the economic cycle? ECB Working Paper Series. No. 1515, pp. 1-32.

Berger A. and Deyoung R., 1997. Problem loans and cost efficiency in commercial banks, *Journal of Banking and Finance*, 21 (6), pp. 849-870.

Boudriga A, Taktak N.B and Jellouli S., 2009. Bank specific, business and institutional environment determinants of nonperforming loans: Evidence from MENA countries, Paper for ERF conference on "Shocks, Vulnerability and Therapy", Cairo, Egypt, November 7-9, 2009.

Brooks, C., 2008. *Introductory econometrics for finance.* 2nd ed. New York: Cambridge University Press.

Chaibi H, Ftiti Z., 2015. Credit risk determinants: Evidence from a cross-country study, *International Business and Finance*, 33, pp. 1–16.

Cooper D.R and Schindler P.S., 2003. Business Research Methods. 8th ed. McGraw-Hill: New York.

Dang, U., 2011. The CAMEL rating system in Banking Supervision: a Case Study of American International Assurance Vietnam (AIA). BA. Arcada University of Applied Sciences.

Daniel T., 2010. *Issues of non-performing loans: Privately owned commercial banks in Ethiopia*, MBA Graduation paper, Addis Ababa University.

Dash M. and Kabra G., 2010. The determinants of non-performing assets in Indian Commercial Bank: an econometric study, *Middle Eastern Finance and Economics,* Issue 7.

Dawson C., 2002. *Practical research methods*. Oxford, Howtobooks.

Delia E.D, Maria P, Oana R.S., ND. Macroeconomic determinants of non-performing loans in emerging markets: evidence from Central and Eastern Europe.

Ekanayake E.M and Azeez A.A., 2015. Determinants of non-performing loans in licensed commercial banks: Evidence from Sri Lanka, *Sri Lanka Asian Economic and Financial Review,* 5 (6), pp. 868-882.

Emmanuel M.M., 2014. *Modeling non-performing loans in Kenya commercial banks*. School of mathematics: University of Nairobi.

Farhan M, Sattar A, Chaudhry A.B. and Khalil F., 2012. Economic determinants of nonperforming Loans: perception of Pakistani Bankers, *European Journal of Business Management*, 4 (19), pp. 87-99.

Fofack H., 2005. Nonperforming loans in Sub - Saharan Africa: Causal analysis and macroeconomic implications, World Bank policy research working paper No.3769.

Franco F, David M.I. and Phil M., 2011. Efficiency and risk in European banking, *Journal of Banking and Finance*, 35 (5), pp. 1315-1326.

Frost S.M., 2004. *The bank analyst's handbook: money, risk and conjuring tricks*. John Wiley and Sons. Chapter.20. Corporate Failures and Problem Loans.

Garcia M.T, Robles. F., 2008. Risk taking behavior and ownership in the banking industry: the Spanish evidence, *Journal of Economics and Business*, 60 (4), pp. 332-354.

Garr. D.K., 2013, Determinants of credit risk in the banking industry of Ghana. *Developing Country Studies*, 3 (11), pp, 64-77.

Godlewski C., 2004. Capital regulation and credit risk taking: empirical evidence from banks in emerging market economies.

Gujarati D.N., Basic Econometric, 4th Edition, McGraw-Hill, USA.

Gunsel N., 2012. Micro and macro determinants of bank fragility in North Cyprus economy, *African Journal of Business Management*, 3 (6), pp. 1323-1329.

Habtamu G., 2015. *Assessment of factors affecting nonperforming loans: the case of Ethiopian Private banks*, MBA Graduation paper, Addis Ababa University.

Hess, Grimes. and Holmes., 2008. Credit losses in Australasian banking. *Working Paper in Economics*, 08 (10).

Hu J.L, Li Y, Chiu Y.H., 2004. Ownership and nonperforming loans: Evidence from Taiwan's banks, *The Developing Economies*, 42 (3), pp. 405-420.

Jakubik P, Schmieder C., 2007. Stress testing credit risk: comparison of the Czech Republic and Germany, *Financial Stability Institute.*

Jimenez G, Saurina J., 2006. Credit cycles, credit risk, and prudential regulation, *International Journal of Central Banking*, 2 (2), pp. 65-98.

Keovongvichith, P., 2012. An Analysis of the Recent Financial Performance of the Laotian Banking Sector during 2005-2010, *International Journal of Economics and Finance,* 4 (4), pp.1-15.

Klein N., 2013. Non-performing assets in CESEE: determinants and impact on macroeconomic performance, *IMF Working Paper*s.

Louzis, Dimitrios, Aggelos T, Vouldis, and V.L. Metaxas., 2010. Macroeconomic and bank-Specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios, *Bank of Greece Working Paper 118*.

Makri V, Tsagkanos A, and Bellas A., 2014. Determinants of non-performing loans: the case of Eurozone, *Panoeconomicus,* 2, pp. 193-206.

Melecky A, Sulganova M and Lelkova P., 2013. Credit risk and the Czech macro economy: The response of nonperforming Loans to macroeconomic fundamentals.

Messai A.S, and Jouini, F., 2013. Micro and macro determinants of non-performing Loans, *International Journal of Economics and Financial Issues*. 3 (4), pp. 852-860.

Muriithi M.W., 2013. *The Causes of non-performing loans in commercial banks in Kenya*. School of Business: University of Nairobi.

National Bank of Ethiopia, 1994. *Licensing and Supervision of Banking Business proclamation No.84/1994*. Addis Ababa, Ethiopia.

National Bank of Ethiopia, 2008. *Asset Classification and Provisioning Directive No. SBB/43/2008*, Addis Ababa, Ethiopia.

National Bank of Ethiopia, 2008. *Amended Directives for Regulation of Banking Business*, Banking Supervision Department.

National Bank of Ethiopia, 2010. *Conference Proceedings on National Payment System.*

Nkusu M., 2011. Nonperforming loans and macro financial vulnerabilities in advanced economies, *IMF Working Papers*, 1-27.

Nyamsogoro D., 2010. *Financial Sustainability of Rural Microfinance in Tanzania*. University of Greenwhich.

Onchomba O.F., 2014. *The relationship between macroeconomic factors and non-performing loans in* mortgage *firms in Kenya*. School of business: University of Nairobi.

Onsarigo I.M, Selvan M, Ramkumar R.R, and Karpagam V., 2013. Relative efficiency of Kenyan commercial banks, *International Business Management*, 7 (3), pp. 142 – 150.

Park J.H. and Lei Z., 2010. *Macroeconomic and bank-specific determinants of the U.S. non-performing loans: before and during the recent crisis*. Beedie School of business: Simon Fraser University.

Pasha S, and T. Khemraj., 2009. The determinants of nonperforming loans: An econometric case study of Guyana. Presented at the *Caribbean Centre for Banking and Finance* Bi-Annual Conference on Banking and Finance, St. Augustine, Trinidad.

Petra T., 2007. *Panel data: fixed effects random effects dynamic panel data models*, New York, Cambridge University Press.

Poudel R.P.S., 2013. Macroeconomic determinants of credit risk in Nepalese banking industry, Proceedings of 21st International Business Research Conference.

Rajan R., 1994. Why bank credit policies fluctuate: a theory and some evidence. *The Quarterly Journal of Economics,* 109, pp. 399-441.

Rashid N, Azid T, Malik S., 2014. Microeconomic determinants of credit risk management in Pakistan: A case study of banking sector, Pakistan Journal of Social Sciences, 34 (1), pp. 177-192.

Saba I, Rehana K, and Muhammad A., 2002. Determinants of non-performing loans: case of US banking sector, *The Romanian Economic Journal,* 4 (44), pp. 141-152.

Salas V, Saurina J., 2002. Credit risk in two institutional regimes: Spanish commercial and savings banks, *Journal of Financial Services Research*, 22 (3), pp. 203-224.

Selma M.A. and Jouini F., 2013. Macro and Micro determinants of Nonperforming loans in Tunisia, *International Journal of Economics and Financial Issues* 13 (3), pp. 852-860.

Shingjergji A., 2013. The impact of macroeconomic variables on the non-performing loans in the Albanian Banking System during 2005-2012, *Academic Journal of Interdisciplinary Studies*, 2 (9), pp. 47-58.

Swamy V., 2012. Impact of macroeconomic and endogenous factors on nonperforming bank assets: *International Journal of Banking and Finance*, Vol. 9.

Tilahun A.T and Dugasa R.O., 2014. Bank-specific determinants of credit risk: empirical evidence from Ethiopian Banks, *Research Journal of Finance and Accounting,* 5 (7). pp. 80-85.

Turan G, Arjeta. K., 2014. Nonperforming Loans in Albania, *Academic Journal of Interdisciplinary Studies,* 3 (3).

Wondimagegn N., 2012. *Determinants of nonperforming loan in Ethiopian banks*, MBA Graduation paper, University of South Africa.

Zribi N, Boujelbene Y., 2011. The factors influencing bank credit risk: The case of Tunisia, *Journal of Accounting and Taxation*, 3 (4), pp. 70-78.

Zurairah B.I., 2010. *Determinants of nonperforming loans of commercial banking institution in Malaysia*. Graduate School of business: University of Malaysia.

## Appendices

### Appendix –I: Tests for the Heteroskedasticity Test: White

Heteroskedasticity Test: White

| | | | |
|---|---|---|---|
| F-statistic | 1.531357 | Prob. F(20,33) | 0.1355 |
| Obs*R-squared | 25.99308 | Prob. Chi-Square(20) | 0.1660 |
| Scaled explained SS | 11.30971 | Prob. Chi-Square(20) | 0.9378 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/04/16 Time: 16:14
Sample: 1 54
Included observations: 54

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 3220.796 | 2094.542 | 1.537709 | 0.1337 |
| GDP^2 | -7.779890 | 4.096379 | -1.899211 | 0.0663 |
| GDP*INF | -0.679193 | 0.457569 | -1.484352 | 0.1472 |
| GDP*AV_LR | -5.248949 | 14.04838 | -0.373634 | 0.7111 |
| GDP*CAR | -67.74599 | 32.52983 | -2.082581 | 0.0451 |
| GDP*ROE | -0.105675 | 0.122163 | -0.865039 | 0.3933 |
| GDP | 251.2872 | 220.5679 | 1.139274 | 0.2628 |
| INF^2 | -0.009843 | 0.032204 | -0.305626 | 0.7618 |
| INF*AV_LR | 0.559627 | 1.381483 | 0.405092 | 0.6880 |
| INF*CAR | 3.279184 | 2.175822 | 1.507101 | 0.1413 |
| INF*ROE | 0.040070 | 0.019567 | 2.047816 | 0.0486 |
| INF | -0.729689 | 16.49572 | -0.044235 | 0.9650 |
| AV_LR^2 | -9.339971 | 8.887536 | -1.050907 | 0.3009 |
| AV_LR*CAR | -27.26207 | 59.95010 | -0.454746 | 0.6523 |
| AV_LR*ROE | -0.518196 | 0.336479 | -1.540054 | 0.1331 |
| AV_LR | 284.1092 | 170.4582 | 1.666739 | 0.1050 |
| CAR^2 | -3294.347 | 1246.960 | -2.641903 | 0.0125 |
| CAR*ROE | -10.06357 | 8.333909 | -1.207545 | 0.2358 |
| CAR | 2072.652 | 934.3841 | 2.218201 | 0.0335 |
| ROE^2 | -0.004212 | 0.012242 | -0.344081 | 0.7330 |
| ROE | 7.503400 | 4.694282 | 1.598413 | 0.1195 |

| | | | |
|---|---|---|---|
| R-squared | 0.481353 | Mean dependent var | 4.038564 |
| Adjusted R-squared | 0.167022 | S.D. dependent var | 4.278094 |
| S.E. of regression | 3.904514 | Akaike info criterion | 5.847445 |
| Sum squared resid | 503.0927 | Schwarz criterion | 6.620939 |
| Log likelihood | -136.8810 | Hannan-Quinn criter. | 6.145751 |
| F-statistic | 1.531357 | Durbin-Watson stat | 2.003525 |

| | |
|---|---|
| Prob(F-statistic) | 0.135506 |

**Appendix –II: Tests for the autocorrelation: Breusch-Godfrey**

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.819355 | Prob. F(2,46) | 0.4470 |
| Obs*R-squared | 1.857529 | Prob. Chi-Square(2) | 0.3950 |

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/04/16 Time: 16:14
Sample: 1 54
Included observations: 54
Presample missing value lagged residuals set to zero.

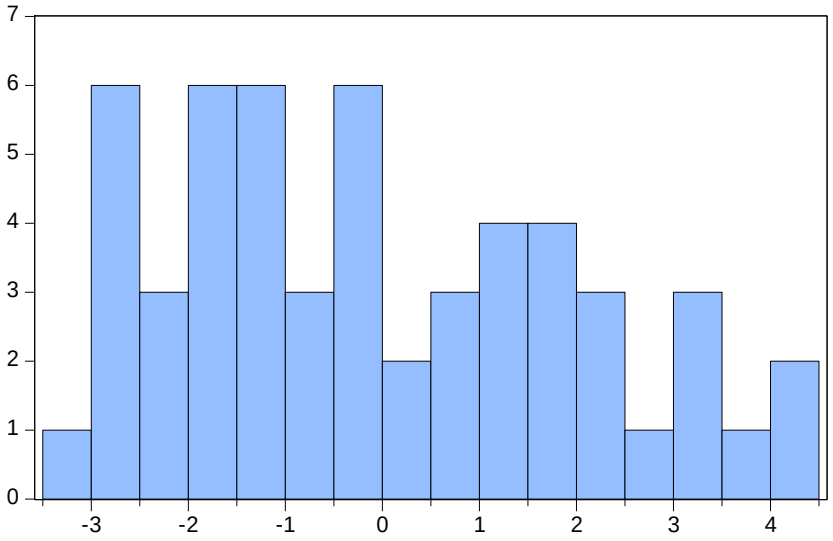
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP | -0.063755 | 0.363039 | -0.175615 | 0.8614 |
| INF | 0.000831 | 0.032776 | 0.025367 | 0.9799 |
| AV_LR | -0.137729 | 0.543056 | -0.253619 | 0.8009 |
| CAR | -3.349903 | 10.97019 | -0.305364 | 0.7615 |
| ROE | -0.000912 | 0.050630 | -0.018012 | 0.9857 |
| C | 2.709514 | 9.236360 | 0.293353 | 0.7706 |
| RESID(-1) | 0.090312 | 0.154066 | 0.586189 | 0.5606 |
| RESID(-2) | 0.167994 | 0.153023 | 1.097834 | 0.2780 |

| | | | |
|---|---|---|---|
| R-squared | 0.034399 | Mean dependent var | 4.83E-15 |
| Adjusted R-squared | -0.112541 | S.D. dependent var | 2.028488 |
| S.E. of regression | 2.139589 | Akaike info criterion | 4.495058 |
| Sum squared resid | 210.5807 | Schwarz criterion | 4.789723 |
| Log likelihood | -113.3666 | Hannan-Quinn criter. | 4.608699 |
| F-statistic | 0.234101 | Durbin-Watson stat | 1.951662 |
| Prob(F-statistic) | 0.974735 | | |

**Appendix –III: Tests for multicollinearity: pair-wise correlation coefficients**

| | GDP | INF | AV_LR | CAR | ROE |
|---|---|---|---|---|---|
| GDP | 1.000000 | -0.553136 | -0.554680 | -0.276736 | 0.111223 |
| INF | -0.553136 | 1.000000 | 0.354070 | 0.164488 | -0.079144 |
| AV_LR | -0.554680 | 0.354070 | 1.000000 | 0.233596 | -0.092229 |
| CAR | -0.276736 | 0.164488 | 0.233596 | 1.000000 | -0.391258 |
| ROE | 0.111223 | -0.079144 | -0.092229 | -0.391258 | 1.000000 |

**Appendix –IV: Tests for Normality: Bera-Jarque test**




Series: Standardized Residuals
Sample 2005 2013
Observations 54

| | |
|---|---|
| Mean | -3.14e-15 |
| Median | -0.296899 |
| Maximum | 4.443760 |
| Minimum | -3.087289 |
| Std. Dev. | 2.051732 |
| Skewness | 0.400688 |
| Kurtosis | 2.134710 |
| Jarque-Bera | 3.129595 |
| Probability | 0.209130 |

**Appendix – V: Tests for Model Specification: Ramsey Reset Tests**

Ramsey RESET Test
Equation: UNTITLED
Specification: NPL GDP INF AV_LR CAR ROE C
Omitted Variables: Squares of fitted values

| | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.922243 | 47 | 0.0606 |
| F-statistic | 3.695018 | (1, 47) | 0.0606 |
| Likelihood ratio | 4.086722 | 1 | 0.0432 |

F-test summary:

| | Sum of Sq. | df | Mean Squares |
|---|---|---|---|
| Test SSR | 15.89542 | 1 | 15.89542 |
| Restricted SSR | 218.0824 | 48 | 4.543384 |
| Unrestricted SSR | 202.1870 | 47 | 4.301852 |

LR test summary:

| | Value | df |
|---|---|---|
| Restricted LogL | -114.3117 | 48 |
| Unrestricted LogL | -112.2683 | 47 |

Unrestricted Test Equation:
Dependent Variable: NPL
Method: Least Squares
Date: 03/04/16 Time: 16:16
Sample: 1 54

Included observations: 54

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP | -0.074338 | 1.112609 | -0.066814 | 0.9470 |
| INF | -0.001329 | 0.051540 | -0.025777 | 0.9795 |
| AV_LR | 0.372378 | 0.634402 | 0.586975 | 0.5600 |
| CAR | 4.011764 | 17.83885 | 0.224889 | 0.8230 |
| ROE | 0.044668 | 0.113208 | 0.394565 | 0.6949 |
| C | 3.198328 | 8.875970 | 0.360336 | 0.7202 |
| FITTED^2 | 0.102644 | 0.053398 | 1.922243 | 0.0606 |

| | | | |
|---|---|---|---|
| R-squared | 0.592952 | Mean dependent var | 5.598519 |
| Adjusted R-squared | 0.540989 | S.D. dependent var | 3.061371 |
| S.E. of regression | 2.074091 | Akaike info criterion | 4.417345 |
| Sum squared resid | 202.1870 | Schwarz criterion | 4.675177 |
| Log likelihood | -112.2683 | Hannan-Quinn criter. | 4.516781 |
| F-statistic | 11.41093 | Durbin-Watson stat | 1.676964 |
| Prob(F-statistic) | 0.000000 | | |

**Appendix – VI: Tests for Model Selection (Random Effect versus Fixed Effect Models): Hausman specification 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 | 0.000000 | 5 | 1.0000 |

* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| GDP | 1.842059 | 1.907705 | 0.004358 | 0.3200 |
| INF | 0.078510 | 0.078176 | 0.000000 | 0.4816 |
| AV_LR | -0.239363 | -0.299525 | 0.003566 | 0.3137 |
| CAR | 40.520685 | -30.469991 | 126.355987 | 0.3713 |
| ROE | -0.107666 | -0.123693 | 0.000446 | 0.4479 |

Cross-section random effects test equation:
Dependent Variable: NPL
Method: Panel Least Squares
Date: 03/04/16 Time: 16:09
Sample: 2005 2013
Periods included: 9
Cross-sections included: 6
Total panel (balanced) observations: 54

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 5.526535 | 8.709557 | 0.634537 | 0.5291 |
| GDP | 1.842059 | 0.348789 | 5.281296 | 0.0000 |
| INF | 0.078510 | 0.030235 | 2.596654 | 0.0128 |
| AV_LR | -0.239363 | 0.502912 | -0.475954 | 0.6365 |
| CAR | -40.52068 | 18.08420 | -2.240668 | 0.0303 |
| ROE | -0.107666 | 0.058853 | -1.829420 | 0.0743 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.650876 | Mean dependent var | 5.598519 |
| Adjusted R-squared | 0.569684 | S.D. dependent var | 3.061371 |
| S.E. of regression | 2.008213 | Akaike info criterion | 4.411991 |
| Sum squared resid | 173.4155 | Schwarz criterion | 4.817154 |
| Log likelihood | -108.1237 | Hannan-Quinn criter. | 4.568246 |
| F-statistic | 8.016533 | Durbin-Watson stat | 2.181522 |
| Prob(F-statistic) | 0.000000 | | |

**Appendix – VII: Tests for Model Selection (Random Effect versus Fixed Effect Models): Hausman specification 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 | 0.000000 | 5 | 1.0000 |

* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| GDP | 1.842059 | 1.907705 | 0.004358 | 0.3200 |
| INF | 0.078510 | 0.078176 | 0.000000 | 0.4816 |
| AV_LR | -0.239363 | -0.299525 | 0.003566 | 0.3137 |
| CAR | 40.520685 | -30.469991 | 126.355987 | 0.3713 |
| ROE | -0.107666 | -0.123693 | 0.000446 | 0.4479 |

Cross-section random effects test equation:
Dependent Variable: NPL
Method: Panel Least Squares
Date: 03/04/16 Time: 16:09
Sample: 2005 2013
Periods included: 9
Cross-sections included: 6
Total panel (balanced) observations: 54

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 5.526535 | 8.709557 | 0.634537 | 0.5291 |
| GDP | 1.842059 | 0.348789 | 5.281296 | 0.0000 |
| INF | 0.078510 | 0.030235 | 2.596654 | 0.0128 |
| AV_LR | -0.239363 | 0.502912 | -0.475954 | 0.6365 |
| CAR | -40.52068 | 18.08420 | -2.240668 | 0.0303 |
| ROE | -0.107666 | 0.058853 | -1.829420 | 0.0743 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.650876 | Mean dependent var | 5.598519 |
| Adjusted R-squared | 0.569684 | S.D. dependent var | 3.061371 |
| S.E. of regression | 2.008213 | Akaike info criterion | 4.411991 |
| Sum squared resid | 173.4155 | Schwarz criterion | 4.817154 |
| Log likelihood | -108.1237 | Hannan-Quinn criter. | 4.568246 |
| F-statistic | 8.016533 | Durbin-Watson stat | 2.181522 |
| Prob(F-statistic) | 0.000000 | | |

**Appendix – VIII: Descriptive Analysis of dependent and independent variables**

| | NPL | GDP | INF | AV_LR | CAR | ROE |
|---|---|---|---|---|---|---|
| Mean | 5.598519 | 10.83999 | 18.47593 | 11.66667 | 0.123129 | 23.32741 |
| Median | 5.145000 | 11.18716 | 17.70000 | 11.90000 | 0.116020 | 23.66500 |
| Maximum | 12.87000 | 12.64421 | 36.40000 | 12.30000 | 0.192177 | 35.67000 |
| Minimum | 0.300000 | 8.839516 | 2.800000 | 10.50000 | 0.071022 | 2.470000 |
| Std. Dev. | 3.061371 | 1.119481 | 10.98304 | 0.672506 | 0.031148 | 6.354208 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Skewness | 0.481666 | -0.240131 | 0.344251 | -0.936036 | 0.613433 | -0.785502 |
| Kurtosis | 2.721859 | 2.207689 | 1.959795 | 2.316188 | 2.325961 | 5.161718 |
| Jarque-Bera | 2.262087 | 1.931418 | 3.501141 | 8.937565 | 4.408935 | 16.06742 |
| Probability | 0.322696 | 0.380713 | 0.173675 | 0.011461 | 0.110309 | 0.000324 |
| Sum | 302.3200 | 585.3595 | 997.7000 | 630.0000 | 6.648944 | 1259.680 |
| Sum Sq. Dev. | 496.7157 | 66.42163 | 6393.239 | 23.97000 | 0.051421 | 2139.926 |
| Observations | 54 | 54 | 54 | 54 | 54 | 54 |

**Appendix – XI: Regression Results**

Dependent Variable: NPL
Method: Panel EGLS (Cross-section random effects)
Date: 03/04/16 Time: 16:08
Sample: 2005 2013
Periods included: 9
Cross-sections included: 6
Total panel (balanced) observations: 54
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP | 1.907705 | 0.342485 | 5.570181 | 0.0000 |
| INF | 0.078176 | 0.030231 | 2.585920 | 0.0128 |
| AV_LR | -0.299525 | 0.499354 | -0.599825 | 0.5514 |
| CAR | -30.46999 | 14.16623 | -2.150889 | 0.0365 |
| ROE | -0.123693 | 0.054933 | -2.251731 | 0.0290 |
| C | 6.393728 | 8.581722 | 0.745040 | 0.4599 |

| Effects Specification | | |
|---|---|---|
| | S.D. | Rho |
| Cross-section random | 1.112519 | 0.2348 |
| Idiosyncratic random | 2.008213 | 0.7652 |

| Weighted Statistics | | | |
|---|---|---|---|
| R-squared | 0.580919 | Mean dependent var | 2.886413 |
| Adjusted R-squared | 0.537264 | S.D. dependent var | 2.909938 |
| S.E. of regression | 1.979476 | Sum squared resid | 188.0796 |
| F-statistic | 13.30725 | Durbin-Watson stat | 2.042027 |
| Prob(F-statistic) | 0.000000 | | |

| Unweighted Statistics | | | |
|---|---|---|---|
| R-squared | 0.550831 | Mean dependent var | 5.598519 |

| | | | |
|---|---|---|---|
| Sum squared resid | 223.1091 | Durbin-Watson stat | 1.721416 |