DETERMINANTS OF NONPERFORMING LOAN: An EMPIRICAL STUDY ON COMMERCIAL BANKS OF ETHIOPIA

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Statement of Certification

This is to certify that Anisa Ummer Mohammed has carried out her research work on the topic entitled ― Determinants of Nonperforming loan: An Empirical study on commercial banks of Ethiopia. The work is original in nature and is suitable for submission for the reward of the M.Sc Degree in Accounting and Finance.

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Statement of Declaration

I, Anisa Umer, have carried out independently a research work on ― Determinants of nonperforming loan: An Empirical study on commercial banks of Ethiopia in partial fulfillment of the requirement of the M.SC program in Accounting and Finance with the guidance and support of the research advisor.

This study is my own work that has not been submitted for any degree or diploma program in this or any other institution.

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Abstract

Banks while making profits, encounter several risks. Nowadays, one of the most important risks is default risk, which leads to increase in non-performing loans (NPLs). As the lending process affects not only the banking activity, but also the development process, risks should be avoided as much as possible.

The current study investigated the Determinants of Nonperforming Loan in Ethiopian Commercial Banks. The study aimed to test and confirm the effectiveness of common commercial banks non-performing loan determinants and how it affects the level of nonperforming loan in Ethiopia commercial banks during the past ten consecutive years. Balanced fixed effect panel regression was used for the data of eight commercial banks (two public owned and six private owned banks). The study period covered from 2004 to 2013. Seven factors (four bank specific and three macroeconomic factors) affecting banks nonperforming loan were selected and analyzed. The results of balanced fixed effect panel data regression analysis showed that deposit rate, loan to deposit ratio and lending interest rate had positive and significant impact on banks nonperforming loan. According to the regression result lending interest rate is a very important determinant of nonperforming loan in Ethiopia banking industry. Cost efficiency had negative and significant impact on banks nonperforming loan. Bank solvency ratio and gross national product (GDP) growth rate ad inflation rate had negative and statistically insignificant impact on banks nonperforming loan. The study then suggests that banks loan officers should constantly monitor each borrower's circumstances to detect loan problems before they become uncorrectable.

Key words: commercial banks, loan and advance and nonperforming loan

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List of Acronyms

AIB: Awash International Bank

BUIB: Buna International Bank

BOA: Bank of Abyssinia

CEF – Cost efficiency

CBB: Construction and Business Bank

CBE: Commercial Bank of Ethiopia

CLRM: Classical Linear Regression Model

DB: Dashen Bank

DR: Deposit rate

DW: Durbin-Watson

FEM: Fixed Effect Model

GDP: Gross Domestic Product

INF: General inflation rate

JB: Jarque-Bera

IR: Interest rate

LTD: Loan to deposit ratio

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NIB: Nib international Bank

NPL- Nonperforming loan

REM: Random Effect Model

SOLV: Solvency ratio

UB: United Bank

WB: Wogagen Bank

CHAPTER ONE

1.1. Background of the Study

Banks play a very important role in the economic development of every nation. They have control over a large part of the supply of money circulation and stimulus for the economic progress of a country. The financial sectors contribution to growth lies in the central role, they plays in mobilizing savings and allocating the resources efficiently to the most productive uses and investments in the real sector (Beck, 2001, sited in Joseph et.,al , 2004. p.467).

The lending function is considered by the banking industry as one of the most important function for the utilization of funds. Since, banks earn their highest gross profits from loans; the administration of loan portfolios seriously affects the profitability of banks. Indeed, large number of non-performing loans is the main cause of bank failure. Banks are learning to review their risk portfolios using the criteria laid down by Basel II. Basel's goal is to encourage bankers on improving their risk management capability, including how the institutions price products, reserve for loss, and control their operations (Rehm, 2002).

When we think about Bank's role, their financial health is the most important factor and it requires decisions about what to do with non- performing loans. The solidity of bank's portfolio depends on the health of its borrowers. In many countries, failed business enterprises bring down the banking system. Among other things a sound financial system requires minimum level of non- performing loans which in turn facilitates the economic development of one country. Non-performing loans have been a hindrance to economic stability and growth of the economies (Beck, 2001, sited in Joseph et.,al , 2004).

Because of controllable and uncontrollable factors, it is unlikely to have 100% of collection of loan. Controllable factors are bank specific factors that are controlled by firm level and reflect overall bank credit policy as well as inadequate credit analysis, loan structuring, and loan documentation, etc. Uncontrollable factors are external factors or macro economic factors that are not controlled by firm level. It reflect adverse economic conditions, adverse change in regulation, environmental change surrounding the borrower's operation, and catastrophic events. So, in reality some of the loan will be nonperforming (Daniel T, 2010).

There are a lot of empirical studies on factors that affect banks nonperforming loan by combining both bank specific and macroeconomic factors jointly and also examining these two factors separately. For bank specific factors, Podpiera and Weill (2008) examine empirically the relationship between cost efficiency and non-performing loans in the context of the Czech banking industry for the period 1994 to 2005. They conclude that there is strong evidence in favor of the bad management hypothesis[1] and proposed that regulatory authorities in emerging economies should focus on managerial performance in order to enhance the stability of financial system (by reducing nonperforming loans). On the other hand, the study focus only on macroeconomic factors of loan defaults through panel regressions and panel vector autoregressive models. Suggests that sharp increase in interest rates result in deterioration of borrower's repayment capacity and hence, cause of increase in non-performing loans (Nkusu, 2011).

Greenidge and Grosvenor (2010), argue that the magnitude of non-performing loans is a key element in the initiation and progression of financial and banking crises. Guy (2011) agrees arguing that non performing loans have been widely used as a measure of asset quality among

[1] Low cost efficiency (high cost inefficiency) signals of the current poor performance of the senior managers in managing day to day activities and loan portfolio.

lending institutions and are often associated with failures and financial crises in both developed and developing world. Reinhart and Rogoff (2010) as cited in Louzis et al (2011) pointed out that non- performing loans can be used to mark the onset of banking crisis.

Authors like Salas and Saurina (2002) study by combining macroeconomic and firm level variables to explain NPLs in Spanish Commercial and Savings Banks (for the period 1985-1997). They estimated a statistically insignificant effect of lagged efficiency on problem loans (probably as a consequence of the counteraction of 'bad management and 'skimping'[2] effects) and a negative influence of lagged solvency ratio to NPLs which is consistent with the moral hazard hypothesis[3]. In addition, they found a *'size'* effect i.e. large banks seem to have fewer NPLs.

Another similar study made by Rajan & Dhal (2003) by using regression analysis for Indian banks concluded that both macroeconomic and bank specific factors have significant impact over NPLs rate. From macroeconomic factors such as, GDP growth rate and bank specific factors like maturity, bank size, credit orientation, and credit terms were included.

Generally, by taking into account the above literature one can suggest that there is a robust association between banks NPLs and several bank specific variables along with macroeconomic variables. From bank specific variables some of them are efficiency of the management, risk appetite and liquidity level, profitability, deposits and lending rates, bank size etc. have significant influence on the NPLs. However, the uniqueness of banking sector, banking polices, efficiency maximization efforts and risk reduction polices also have significant impact on the quality of loans. From the external or macro level factors, unemployment rate, real GDP growth

[2] Resource allocated for monitoring loans and underwriting affects the cost efficiency and loan quality of the banks and leads to the growth in NPLs.

[3] Imply that with the increase in loan to asset ratio (low financial capital) banks chance of insolvency increases due to the mismanagement of assets by banks in long run.

rate, inflation rate, real exchange rate, real interest rate etc. have a significant impact on the rate of NPL.

In our country the most important functions of commercial banks in the area of financial intermediations are deposit mobilization and lending activities. As it is obviously known that among the three major financial institutions operating in Ethiopia the dominant one is the banking sector which takes the lion's share in respect of loans and advances. The Regulatory body, NBE (National Bank of Ethiopia), has become more determinant factor in the day to day activity of the Commercial banks in Ethiopia. The Government will assume so many macroeconomic issues like inflation, in addition to the negative impact of the regulation in the performance of the Commercial banks, and assume it is justifiable cost the banks are paying because of the regulation. The government believes that the profitability and sustainability of privately owned commercial banks are mainly arise from the safe business floor created by the regulation and take in to consideration that most of commercial banks failures are caused by NPLs (Daniel T, 2010).

In light with the above points, the general objective of the study is to examine the determinants of nonperforming loan (NPLs) in Ethiopia commercial banks, by combining both bank specific and macroeconomic factors. The study used ten years audited financial statements of selected commercial banks (both public and private) from 2004 to 2013.

1.2. Background of the Study Area

Modern banking in Ethiopia was introduced in 1905 when Bank of Abyssinia was established. 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. 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. After the libration in 1942, the State Bank of Ethiopia was established. It became operational in 1943. The bank also acted as the country's main commercial bank, while a few much smaller foreign banks continued to operate. The country's first development bank was founded in 1951. The World Bank provided $2 million towards the founding Development Bank of Ethiopia (DBE), and invested a further $2 million in 196079.

In 1963, a new banking law split the functions of the State Bank of Ethiopia in to central and commercial banking as the National Bank of Ethiopia and the Commercial Bank of Ethiopia respectively. Both were government- owned. The 1963 law allowed for other commercial banks to operate, including foreign banks provided that they were 51% owned by Ethiopians. The biggest of theses was the Addis Ababa Bank .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 were formed.

With the overthrow of the Derg Regime in 1991, Ethiopia began its transition to a market economy. This transition has had profound implications for financial system. New financial system has been expanded, and the role of central bank is being formulated81.

During the socialist period, the government nationalized the small commercial banks and concentrated them into the Commercial Bank of Ethiopia (CBE). Commercial Bank of Ethiopia (CBE) and the other government banks were obliged to lend to public enterprises according to government instructions, which were in turn based on central planning. The CBE could not refuse credit in these circumstances, regardless of whether its credit assessment was positive or negative. The CBE made no provisions against lending to public enterprises during the relatively short period when debt service was in arrears (with the exception of lending to the construction sector, for which provisions were made after 1990). In practice, the CBE clearly expected the government to carry any unrecovered losses eventually. The losses incurred from lending to the construction sector have been 'presented' to government, which is expected to issue bonds in their place. Therefore there was a second line of defense in the CBE's lending to parastatals, namely, that it expected to be compensated for the cost of any bad debts resulting from the lending it had been instructed to undertake. Considering the extent of loan advances given by CBE, it would have been possible for bad debts to have rendered the CBE insolvent. On the published evidence, this did not happen. Cumulative provisions were much greater than bad debts(J. Taylor.1999).

After the fall of the Derg regime, financial liberalization started to take place. The CBE remained in 100% government ownership, but it was given greater autonomy in lending activity, especially

from September 1994. Financial reform began in earnest in 1994. Ethiopian National Bank's (NBE) role in overseeing the commercial banks was codified. Sector-specific interest rates administered by NBE were also ended, and replaced with a minimum deposit rate (10 per cent) and a maximum lending rate (15 per cent). The domestic private sector was permitted to enter the banking and insurance business (foreign financial institutions are not yet permitted to invest). The response to these reforms has been promising84. This is because there are now many private banks being established and already working in the banking sector.

During the series of financial sector reforms, private banks were allowed to be reestablished. But during that time, the three large state-owned banks continued to dominate the market in terms of capital, deposits and assets.

It can be seen that the share of assets of private banks grew from 6.4 percent in 1998 to 30.4 percent in 2006. This in turn implies that the share of state-owned banks significantly declined. Note, however, that the values of total assets increased from 1998to 2006 for both state-owned and private banks. This suggests that the Ethiopian banking sector has grown rapidly. The growth of private banks has been much faster than state owned banks, although more than two-thirds of assets are still held by state-owned banks, although more than two-thirds of assets are still held by state-owned banks it is also evident that private banks show generally better performance than state-owned banks. Throughout the years, private banks had higher return of asset than state-owned bank. The lending process also grows overtime creating a wider competition between different banks. But the undertakings of loan advancement by these banks are regulated.

All the banks are now regulated by the central bank which is the National Bank of Ethiopia. A central bank plays the most influential role in a country’s economic and financial development.

Generally, the primary role of a central bank is the same in all countries. It acts as a banker and financial advisor to the government as the nation's monetary authority, and is responsible to the government for promoting monetary stability in the country. To improve the stability of the financial system further, a central bank will act as a banker to the banking and other financial institutions in the country. Consequently, a central bank can influence the lending policy of commercial banks and thus debt recovery.

The National Bank of Ethiopia was reestablished by Proclamation No. 591/2008. The NBE under article 5(7) has the power to license and supervise banks. Furthermore, it has the right to exercise such other powers and functions to execute its purposes as central bank customarily perform. NBE also acts as a banker to other banks and the government.

As discussed in the previous chapter, one of the main important functions of a bank is giving a loan. And these loans have a capacity of affecting the whole financial sector. Accordingly, NBE issues different laws to control the activities of the banks regarding loans.

Soundness indicators of the banking system in Ethiopia show that:

- Capital adequacy ratio is well above the minimum requirement of 8% of risk weighted asset;
- The level of non-performing loans has substantially declined and is less than 5% for most of the banks, in line with the NBE directives;
- Return on equity which is to the tune of 30% is steadily improving;
- Exposure to foreign liabilities is very minimal; and
- All Banks register a positive profit after tax (NBE, 2013).

Although the banking industry in Ethiopia has about hundred years of experience, the sector is yet to develop and is still in its infancy or growing stage. The banking sector in Ethiopia provides

the most basic banking products including deposit facilities, loans and advances fund transfer (local /global), import/export facilities, and guarantees. Recently, most of the banks are striving to improve their service delivery through introducing different IT solutions. Recent trends also indicate that banks are competing in the market on the basis of branch expansion, advertisements, raising capital bases, improved service delivery, and investment on IT software and infrastructure. However, these technological innovations are at their infant stage and the sector is required to do much more to meet its customer expectations (NBE, 2010).

1.3. Statement of the Problem

Beyond the parochial question of bank profitability decisions to lend or not to lend banks influences the economic development of its community. As the lending process affects not only the banking activity, but also the development process, risks should be avoided as much as possible. As a matter of fact most bank failures may be traced to faulty policies in respect of loans and advances. From the point of safety and liquidity, loan and advances are poor assets. The risk mostly ensues when loans become non- performing.

The very nature of the banking business is so sensitive, because more than half percent of their liability is deposits from depositors. Banks use these deposits to generate credit for their borrowers, which in fact is a revenue generating activity for most banks. This credit creation process exposes the banks to high default risk which might lead to financial distress including bankruptcy because of NPLs. All the same, beside other services, banks must create credit for their clients to make some money, grow and survive stiff competition at the market place. Loans are forming a greater portion of the total assets in banks. These assets generate huge interest income for banks, which is to a large extent determines the financial performance of banks.

However, some of these loans usually fall into non-performing status and adversely affect the performance of banks. In view of the critical role banks play in an economy, it is essential to identify problems that affect the performance of these institutions. This is because non-performing loans can affect the ability of banks to play their role in the development of the economy (Saunders and Cornett, 2005).

In addition to the above statement in process of resources allocation, banks while making profits, encounter several risks. Nowadays, one of the most important risks is default risk, which leads to increase in non-performing loans (NPLs). The most important problems that country's banking system face is increasing of banks NPLs and consequently, reduction of liquidity, disruption of resources' allocation and finally reduction of bank's profit (Ghasemi, 2010).

Non-performing loans are one of the determinant factors for the soundness of the banking sector. At the same time nonperforming loan rate is the most important issue for banks to survive. The issue of non-performing loan has, therefore, gained increasing attentions since the immediate consequence of large amount of NPLs in the banking system is a cause of bank failure. It is accepted that the quantity or percentage of non-performing loan (NPLs) is often associated with bank failures and financial crises in both developing and developed countries. (Caprio and Klingebiel, 2002 sited in Wanjau K et al. 2011).

NPLs have impact on investment and level of employment on the community in the next step; these two factors make the country's economic growth unstable. Non-performing loans can lead to efficiency problems for banking sector. Of course, the adverse effects of NPLs have different dimensions and not restricted to these cases. First and most effective step to treatment of this chronic and epidemic pain is pathology and then finding of effective solutions for modifying and

improving of banks conditions as the country's greatest economic patient. Pathology of causes and factors that will raise NPLs amount and provision of practical solutions can reduce the damaging effect of NPLs on banks (Sinkey, 2002:90 sited in Biabani et al.,2012).

In Ethiopian context, Banks found in the country are required to maintain ratio of their non Performing loans below five percent (NBE, 2008). Although banks loan collection ability in Ethiopia increase from time to time, the average has not reached on the amount that are required by national bank of Ethiopia.

While quite a number of studies have been investigated on the determinants of NPL, most of these studies have been done in developed countries with few being done in developing countries. In Ethiopia as to the researcher knowledge, two studies were undertaken on the determinants of NPLs and management of NPLs.

Daniel .T (2010), focusing on management of non-performing loan on private commercial banks in Ethiopia. The study employed the mixed type of research. The result showed that credit policy and supervision by the management has less contribution to the NPLs and most of the NPLs are caused by factors after the loan released, like Moral hazard of the borrower, ineffective monitoring, and operational loss of the borrower has created high NPLs in private commercial banks in Ethiopia.

Wondimagegnehu N(2012) conducted a study on determinants of NPL, focusing only bank specific factors that cause NLPs by using mixed research method. The study conclude that poor credit assessment, failed loan monitoring, underdeveloped credit culture, lenient credit terms and conditions, aggressive lending, compromised integrity, weak institutional capacity, unfair competition among banks, willful default by borrowers and their knowledge limitation, fund

diversion for unintended purpose, over/under financing by banks ascribe to the causes of loan default. Even if both studies are a very recent one, the gaps are there that are not touched by both researchers and need further investigation by others.

The study made by Daniel(2010) focuses on NPLs management, not on its determinants and the study made by Wondimagegnehu N(2012) tried to see only bank specific factors (didn't see the macroeconomic factors) that affect the level of NPLs. This gap initiates the researcher to involve in this topic area. So the researcher wants to see the determinants of NPLs, by using both macroeconomic and bank specific variables and adopt a quantitative type research.

1.4. Objective of the Study

1.4.1. General Objective

In the context of the problems highlighted above, the general objective of the study is to determine bank specific and macroeconomic factors that could affect banks NPLs and to examine the relationship between these factors with the rate of banks NPLs.

1.4.2. Specific Objective

Furthermore, the specific objectives of this study are:

- To examine the trend of NPLs in Ethiopia commercial banks;
- To examine the impact of cost efficiency, banks solvency, deposit rates and loan to asset ratio on the growth of NPLs;
- To analyze the significance of the above bank specific NPLs determinants on Ethiopian commercial banks ;

- To examine the impact of real GDP growth rate, lending interest rate and inflation rate on the growth of NPLs;
- Analyze the significance of the above macroeconomic NPLs determinants on Ethiopia commercial banks.

1.5. Research Question and Hypothesis

1.5.1. Research Question

RQ: what are bank specific and macroeconomic determinants of non-performing loan in Ethiopia commercial banks?

1.5.2. Research Hypothesis (RH)

Hypothesis is developed after supporting theoretical framework or comes from prior literature and studies on the topic, so as to answer specific research question and to achieve the general objective, the current study proposed the following research hypothesis.

- H1: There is a negative relationship between cost efficiency and NPLs.
- H2: There is a negative relationship between solvency ratio and NPLs.
- H3: There is a positive relationship between deposit rates and NPLs.
- H4: There is a positive relationship between loans to deposit ratio NPLs.
- H5: There is negative relationship between real GDP growth rate and NPLs.
- H6: There is a positive relationship between lending interest rate and NPLs.
- H7: There is a positive relationship between inflation rate and NPLs.

1.6. Research methodology

In order to achieve the research objectives a quantitative research method adopted. The purpose of using such approach is, it is important to gather data that help the researcher to investigate cause-effect relationships. In this particular case, the effect is banks NPL ratio and the research is targeted at identifying significant causes, i.e. determinants on banks NPLs (both bank specific as well as macroeconomic factors).

To gather data on determinants of banks NPLs, it is obvious to use more of secondary data (audited financial statement of selected banks). For the reason that the ultimate data's for the study couldn't be found simply using questioner or face to face interviews with concerned bodies, thoroughly the study was depend on secondary data. On the other hand, once data were found and accepted, data entry and process was made using Eviews6 software. Analysis of data was undertaken to show important relationships of variables in the study. To this end, descriptive statistics, regression analysis(Balanced fixed effect panel regression model) and Pearson correlation coefficient was used.

1.7. Scope of the study

This study concentrated only on commercial banks which have ten years experience. Moreover the researcher wants to see factors that affect the level of NPLs on Ethiopia commercial banks. Therefore, the current study limits its coverage on the possibility of nonperforming loan and factor that influence the level of nonperforming loan in Ethiopia commercial banks for the past ten consecutive years, that is, from 2004 to 2013. The research data was based on intensive secondary data review.

1.8. Limitation of the study

While doing this research, the researcher encounter various problems, from these problems the most dominant ones are owing to the nature of the subject area, i.e., excessive confidentiality, and because of limited access, it wouldn't easy to get all relevant information from respective banks. Budget problem and time constraints were other prominent factors that face the researcher while doing this paper. However, the above resistant factors make this study difficult; the researcher hopes that readers will get some valuable ideas from the outcome of this study.

1.9. Significance of the study

The findings of this research are expected to contribute a lot for different stakeholders. The following are significance of this study:

- The current study benefits the researcher to obtain new knowledge about problems under the study and gives clear picture about the discipline.
- This study help to present the current picture of NPLs in Ethiopia commercial banks and it also helps to show the significant factors (internal as well as external) that determine commercial banks NPLs in Ethiopia
- The study serve as a starting point for other studies, which may focus on similar topics and issues related to nonperforming loan in general and factors that influence the level of nonperforming loan in Ethiopia baking industry in particular.
- Furthermore, the study will enable commercial banks (lender s) how to overcome potential factors that are highly affects the level of nonperforming loan in Ethiopia banking industry.

1.10. Definition of terms

- **Financial capital:** Financial capital or just capital in finance and accounting, is funds provided by lenders (and investors) to businesses to purchase real capital equipment for producing goods/services. Real capital or economic capital comprises physical goods that assist in the production of other goods and services.
- **Gross Domestic Product**: GDP is a measure of the income and expenditures of an economy. It is the total market value of all final goods and services produced within a country in a given period of time.
- **Inflation:** Inflation can be defined as a sustained or continuous rise in the general price level or, alternatively, as a sustained or continuous fall in the value of money.
- **Loan or advance:** according to NBE loan directive 2007, loans" or "Advances" means any financial assets of a bank arising from a direct or indirect advance (i.e. unplanned overdrafts, participation in loan syndication, the purchase of loans from another lender, etc.) or commitment to advance funds by a banks to a person that are conditioned on the obligation of the person to repay the funds, either on a specified date or dates or on demand, usually with interest.
- **Nonperforming loan:** according to NBE loan directive 2007, "Nonperforming loan means 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 advance is in question.

- **Lending interest rate:** Interest rate is the price a borrower pays for the use of money they borrow from a lender/financial institutions or fee paid on borrowed assets. Interest can be thought of as "rent of money".

1.11. Organization of research report

Research report is organized according to the following chapters. Chapter one discusses on introduction of the study that would give a brief overview of nonperforming loan. The chapter also discusses on objectives of the study, research questions, research hypothesis, research method adopted, scope and significance of the study. Chapter two shows an exhaustive literature review conducted on relevant studies. The review included both theories and empirical studies on the subject area. Chapter three describes the research methodology. It explains the research design, the sample population, data collection method, measuring instruments and data analysis techniques. Similarly, chapter four also discuss on result and summary of the study. Based on the results of the study the last chapter (chapter five) gives a brief conclusions and recommendations.

CHAPTER TWO

2. Review of Related Literature

Introduction

The preceding chapter deals on the introductory part of the study i.e. the motive behind conducting this study. The purpose of this chapter is to review the existing literatures concerning on the area of NPLs(nonperforming loans) and factor that affect the level of NPLs i.e. internal (bank specific) as well as external (macroeconomic) factor in the banking industry. The current chapter has three sections and organized as follows. The first section (2.1) presents the theoretical reviews on NPLs; it includes nature and definition of NPLs, Classifications of Loans and advances and theories on bank loan and cause for loan default. Second section (2.2) similarly reviews different empirical results regarding the impact of various banks specific and macro level factors on the growth of nonperforming loan rate. Finally, section three (2.3) deals with conclusion of the chapter and knowledge gap that inspire this study.

2.1. Theoretical Review

In the past decades there have been major advances in theoretical understanding on the role of credit markets. These advances have evolved from a paradigm that emphasis the problems of imperfect information and imperfect enforcement (Hoff and Stiglitz, 1990). They pointed out that borrowers and lenders may have differential access to information concerning a projects risk, they may form different appraisal of risk. So what is clearly observed in credit market is asymmetric information, where the borrower knows the expected return and risk of his/her project, where as the lender knows only the expected return and risk of the average project in the economy.

Four common problems that faced lending institutions such as banks in the course of undertaking credit activity are:

- To find out what kind of risk the potential borrowers have (adverse selection).
- To make sure that borrower will utilize the loan properly once made, so that he/she will be able to repay it (moral hazard).
- To learn how the project really did in case the borrower declares his/her inability to repay and,
- To find methods to force the borrower to repay the loan if the borrower is reluctant to do so (enforcement).

From the above problem imperfect information and enforcement leads to inefficiency of credit market which in turn leads to loan default. Thorough credit assessment that takes into account the borrowers` character, collateral, capacity, capital and condition (what is normally referred to in the banking circles as the 5C`s) should be conducted if they are to minimize credit risk (Ghatak and Guinnane, 1999).

Banks in many developing countries hold a truly an alarming volume in non-performing loan. The differences between promised and actual repayments on loans are the result of uncertainty concerning the borrower's ability or willingness to make the repayments when they are due which creates the risk of borrowers default (Pischke, 1991; Vigano, 1993; Kitchen, 1989). The inapplicability of the standard demand and supply model for credit market give rise to credit rationing phenomena. Credit rationing as defined by Jaffee (1971) is the difference between the quantity of loans demanded and loans supplied at the ruling interest rate. In this case lending institutions make use of their own screening criteria to identify credit worthy borrowers so as to decrease the probability of default.

The probability of regular repayment depends on objective factors related to the borrower's operating environment, the borrower's personal attitude towards loan obligation, and the bank's ability to evaluate these two aspects through the information it has and to control credit risk specific contractual conditions. The author argues that the failure of lending agencies in playing their roles in loan disbursement and recovery process is a major contribution to loan default. Determining credit worthiness requires investment of time and resources to evaluate firm specific and industry wide variable, structural or cyclical, by analysts with specific professional skills. A mistake on the evaluation of the borrowers' characteristics or the introduction of inappropriate loan conditions may increase the total risk of the transaction (Vigano, 1993).

2.1.1. Nature and Definition of Nonperforming Loan

The principal activity of commercial banks is making loans to its customers. In allocating funds, the primary objective of bank management is to earn income while serving the credit needs of its community. Lending represents the heart in banking industry. Loans are the dominant asset and represent fifty percent to seventy five percent to the total amount of banks assets. In most banks loans generate the largest share of operating income and represent banks greater risk exposure (Mac Donald and Koch, 2006).

Loans and advances are the most profitable of all assets of a bank. These assets constitute the primary source of income by banks. As a business institution, a bank aims at making a giant profit. Since loans and advances are more profitable than any other assets, it is willing to lend as much of its funds as possible. But banks have to be careful about the safety of such advances (M. Radha, and SV. Vasudevan. 1980). from management accounting point of view, bank asset quality and operating performance are positively related. If a bank's asset quality is inadequate (*e.g*. the loan amount becomes the amount to be collected), the bank will have to increase its bad

debt losses as well as spend more resources on the collection of non-performing loans, this increase non-performing loans (Hassan.S.2010).

Non-Performing Loan (NPL) is one of the concrete embodiments of credit risk which banks take. The high amount of NPLs represents high credit risk in today banking system and this encounters banks with market risks and liquidity risk. They have greater implication on the function of banks as well as overall financial sector development (Ekrami and Rahnama, 2009). In line with the above idea Daumont .et. al (2004) found the accumulation of nonperforming assets to be attributable to economic downturns and macroeconomic volatility, terms of trade deterioration, high interest rates, excessive reliance on overly high-priced interbank borrowings, insider lending and moral hazard. HR Machiraju (no date) sited in Wondimagegnehu N (2011) clearly point out non- performing loans as a leading indicator of credit quality for banks. Bhide, *et.al.* (2003) has noted among various indicators of financial stability, banks' non-performing loan assumes critical importance since it reflects on the asset quality, credit risk and efficiency in resources allocation to productive sectors.

Historically, the occurrence of banking crises has often been associated with a massive accumulation of non-performing loans which can account for a sizable share of total assets of insolvent banks and financial institutions, especially during a period of systemic crises. Non-performing loans generally refers to loans, which for a relatively long period of time do not generate income; that is the principal and/or interest on these loans has been left unpaid for at least 90 days. The economic and financial costs of bad loan are significant. Potentially, these loans may negatively affect the level of private investment, increase deposit liabilities and constrain the scope of bank credit to the private sector through a reduction of banks' capital, following falling saving rates as a result of runs on banks, accumulation of losses and correlative

increased provisions to compensate for these losses. Impaired loans also have potential for reducing private consumption, and in the absence of deposit guarantee mechanisms to protect small depositors can be a source of economic contraction, especially when coupled with declining gross capital formation in the context of a credit crunch caused by erosion of banks' equity and asset (Fofack, 2005).

When lending funds are lend their money to the borrowers who are willing to pay higher rates to earn large amount of profit increases the risk exposure of banks, which can be considered negligence on the part of mangers, because they prefer the short term profits and ignore the future loan defaults (Ahmad F and Bashir T 2013. p.1221).

Criterion for identifying non performing loans varies throughout the world even between African countries. Some countries use quantitative criteria to distinguish between "good" and "bad" loans (e.g., number of days of overdue schedule payments), while others rely on qualitative standards (such as the availability of information about the client's financial status, and perspectives about future payments). However, the Basel II Commission emphasizes the need to evolve toward a standardized and internal rating-based approach (Fofack, 2005). Accordingly, the Basel committee puts non performing loans as loans left unpaid for a period of 90 days.

The definition of NLP varies across countries; there is no global standard to define non-performing loans at practical level. Saba I**,** et al. (2012:127) argues that non-performing loan (NPL) is a sum of borrowed money upon which the debtor has not made his or her scheduled payments for at least 90 days. Nonperforming loan is either in default or close to being in default. Once a loan is nonperforming, the loans that it will be repaid in full are considered to be substantially lower. If the debtor starts making payments again on a nonperforming loan, it

becomes a re-performing loan, even if the debtor has not caught up on all the missed payments. This is why most countries provide their own rules regarding NPLs. performing loans are further defined as loans whose cash flows stream is so uncertain that the bank does not recognize income until cash is received, and loans those whose interest rate has been lowered on the maturity increase because of problem with the borrower.

Caprio and Klingebiel (1996), cited in Fofack (2005), who define non performing loans as those loans which for a relatively long period of time do not generate income that is, the principal and or interest on these loans have been left unpaid for at least ninety days. The authors further supported that non performing loans are the loans which are not generating income. Non-performing loans are also commonly described as loans in arrears for at least ninety days and non performing loans have been widely used as a measure of asset quality among lending institutions and often associated with failures and financial crises in both developed and developing world (Guy, 2011).

The term "bad loans" as described by Basu (1998) is used interchangeably with non- performing and impaired loans. Despite ongoing efforts to control bank lending activities, non performing loans are still a major concern for both international and local regulators (Boudriga et al, 2009). Greenidge and Grosvenor (2010), again argue that the magnitude of non-performing loans is a key element in the initiation and progression of financial and banking crises. In consistence with the above authors, Reinhart and Rogoff (2010) as cited in Louzis et al (2011) pointed out that, non- performing loans can be used to mark the onset of a banking crisis. According to Berger and De Young (1997) sited in Joseph M, et al., (2012), non performing loans could be harmful to the financial performance of banking institutions.

Nonperforming loan is also defined from institutional point of view. According to the IMF, a non-performing loan is any loan in which interest and principal payments are more than 90 days overdue; or more than 90 days' worth of interest has been refinanced, capitalized, or delayed by agreement; or payments are less than 90 days overdue, but no longer anticipated. Another definition of a non-performing loan is one in which the maturity date has passed but at least part of the loan is still outstanding. The specific definition is depending upon the loan's particular terms. Non -performing loans can also be defined as defaulted loans, which banks are unable to profit from it. Usually loans fall due if no interest has been paid in 90 days, but this may vary between different countries and actors. Defaulted loans force banks to take certain measures in order to recover and securitize them in the best way[4].

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, 2007). It further provides that:

> *…, loans or advances with pre established repayment programs are nonperforming when principal and/ or interest is due and uncollected for 90 (ninety) consecutive days or more beyond the scheduled payment date or maturity.*

Therefore, loans become nonperforming when it cannot be recovered within certain stipulated period of time that is governed by some respective laws.

[4] Access April 8, 2014 http://financial_dictionary.thefreedictionary.com/Non+Performing+Loan.

Generally, from the above definition NPL is:

i. A loan that is not earning income;

ii. Full payment of principal and interest is no longer anticipated;

iii. Principal or interest is 90 days or more delinquent or;

iv. The maturity date has passed and payment in full has not been made.

In Ethiopia the criteria of NPL is in accordance with the Basel rules. If a loan is past due 90 consecutive days, it will be regarded as non- performing. The criteria used in Ethiopian banking business to identify non-performing loan is a quantitative criteria based on the number of days passed from loan being due.

2.1.2. Classifications of Loans and Advances

Loan can be classified as performing and non-performing. Performing loan is loan that Payments of both principal and interest charges are up to date as agreed between the creditor and debtor. Generally, loans those are outstanding in both principal and interest for a long time contrary to the terms and conditions contained in the loan contract are considered as NPLs.

To identify the loans which are non- performing and to calculate and determine the amount of provisions according to loans directive number SBB/43/2007 loans are classified into five class.

1. **Pass:** Loans or advances that are fully protected by the current financial and the paying capacity of borrower and are not subject to criticism. In other word passed means loans paid back.
2. **Special Mention:** Past due for more than 30 days but less than 90 days. Special mention class of loans implies Loans to incorporations, which may get some trouble in the repayment due to business cycle losses.

3. **Substandard:** Past due for more than 90 days but less than 180 days. Substandard signify Loans whose interest or principal payments are longer than three months in arrears of lending conditions are eased.
4. **Doubtful:** Past due for more than 180 days but less than 360 days. Doubtful indicate that full liquidation of outstanding debts appears doubtful and the accounts suggest that there will be a loss.
5. **Loss:** Past due over 360 days, in other word loss imply that outstanding debts are regarded as not collectable.

Non-performing loans comprise the loans in the last three categories (Substandard, Doubtful and Loss), and are further differentiated according to the degree of collection difficulties.

As per the directive No. SBB/43/2007 Minimum provision percentage against outstanding principal amount of each loan or advance classified in accordance with the criteria for the classification of loan or advance on the above. Below the table show that the minimum percent of provision for NPLs.

Classification category	**Minimum provision**
Pass	1%
Special mention	3%
Substandard	20%
Doubtful	50%
Loss	100%

Source: Directive No. SBB/43/2007

2.1.3.Theories on Bank Loan

2.1.3.1. Loan Pricing Theory

Banks cannot always set high interest rates, e.g. trying to earn maximum interest income. Banks should consider the problems of adverse selection and moral hazard since it is very difficult to forecast the borrower type at the start of the banking relationship (Stiglitz and Weiss, 1981). If banks set interest rates too high, they may induce adverse selection problems because high-risk borrowers are willing to accept these high rates. Once these borrowers receive the loans, they may develop moral hazard behavior or so called borrower moral hazard since they are likely to take on highly risky projects or investments (Chodecai, 2004). According to loan pricing theory setting too high interest rate increase the chance of loan default, consequently it boosts the rate of nonperforming loan. According to loan pricing theory interest rate have a positive and significant impact on the rate of NPL.

2.1.3.2. Hold-up and Soft-Budget-Constraint Theories

Banks choice of multiple-bank lending is in terms of two inefficiencies affecting exclusive bank-firm relationships, namely the hold-up and the soft-budget-constraint problems. According to the hold-up literature, sharing lending avoids the expropriation of informational rents. This improves firms' incentives to make proper investment choices and in turn it increases banks' profits (Von Thadden, 2004; Padilla and Pagano, 1997). As for the soft-budget-constraint problem, multiple-bank lending enables banks not to extend further inefficient credit, thus reducing firms' strategic defaults. Both of these theories consider multiple-bank lending as a way for banks to commit towards entrepreneurs and improve their incentives. Signaling argument states that banks only require collateral and or covenants for relatively risky firms that also pay higher interest rates (Chodechai, 2004; Ewert and Schenk, 1998).

2.1.3.3. Credit Market Theory

The theory postulates that if collateral and other pertinent restrictions remain given, then it is only the lending rate that determines the amount of credit that is dispensed by the banking sector. Therefore, with an increasing demand for credit and a fixed supply of the same, interest rates will have to rise. Any additional risk to a project being funded by the bank should be reflected through a risk premium that is added to lending rate to match the increasing risk of default. Subsequently, there exist a positive relationship between the default probability of a borrower and the interest rate charged on the advance. It is thus believed that the higher the failure risks of the borrower, the higher the interest premium (Ewert et al, 2000). Credit market theory is directly support the idea of loan pricing theory.

2.1.4. Determinants of Nonperforming Loan

Despite the fact that loan is major source of banks income and constitutes their major assets, it is risky area of the industry. That is also why credit risk management is one of the most critical risk management activities carried out by firms in the financial services industry. In fact, from all risks banks face, credit risk is considered as the most dangerous as bad debts would impair banks profit. It has to be noted that credit risk arises from uncertainty in a given counterparty's ability to meet its obligations. The solidity of bank's portfolio depends on the health of its borrowers. In many countries, failed business enterprises bring down the banking system (Alemu, 2001, sited in W. N. Geletta, 2011). A sound financial system, among other things, requires maintenance of a low level of non- performing loans which in turn facilitates the economic development of a country.

It is widely accepted that the quantity or percentage of non-performing loans (NPLs) is often associated with bank failures and financial crises in both developing and developed countries. In

fact, there is abundant evidence that the financial/banking crises in East Asia and Sub-Saharan African countries were preceded by high non-performing loans. The current global financial crisis, which originated in the US, was also attributed to the rapid default of sub-prime loans/mortgages. In view of this reality it is therefore understandable why much emphasis is placed on non-performing loans when examining financial vulnerabilities (Sorge, 2004).

Allocating loans has always been one of the central pillars of the banking business. Traditionally this marked the start of a long term relationship with the client, which would continue at least until the maturity of the loan. With the growth of deposits, banks are supposed to increase their lending. However, when non-performing loans (NPLs) are high, the willingness to expand loan reduces. This relationship will be distorted under high NPL condition (Dickinson D and Hou Y. 2009). In any lending process, there is inherent risk of loans being defaulted which leads to the concept of non- performing loans.

The literature identifies two sets of factors to explain the evolution of NPLs over time. One group focuses on external events such as the overall macroeconomic conditions, 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.

2.1.4.1. Cost efficiency

Hughes et al. (1995) link risk taking to banks' operating efficiency. The argument is that risk-averse managers are willing to trade off reduced earnings for reduced risk, especially when their wealth depends on bank performance. In order to improve loan quality, bank will increase monitoring and incur higher costs, affecting the measure of operating efficiency. Therefore, a

less efficient bank may in fact hold a low risk portfolio. When banks list the loan amount for collection, they will incur extra operating costs from non-value-added activities to handle and supervise the collection process. These non-value-added activities consist of constantly tracking the debtor's financial status, being cautious of the collateral value, discussing the amortization plan, paying expenses for contract negotiation, calculating the costs to withhold, deposit and dispose of collateral at the time the loans become non-payable. Basically, non- performing loans are a result of compromise objectivity of credit appraisal and assessment. The problem is aggravated by weakness in accounting disclosure and grant of additional loans. In assessment of current loans status, the borrower's credit worthiness and the market value of collateral are not taken into account thereby rendering it difficult to spot bad loans (Tihitina A, 2009). On the other hand, Berger and DeYoung (1997) also suggested efficiency of the banking firms might affect the non-performing loans in the banking industry. Therefore, banks' inefficiencies might lead to higher non-performing loans.

2.1.4.2. Solvency

Comptrolle's Handbook (1998), states that lending is the principal business activity for most commercial banks. The loan portfolio is typically the largest asset and the predominate source of revenue. As such, it is one of the greatest sources of risk to a bank's safety and soundness. Since loans are illiquid assets, increase in the amount of loans means decrease bank solvency. According to Pilbeam (2005, p. 42), in practice the amount of liquidity held by banks is heavily influenced by loan demand that is the bases for loan growth. If demand for loans is weak, then bank tends to hold more liquid assets (i.e. short term assets), whereas if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable. Therefore, bank solvency has negative impact on banks nonperforming loan and vice versa.

According to Brown, Mallett and Taylor(1993), bad loans (NPLs) cause, reducing the capital resource of the bank, affects its ability to grow and develop its business . Disclosure of the extent of losses in its financial statements may lead to a loss of confidence in the bank's management and a reduction in its credit ratings. This will in turn increase the bank's cost of borrowing in the wholesale market and make it more expensive or more difficult to raise capital. In extreme cases, it can lead to a loss of deposits, withdrawal of the bank's authorization and ultimately insolvency.

2.1.4.3. Deposit Rate

During intensive competition banks offers a competitive deposit rates to attract funds and charge marginal costs to the borrowers. Banks offering higher deposits rates have greater share of deposits and lower interest rate spreads, whereas banks offering lower deposits rates have small share of deposits and higher interest rate spread. Thus it can be concluded that market concentration is significantly positively associated with interest rate spread. The banks with lower capitalization and high risk increases their customers by offering higher competitive rates and have lower interest rate spread (Berger, A.N., R et al. 2004). Uhde and Heimeshoff (2009) argued that short term increases in interest rates to deposit rates increase the banks costs of funds, resulting in the higher interest demand on loans. The growth in lending rates is positively correlated with loan defaults, thus results in growth of banks NPLs.

2.1.4.4. Interest Rate

Lending Interest rate as a price of money reflects market information regarding expected change in the purchasing power of money or future inflation (Ngugi, 2001). Monetary contraction and interest rate increase reduce spending directly; both also reduce spending indirectly by shrinking bank loan supply (Bernanke and Blinder, 1988). Many of the bad debts were attributable to

moral hazard: the adverse incentives on bank owners to adopt imprudent lending strategies, in particular insider lending and lending at high interest rates to borrowers in the most risky segments of credit markets. Bank lending rates are mostly seen as being rigid for the reason that they do not move in tandem with the markets. A number of explanations have been suggested to account for the rigidity in bank lending rates. In the case of loans, the rigidity has been as a result of the rationing of credit to borrowers owing to the fact that there are problems of asymmetric information (Blinder and Stiglitz, 1983). Indeed, financial markets are not perfect; in the presence of adverse selection and moral hazard issues, banks are more likely to opt for credit rationing than to adjust their lending rates in a situation where there has been an upward adjustment of interest rates by the central bank. It may also be possible that when large banks capture large market share, the impact of tight monetary policy on bank lending will be minimal.

Bloem and Gorter (2001) agreed that "bad loans" may considerably rise due to abrupt changes in interest rates. They discussed various international standards and practices on recognizing, valuing and subsequent treatment of non-performing loans to address the issue from view point of controlling, management and reduction measures. A study conducted by Espinoza and Prasad (2010) focused on macroeconomic and bank specific factors influencing non-performing loans and their effects in GCC Banking System. After a comprehensive analysis, they found that higher interest rates increase non performing loans but the relationship was not statistically significant.

The interest rate affects the difficulty in servicing debt, in the case of floating rate loans. This implies that the effect of the interest rate should be positive, and as a result the increasing debt burden caused from rising interest rate payments should lead to a higher number of NPLs.

2.1.4.5. Gross Domestic Product

The performance of any types of loans is highly related to country's economic condition. Keeton and Morris (1987), who investigated the fundamental drivers of loan losses for a sample of nearly 2,500 US commercial banks for the period 1979 to 1985 using simple linear regressions, had already demonstrated that local economic conditions explained the variation in loan losses recorded by banks. To support the above empirical study, Sinkey and Greenwalt(1991) by employing a simple log-linear regression model and data of large commercial banks in the United States from 1984 to 1987. Report that depressed regional economic conditions also explain the loss-rate (defined as net loan charge offs plus NPLs divided by total loans plus net charge-offs) of the commercial banks. Carey (1998) sited in Joseph, Mabvure T et al, (2012.p.474) also report similar results and suggests that the state of the economy is the single most important systematic factor influencing diversified debt portfolio loss rates. A strong economic condition measured by GDP, as motivating factor to banks has statistically significant impact on issuance of more private credit to businesses. A strong economic condition creates more demand for goods and services which lead to more investment in different sectors hence increase the per capita income as well as the savings, collectively these factors convince to banks to issue more private credit (kashif and mohammed, undated).

2.1.4.6. Rate of Inflation

Macroeconomic instability which is mostly manifested by high inflation rate also makes loan appraisal more difficult for the bank, because the viability of potential borrowers depends upon unpredictable development in the overall rate of inflation. Moreover, asset prices are also likely to be highly volatile under such conditions. Hence, the future real value of loan security is also very uncertain that banks do poorly both when product and asset price prudential policy,

inflation accelerates unexpectedly, unemployment increases, and/or aggregate output and income decline unexpectedly. Unexpected accelerations in inflation adversely affect banks performance, by increasing the rate of loan default and decreasing banks profit (Martin Brownbrigde, 1998, sited in W. N. Geletta, 2011).

A growing theoretical literature describes mechanisms whereby even predictable increases in the rate of inflation interfere with the ability of the financial sector to allocate resources effectively. More specifically, recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector (both banks and equity market) performance and therefore long-run real activity (Huybens and Smith 1998, 1999). The common feature of these theories is that there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans because their loan is not secure, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. Hence, there is a positive relationship between increase in inflation rate and nonperforming loan.

Causes of nonperforming loan extends from borrowers specific act to bank's weak regulatory mechanism in advancing loans and monitoring procedures. Credit/loan contracts specify the amount borrowed, the interest and non-price terms like collaterals, which constrain the borrower in order to reduce default. As the terms of contract change the behavior of the borrower is likely to change(Stiglitz 1990).

From the above theories information asymmetry have a lion share for banks loan default. The problem of asymmetric information between lenders and borrowers further complicates the matter. Besides that, the management might not be efficient in managing loan portfolios. Consequently, this leads to lower credit ratings for the approved loans and high probability of default resulting in higher non-performing loans. The authors like Gehrig and Stenbacka, (2007) stated that information sharing reduces adverse selection problems and thereby promotes financial stability; it serves as a borrower disciplining device and it reduces the informational rents that banks can extract within the framework of their established customer relationships.

In addition, Barth, Lin, Lin & Song (2008) show that information exchange will help in minimizing lending corruption in banks by reducing information gap between consumers and lenders, improving the bribery control methods and reducing informational rent, and hence the bargaining power of lenders.

Furthermore, Jentzsch (2008) clarify that sharing credit information between lenders increases competition and enhance access to finance. Credit information also acts as a borrower disciplining device, by cutting insolvent debtors off from credit and eliminates or reduces the borrower's incentive to become over-indebted by drawing credit simultaneously from many banks without any of them realizing it.

Generally, in developing and underdeveloped countries, the reasons for default have a multidimensional aspect. Various researchers have concluded various reasons for loan default.

2.2. Review of Related Empirical Study

The previous section presented theories of nonperforming loan focusing on definition, classification of NPL and determinant of NPL. This section reviews the empirical studies on the

determinants of NPLs. There are a number studies that examined the factors that affect the level of banks NPL from the perspective of both developing and developed nations.

As indicated in the above section, determinants of bank lending behavior may be classified into internal and external factors. External factors include gross domestic product, interest rates and inflation. Internal factors, on the other hand include capital, cost efficiency, loan to deposit ratio and deposit rate of banks. Both internal and external determinants studied by different scholars are reviewed in the following paragraphs.

In the banking literature, the problem of NPLs has been revisited in several theoretical and empirical studies. A synoptic review of literature brings to the fore insights into the determinants of NPLs across countries. A considered view is that banks' lending policy could have crucial influence on non-performing loans (Reddy, 2004 sited in Ranjan and Dhal, 2003.p. 83).

The internal determinants of banks NPLs are those management controllable factors which account for the inter-firm differences in NPLs, given the external environment. 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 **(**Daniel T, 2010**)**. Numerous literatures have examined the connection between bank-specific factors and NPLs.

The uniqueness of banking sector, banking polices, efficiency maximization efforts and risk reduction polices also have significant impact on the quality of loans. Furthermore variables such as efficiency of the management, risk appetite and liquidity level, profitability, capital availability, size of banks, nature of operation, deposits and lending rates also have significant influence on the growth and decline of NPLs (Ahmad and Bashir, 2013. p.1221). The study of

Salas and Saurina (2002) on Spanish banks showed that, in addition to real GDP growth and credit growth, bank size, capital ratio and market power also create variations in NPLs. In the same year the study done by Bercoff, et al., (2002) conclude that asset growth, operating efficiency and exposure to local loans also helped to explain the level of NPLs.

There are around ten bank specific hypotheses found in different empirical study hypothesized by different researchers and believed to have impact on the level of nonperforming loan , among thus six of them are developed and tested by Berger and DeYoung(1997) and Louzis et, al.(2011) whereas the rest hypotheses are developed and tested by others. Berger and DeYoung (1997) also 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 codified and tested four hypotheses concerning the flow of causality between the mentioned variables and NPL.

The accumulation of nonperforming loans is generally attributable to a number of factors, including economic downturns and macroeconomic volatility, terms of trade deterioration, high interest rates, excessive reliance on overly high-priced interbank borrowings, insider lending and moral hazard (Goldstein and Turner, 1996).

From the main factors of banks NPL every country central bank regulation is the prominent factor that determined the level banks NPL. Regulation in the financial sector is aimed at reducing imprudent actions of banks with regards to charging high interest rates, insider lending and reducing asset defaults. The central banks have achieved this through interest rate ceilings and other monetary policies. Demirguc-Kunt and Huizinga (1997) found that better contract enforcement, efficiency of the legal system and lack of corruption are associated with lower

realized interest margins and loan non-performance. This is because they reduce the default risk attached to the bank lending rate. However, it is noted that in developing countries regulations tend to be on paper but in practice are not enforced consistently and effectively. Thus, leading to default on loans lent to clients (Collin. J. N and Wanjau K, 2011).

The authors like Sinkey and Greenwalt (1991) by employing a simple log-linear regression model and data of large commercial banks in the United States from 1984 to 1987 investigate the loan loss-experience of large commercial banks in the US; they argue that both bank specific and macro economic factors explain the loan-loss rate (defined as net loan charge offs, charge off rate which is also known as NPL rate) plus NPLs divided by total loans plus net charge-offs of these banks. The authors find a significant positive relationship between the loan-loss rate and internal factors such as high interest rates, excessive lending, and volatile funds. Similar to other study, the authors further report that depressed regional economic conditions also explain the loss-rate of the commercial banks.

- **Bad Management Hypothesis**

This hypothesis developed to see the effect of bank efficiency on the level of non-performing loans in the banking industry. Low cost efficiency is positively associated with increases in future NPLs. The proposed justification links behind this hypothesis is bad management with poor skills in credit scoring, appraisal of pledged collaterals and monitoring borrowers. Low cost efficiency (high cost inefficiency) signals of the current manager performance of senior managers in managing day to day activities and loan portfolio. The lower management also does not monitor and control operating expenses, which is reflected in the low cost efficiency almost immediately. Managers in such banks do not follow the standard practices of loan monitoring, controlling and underwriting. Thus as “bad managers” they have poor credit scoring, collateral

evaluating and loan monitoring and controlling skills. When mangers are inefficiently managing the current banking operations then it will lead to future growth in NPLs **(**Berger and DeYoung, 1997**)**. The authors concluded that current poor performance, poor credit evaluation and monitoring skills and wrong collateral valuation lead to the growth in future NPLs.

The study made by Podpiera and Weill (2008) examine empirically the relation between cost efficiency and non-performing loans in the context of Czech banking industry for the period 1994 to 2005 support the above argument . They conclude that there is strong evidence in favor of the bad management hypothesis and propose that regulatory authorities in emerging economies should focus on managerial performance in order to enhance the stability of financial system (by reducing nonperforming loans). Hassan S.et. al,.(2010) by using the stochastic cost frontier approach and by applying normal-gamma efficiency distribution model to investigate the relationship between non-performing loans and bank efficiency in Malaysia and Singapore. There result also support the hypothesis of bad management proposed by Berger and DeYoung (1997), which suggests that poor management in the banking institutions results in bad quality loans, and therefore, escalates the level of non-performing loans. Banks' inefficiencies might lead to higher non-performing loans.

- **Moral Hazard Hypothesis**

NPLs are significantly positively associated with loan to asset ratio, implying that with the increase in loan to asset ratio banks chance of insolvency increases due to mismanagement of assets by the banks in long run. Mismanagement of assets refers to the extensive lending by the banks when they have excess time deposits (Fofack, 2005).

Banks having low capital tends to increase earnings through increase in loan portfolio riskiness by allocating funds to low quality borrowers, resulting in the future growth in NPLs. This

practice of banks comes under moral hazard, because banks know that they are thinly capitalized but still increases the riskiness of loan portfolio. Thus low financial capital may leads to the future growth in NPLs (Nir Klein, 2013). Berger and DeYoung(1997) findings also supported the moral hazard hypothesis by suggesting unidirectional causality from financial capital to NPLs.

Keeton and Morris (1987), also argues that banks with relatively low capital respond to moral hazard incentives by increasing the riskiness of their loan portfolio, which in turn results in higher non-performing loans on average in the future. The authors certainly showed that excess loss rates were prominent among banks that had relatively low equity-to-assets ratio. More generally, the authors argued that banks that tend to take more risks, including in the form of excess lending eventually absorbed higher losses. Similar to the above empirical evidence adverse selection and moral hazards have led to significant accumulation of nonperforming loans in banks (Bofondi and Gobbi, 2003, sited in Joseph Mabvure T, et al. 2011).

- **Size Effect Hypothesis**

Bank size allows diversification opportunity in lending, consequently loans of banks will be dispersed among different sectors and chances of NPLs will decline as compared to the concentrated loans. Therefore, diversification supports the negative association between NPLs and size of the banks. Hu, et al., **(**2006**)** used panel data over the period of 1996-1999 found that banks with higher government ownership are having less NPLs. The authors further concluded that bank size have a negative effect on the growth of NPLs. Thus it can be concluded that increase in bank size reduces the future growth of NPLs.

Recent paper, made by Salas and Saurina (2002) found that a negative relation between bank size and nonperforming loans and they argue that banks those has bigger size allows for more

diversification opportunities. Alike to Salas and Saurina (2002) other researchers such as Rajan and Dhal (2003) and Hu et al. (2006) find similar empirical evidence. However, on the contrary evidence found by Stiroh (2004) by using US banks suggest that diversification does not benefits in the form of risk reduction. Therefore, the impact of diversification is not proven significant.

- **Procyclical Credit Policy Hypothesis**

The existing literature has suggested that banks adopt liberal credit policy during the boom and adopt tight policy in depression (Rajan, R.1994 sited in Fawad and Taqadus , 2013). Marcucci and Quagliariello (2008) also confirmed that NPLs follows a cyclic trend, increase during boom and decrease during depression. In addition, the same study by Babihuga. R (2007) suggested banking income cycle is significantly negatively correlated with the banking size cycle, and also the authors signifying that low income economies with low financial development have significant negative association between capital adequacy and business cycle and vice-versa. Thus the positive impact of the business cycle can be expected on the NPLs in economies with lower financial development. Furthermore the above concept has been more recently developed by Festi *et al*. (2011), sited in Fawad and Taqadus (2013:1223) recommended that procyclicality and high economic growth increases credit in the country but sudden slowdown or decline in economic growth leads to the growth in NPLs due to inability of borrowers to repay loans. Thus credit growth in boom results in growth of NPLs in depression.

In consistence with the above empirical evidence the study made by Fawad and Taqadus (2013), by using six years panel data (2006-2011) of 30 banks in Pakistan to test the validity of 10 banks specific hypotheses provides the validity of procyclical credit policy hypothesis and investigate significant positive association between NPLs and credit growth. Theoretical justification for positive association is that extensive lending during the boom; in order to earn more banks lend

to the low quality borrowers. As the boom ends and depressions starts low quality borrowers do not have sufficient earnings to repay loans thus leading to the growth in NPLs.

- **Deposit Rate Effect Hypothesis**

During intensive competition banks offers a competitive deposit rates to attract funds and charge marginal costs to the borrowers. Banks offering higher deposits rates have greater share of deposits and lower interest rate spreads, whereas banks offering lower deposits rates have small share of deposits and higher interest rate spread. Thus it can be concluded that market concentration is significantly positively associated with interest rate spread. Banks with lower capitalization and high risk increases their customers by offering higher competitive rates and have lower interest rate spread (Berger, et al, 2004). Uhde and Heimeshoff (2009) argued that short term increase in interest rates to deposit rates, increase the banks costs of funds, resulting in the higher interest demand on loans. The growth in lending rates is positively correlated with loan defaults, thus results in growth of banks NPLs.

As Fawad and Taqadus (2013) clearly point out there is insignificant positive association between NPLs and deposits rate ratio. The result rejects the validity of deposits rate hypothesis. Justification for the positive relation is that with increase in deposit rate, interest spread rate and competitiveness of the banks decline, because of which deposit holders demand higher rates, in order to attract deposits banks has to pay higher rates. To pay deposit holders banks lend funds at higher rates to the low quality borrowers and by using corrupt practices low quality borrowers do not repay loans, thus results in the growth of NPLs.

- **Deposits to Loans Ratio Effect Hypothesis**

According to Ferreira, C (2008) deposits to loans ratio can be used as rough estimate of profitability on the deposits or as rough estimate of banking reserve ratio or can be used to

measure national savings. The growth in deposits to loans ratio can predict the decline in the NPLs ratio. The theoretical justification of the relation is that the growth in deposits to loans ratio means the greater increase in the deposits as compared to the loans. As the deposits of the banks are growing and loans are not, it shows that banks are risk averse and lend only to those customers who have good credit history and are able to repay the loan. The authors concluded that increase in deposits as compared to the loans shows that banks are more concerned with the quality of loans rather than the quantity and lend only to the quality borrowers.

On the contrary, study done by Fawad and Taqadus (2013) rejects the validity of the deposits to loans ratio effect by suggesting significant positive association between NPLs and reserve ratio. There finding is opposite to the findings of the above researchers. the study suggests that banks has already lend funds to the low quality borrowers in order to utilize idle funds because of the bad management and deviation from standard loan allocation practices, wrong evaluation of collateral and lack of loan monitoring and controlling skills (bad management hypothesis) and expect that in future the borrowers will not repay loans, banks stop lending with the fear of further increase in the riskiness of loans, thus deposits to loan ratio increases because of the expected increase in the future NPLs. Thus it can be concluded that the deposits to loan ratio increases because of the current lending to the low quality borrowers because of the bad management and stop current lending to prevent further growth in future NPLs.

In our country the study made by Wondimagegnehu N (2011), intends to assess determinants of NPLs, the researcher only see bank specific factors of NPLs in Ethiopian commercial banks by adopting mixed research approach. The researcher conclude that poor credit assessment, failed loan monitoring, underdeveloped credit culture, lenient credit terms and conditions, aggressive lending, compromised integrity, weak institutional capacity, unfair competition among banks,

willful default by borrowers and their knowledge limitation, fund diversion for unintended purpose, over/under financing by banks ascribe to the causes of loan default.

The literature suggests a big and strong association between NPLs and several macroeconomic factors other than the mentioned bank specific factors. These are annual growth in *GDP*, credit growth, real interest rates, the annual inflation rate, real effective exchange rate annual unemployment rate, broad money supply (*M2*) and GDP per capital etc. (Saba et al., 2012:129). The external or Macroeconomic factors that determine bank NPL are those factors which are external to the commercial banks and hence outside the control of management. The relation between the macroeconomic environment and loan quality has been investigated in the literature linking the phase of the business cycle with banking stability. In this line of research the hypothesis is formulated that the expansion phase of the economy is characterized by a relatively low number of NPLs, as both consumers and firms face a sufficient stream of income and revenues to service their debts. However as the booming period continues, credit is extended to lower-quality debtors and subsequently, when the recession phase sets in, NPLs increase (Louzis. et al,.2010).

Furthermore macroeconomic instability which is mostly manifested by high inflation rate also makes loan appraisal more difficult for the bank, because the viability of potential borrowers depends upon unpredictable development in the overall rate of inflation, its individual components, exchange rates and interest rates. Moreover, asset prices are also likely to be highly volatile under such conditions. Hence, the future real value of loan security is also very uncertain that banks do poorly both when product and asset price prudential policy, inflation accelerates unexpectedly and when inflation decelerates unexpectedly, unemployment increases, and/or aggregate output and income decline unexpectedly. Unexpected accelerations in inflation

adversely affect banks that, on average, lend longer term at fixed-rates than they borrow because nominal interest rates will raise more than expected. This will increase their cost of deposits more than their revenues from loans (Martin Brownbrigde, 1998, sited in W. N. Geletta, 2011).

Macroeconomic variables, other than GDP growth such as unemployment and interest rates provide additional information regarding the impact of macroeconomic conditions on household and firms. More specifically, an increase in the unemployment rate should influence negatively the cash flow streams of households and increase the debt burden. With regards to firms, increases in unemployment may signal a decrease production as a consequence of a drop in effective demand. This may lead to a decrease in revenues and a fragile debt condition. The interest rate affects the difficulty in servicing debt, in the case of floating rate loans. This implies that the effect of the interest rate should be positive, and as a result the increasing debt burden caused from rising interest rate payments should lead to a higher number of NPLs. and at last the regulatory framework (Louzis, et al., 2010.p. 481).

Salas and Saurina (2002) estimate a significant negative contemporaneous effect of GDP growth on non performing loans and infer the quick transmission of macroeconomic developments to the ability of economic agents to service their loans (Bangia et al., 2002; Carey, 2002). In the same year similar study of Shu (2002) uses a single-equation time series model to examine the impact of macroeconomic developments on loans quality in Honk Hong for the period 1995–2002. The results show that the ratio of bad loans to performing loans falls with higher real gross domestic product growth, higher consumer price inflation rate and higher property prices growth, whereas it rises with increases in nominal interest rates. The unemployment rate and performance of equity prices growth are not significant. Interest rates were also found to be significant in several studies. Furthermore Rajan and Dhal (2003) utilize panel regression analysis to report that

favorable macroeconomic conditions impact significantly on the non performing loans of commercial banks in India. Fuentes and Maquieira (2003) looking the determinant of NPLs in the Chilean banks, their investigation demonstrated that interest rates had a greater effect on NPLs than the business cycle.

Parallel to the above evidence Jimenez and Saurina (2005) examine the Spanish banking sector from 1984 to 2003; they provide evidence that non performing loans are determined by GDP growth, and high real interest rates. In the same year Fofack(2005) by using a pseudo panel-based model for several Sub-Saharan African countries, finds evidence that economic growth, real exchange rate appreciation and the real interest rate are significant determinants of non-performing loans in these countries. The author attributes the strong association between the macroeconomic factors and non-performing loans to the undiversified nature of some African economies. The researcher also provides evidence of a positive relationship between inflation rate and non-performing loans. He shows that inflationary pressures contribute to the high level of impaired loans in a number of Sub- Saharan African countries with flexible exchange rate regimes. According to this author, inflation is responsible for the rapid erosion of commercial banks' equity and consequently higher credit risk in the banking sectors of these African countries.

Another study done by Hoggarth et al. (2005) by using UK quarterly data for the period 1988 to 2004 to evaluate the dynamics between banks' write-off to loan ratio and several macroeconomic variables. In general, their results show a significant and negative relationship between changes in the output gap and the write-off ratio, with the maximum impact occurring after one year. Banks' write-off ratio also increases after increases in retail price inflation and nominal interest rates. At a sectoral level, the write-off ratio for firms increases following unexpected adverse

output shocks or rises in the nominal interest rate, while that for households seems more sensitive to changes in the ratio of interest payments to disposable income than to changes in business cycle conditions. Similarly in the same year, Babouček and Jančar (2005) measure the effects of macroeconomic shocks on the loan quality of the Czech banking sector for the period 1993–2006 and their evidence show that there is a positive correlation of non-performing loans with the unemployment rate and consumer price inflation.

Empirical studies tend to confirm the aforementioned link between the phase of the cycle and credit defaults. Quagliarello (2007) find that the business cycle affects the NPL ratio for a large panel of Italian banks over the period 1985 to 2002. And other similar study by Marcucci and Quagliariello (2008) employ a reduced-form VAR to assess, among other things, the effects of business cycle conditions on bank customers' default rates over the period 1990–2004. Their results show that the default rates follow a cyclical pattern, falling during macroeconomic expansions and increasing during downturns. Finally the authors do not find strong evidence of feedback effects from the soundness of banks' balance sheets to economic activity.

To strengthen the above empirical findings and to see additional macroeconomic factor researchers like Pasha and Khemraj (2009), investigate determinants of non-performing loans in the Guyanese banking sector using a panel dataset and a fixed effect model similar to Jimenez and Saurina (2005). Consistent with international evidence the researchers find that the real effective exchange rate has a significant positive impact on non-performing loans. This indicates that whenever there is an appreciation in the local currency the non-performing loan portfolios of commercial banks are likely to be higher. Moreover their results show that GDP growth is inversely related to non-performing loans, suggesting that an improvement in the real economy translates into lower non-performing loans. The authors also found that banks which charge

relatively higher exchange rate has a significant positive impact and lend excessively are likely to incur higher levels of non-performing loans. Finally, their result reveals that inflation is not an important determinant of NPLs in the Guyanese banking system.

Similar to the above finding study made by Louzis, et al.,(2010), by using dynamic panel data methods to examine the determinants of non-performing loans (NPLs) in the Greek banking sector, separately for each type of loan (consumer, business and mortgage loans). It was found that macroeconomic variables, specifically the real GDP growth rate, the unemployment rate and the lending rates have a strong effect on the level of NPLs or it shows that NPLs in the Greek banking system can be explained mainly by macroeconomic fundamentals (GDP, unemployment, and interest rates). On the same year the finding of Greenidge and Grosvenor (2010) show that GDP growth, inflation and interest rates are common macro-economic factors that determine the level of NPLs.

Bofondi and Ropele (2011), the authors use a single-equation time series approach to examine the macroeconomic determinants of banks' loan quality in Italy for the past twenty years, from the period 1990q1to 2010q2.The study analyzed the quality of loans to households and firms separately on the grounds that macroeconomic variables may affect these two classes of borrowers differently. According to the authors finding quality of lending to households and firms can be explained by a small number of macroeconomic variables mainly relating to the general state of the economy, the cost of borrowing and the burden of debt; changes in macroeconomic conditions generally affect loan quality.

The impact of inflation, however, may be ambiguous. On one hand, higher inflation can make debt servicing easier by reducing the real value of outstanding loan, but on the other hand, it can

also reduce the borrowers' real income when wages are sticky. In countries where loan rates are variable, higher inflation can also lead to higher rates resulting from the monetary policy actions to combat inflation (Nkusu, 2011). Several studies also found that NPLs are affected by stock prices arguing that a drop in shares prices might lead to more default via wealth effects and decline in the value of collaterals.

Nkusu (2011) who focused on 26 advanced economies in the period of 1998–2009, investigate the macroeconomic determinants of loan defaults through panel regressions and panel vector autoregressive models found that adverse shocks to asset prices, macroeconomic performance and credit to the private sector lead to a worsening of loan quality. The author suggests that increase in interest rates result in deterioration of borrower's repayment capacity and hence, cause of increase in non-performing loans.

A very recent study made by Joseph, Mabvure T et al.,(2012) in Zimbabwe, non performing loans in BZ Bank Limited by employing a case study research design . The paper revealed that external factors are more prevalent in causing non performing loans in CBZ Bank Limited. The major factors causing non performing loans were natural disasters, government policy and the integrity of the borrower. The findings of this study seen determinants of NPLs as external factor different side what the other authors' looks external determinants of NPLs.

2.3. Conclusion and identification of knowledge gap

In line with the above theoretical as well as empirical review there is no global standard to define non-performing loans at practical level. Nonperforming loan is loan either in default or close to being in default. Nonperforming loan is not only harm to banks, but also it is danger for the overall economy. It also revealed that banks nonperforming loan can be affected by different factors such as bank specific and macroeconomic factors.

The empirical literature on the interaction between the macroeconomic conditions and asset quality is vast and diverse. A common finding of these studies is the positive relationship between asset quality and economic growth. Nevertheless, the measures of asset quality analyzed in many of these papers differ. Most of the studies linking credit risk to the real economy have looked at the development of expected default frequencies, loan loss provisions, loss given default and NPLs as a measure of asset quality. According to Espinoza and Prasad (2010), who estimate a dynamic panel over 1995-2008 on around 80 banks in the Gulf Cooperation Council, lower economic growth and higher interest rates trigger an increase in NPLs. The paper also finds a positive relationship between lagged credit growth and NPLs. The findings are also in line with the results of Nkusu (2011), who uses panel data techniques on a sample of 26 advanced economies that spans from 1998 to 2009, to quantify the relationship between the quality of banks' loan portfolio and macro financial vulnerabilities. Glen and Mondragón-Vélez (2011) look at 22 advanced economies during the period 1996-2008 and find that the developments of loan loss provisions are driven mainly by real GDP growth, private sector leverage and a lack of capitalization within the banking system.

Even though, there is a large empirical study on determinants of NPLs for both bank specific and macroeconomic factor across different countries, almost all of them except few are done in developed countries. In our country as to the researcher knowledge, there is no empirical study on the determinants of NPLs for both bank specific and macroeconomic factors on the commercial banks. Therefore, this research will contribute towards filling the gap by identifying and analyzing the factors that affect level of nonperforming loans in Ethiopia commercial banks.

CHAPTER THREE

3. Research Design

The preceding chapter indicated the literature review on determinants of NPLs by separately seeing bank specific factors from macroeconomic factors that affect the growth of NPLs on commercial banks across countries. Especially from developing countries' perspective Ethiopia in particular, has been shown that there is no comprehensive study in estimation and analysis on determinants of nonperforming loan (bank specific and macroeconomic factors).

The intent of this chapter is to provide brief outline of the broad objective of the study and hypotheses, the underlying principle of research methodology and the choice of the appropriate research method for the study. The chapter is arranged as follows: section 3.1 presents the research objective and hypotheses. Section 3.2 discusses population of the study and sampling design. 3.3 will present details of data collection, analysis and presentation techniques. Finally, under section 3.4 the regression model for the study will be discussed.

3.1. Research objective and hypotheses

The general objective of the current study is to determine bank specific and macroeconomic factors that could affect banks NLPs and to examine the relationship between these factors with banks NLPs.

3.1.1. Research hypothesis

Hp1: *there is a negative and significant relationship between cost efficiency and NPL.*

This hypothesis developed to see the effect of bank efficiency on the level of non-performing loans in the banking industry. Low cost efficiency is positively associated with increases in future NPLs. The proposed justification links behind this hypothesis is bad management with

poor skills in credit scoring, appraisal of pledged collaterals and monitoring borrowers. Low cost efficiency (high cost inefficiency) signals of the current manager performance of the senior managers in managing day to day activities and loan portfolio. The lower management also does not monitor and control operating expenses, which is reflected in the low cost efficiency almost immediately. Managers in such banks do not follow the standard practices of loan monitoring, controlling and underwriting. Thus as "bad managers" they have poor credit scoring, collateral evaluating and loan monitoring and controlling skills. When managers are inefficiently managing the current banking operations then it will lead the future growth in NPLs **(**Berger and DeYoung, 1997**)**. The authors concluded that current poor performance, poor credit evaluation and monitoring skills and wrong collateral valuation lead to the growth in future NPLs.

The study by Podpiera and Weill (2008) support the above argument, they examine empirically the relationship between cost efficiency and non-performing loans in the context of Czech banking industry for the period 1994 to 2005, they conclude that there is strong evidence in favor of the bad management hypothesis[5] and propose that regulatory authorities in emerging economies should focus on managerial performance in order to enhance the stability of the financial system (by reducing nonperforming loans). Similarly, Hassan S.et. al,.(2010) by using the stochastic cost frontier approach. The authers used normal-gamma efficiency distribution model to investigate the relationship between non-performing loans and bank efficiency in Malaysia and Singapore. The result also support poor management in the banking institutions results in bad quality loans, and therefore, escalates the level of non-performing loans. Generally banks' inefficiencies might lead to higher non-performing loans.

[5] Bank cost efficiency and nonperforming loan have a negative relationship.

Hp2: *There is a negative and significant relationship between financial capital (bank solvency) and NPLs.*

Keeton and Morris (1987), also argues that banks with relatively low capital respond to moral hazard incentives by increasing the riskiness of their loan portfolio, which in turn results in higher non-performing loans on average in the future. The authors certainly showed that excess loss rates were prominent among banks that had relatively low equity-to-assets ratio. More generally, the authors argued that banks that tend to take more risks, including in the form of excess lending eventually absorbed higher losses.

NPLs are significantly positively associated with loan to asset ratio, implying that with the increase in loan to asset ratio banks chance of insolvency increases due to the mismanagement of assets by banks in the long run. The mismanagement of assets refers to the extensive lending by the banks when they have excess time deposits (Fofack, 2005).

Banks having low capital tends to increase earnings through increase in loan portfolio riskiness by allocating funds to low quality borrowers, resulting in the future growth in NPLs. This practice of banks comes under moral hazard, because banks know that they are thinly capitalized but still increases the riskiness of loan portfolio. Thus low financial capital may leads to the future growth in NPLs (Nir Klein, 2013).

Hp3. *Deposit rate has positive and significant impact on the NPLs.*

During intensive competition banks offers a competitive deposit rates to attract funds and charge marginal costs to the borrowers. Banks offering higher deposits rates have greater share of deposits and lower interest rate spreads, whereas banks offering lower deposits rates have small share of deposits and higher interest rate spread. Thus it can be concluded that market

concentration is significantly positively associated with interest rate spread. The banks with lower capitalization and high risk increases their customers by offering higher competitive rates and have lower interest rate spread (Berger, et al, 2004). Uhde and Heimeshoff (2009) argued that the short term increase in interest rates to deposit rates, increase the banks costs of funds, resulting in the higher interest demand on loans. The growth in lending rates is positively correlated with loan defaults, thus results in growth of banks NPLs

As Fawad and Taqadus (2013) clearly point out there is insignificant positive association between NPLs and deposits rate ratio. The result rejects the validity of deposits rate hypothesis. The justification for the positive relation is that with the increase in deposit rate, the interest spread rate and competitiveness of the banks decline, because of which deposit holders demand higher rates, in order to attract deposits banks has to pay higher rates. To pay deposit holders banks lend funds at higher rates to the low quality borrowers and by using corrupt practices low quality borrowers do not repay loans, thus results in the growth of NPLs.

HP4: *There is a positive and significant relationship between bank loan to deposit ratio and NPLs.*

The increase in banks lending as compared to the deposits increases bank's NPLs because, at the time of low loans to deposits ratio in order to earn more banks start lending to the low quality borrowers and do not follow the standard loan allocation practices, which leads to the growth in NPLs. In other word with the growth in deposits banks start extensive lending, which leads to the increase in bank lending as compared to deposits and also increases the riskiness of loan portfolio by allocating funds to the low quality borrowers, which in future leads to the growth in NPLs

Hp5: *There is negative and significant relationship between real GDP growth rate and NPLs.*

The performances of any type of loans are highly related to country's economic condition. Jimenez and Saurina (2005) examine the Spanish banking sector from 1984 to 2003; they provide evidence that non performing loans are determined by GDP growth. In the same year Fofack H (2005) by using a pseudo panel-based model for several Sub-Saharan African countries, found evidence that economic growth are significant determinants of non-performing loans in these countries. The author attributes the strong association between the macroeconomic factors and non-performing loans to the undiversified nature of some African economies.

A strong economic condition measured by GDP, as motivating factor to banks has statistically significant impact on issuance of more private credit to businesses. A strong economic condition creates more demand for goods and services which lead to more investment in different sectors hence increase the per capita income as well as the savings, collectively these factors convince to banks to issue more private credit (kashif and mohammed, undated).

Hp6: *There is a positive and significant relationship between real interest rate and NPLs.*

The real interest rate is expected to have a positive relationship with NPLs in the essence of lend-long and borrow-short argument (Vong and Hoi Si Chan, 2008). That means banks may increase lending rates sooner by more percentage points than their deposit rates. On the other hand, the rise in real interest rates may increase the real debt burden on borrowers and this may lower asset quality, thereby interest rate may have a negative impact on NPLs. and the real interest rate are significant determinants of non-performing loans in sub Saharan African countries.

Hp7: *There is a positive and significant relationship between inflation rate and NPLs.*

According to the recent theory of information asymmetry in the credit market an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As all result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. To proxy inflation the annual gross inflation rate was used.

High inflation rate is associated with higher costs as well as higher income. If a bank's income rises more rapidly than its costs, inflation is expected to exert a negative effect on NPLs. On the other hand, a positive coefficient is expected when its costs increase faster than its income. The literature also provides evidence of a positive relationship between the inflation rate and non-performing loans. According to Fofack (2005), inflationary pressures contribute to the high level of impaired loans in a number of Sub- Saharan African countries with flexible exchange rate regimes. According to the author, inflation is responsible for the rapid erosion of commercial banks' equity and consequently higher credit risk in the banking sectors of these African countries. The researcher also provides evidence of a positive relationship between inflation rate and non-performing loans.

3.2. Research Method Adopt

Depending on the research problem carried out research method can be qualitative, quantitative or mixed. Creswell (2009) defined quantitative research as a formal, objective and systematic process in which numerical data are utilized to obtain information. Mmuya (2007) stated that

qualitative research is an investigative methodology that is grounded in a philosophical position that focuses on making sense of the social world through a process involving how it is experienced, understood and interpreted. The qualitative method takes a theoretical and methodological focus on complex relations between personal and social meanings, individual and cultural practices and the material environment or context. Whereas, mixed research is characterized as the combination of both qualitative and quantitative research approaches.

The primary criterion that should be considered for selecting an approach is the research problem In view of that, quantitative approach is best if the problem is identifying factors that influence an outcome, the utility of intervention, or understanding the best predictors of outcomes. This approach is also best to test a theory or explanation. Conversely, a qualitative approach is preferable if a concept or phenomenon needs to be understood. Qualitative approach is exploratory, so that it is preferable when the researcher does not know the essential variables to examine (Creswell, 2003).

A quantitative approach is investigatory approach and primarily use postpositive claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of the theories), employs strategies of inquiry such as experiments and surveys, and collect data on predetermined instruments that yield statistical data. The researcher tests theory by specifying hypotheses and collect the data to support or refute the specified hypotheses. The data are collected on an instrument that measures attitudes, and the information collected is analyzed using statistical procedures and hypothesis testing (Crosswell, 2009. p .13-14).

In this research in order to address the research questions and thereby to investigate bank specific and macroeconomic factors that affect the level of NPLs of commercial banks in Ethiopia, the researcher used a quantitative research approach. Well designed and implemented quantitative research has the merit of being able to make generalizations, for a broader population, based on findings from the sample. To enhance the generalization of findings, quantitative research methods follow, at least theoretically, standardized procedures in sample selection, instrument design, implementation and analysis. This standardization in turn increases the replicability of procedures and the reliability of findings and also can mitigate the impact of interviewer (if administered through direct interviews) and interviewee biases. (Wollela, 2008, p. 71). So, the rationale behind using this approach is quantitative approach help the researcher to prevent bias in gathering and presenting research data. Quantitative data collection procedures create epistemological postulations that reality is objective and unitary, which can only be realized by means of transcending individual perspective. This phenomenon in turn should be discussed or explained by means of data analysis gathered through objective forms of measurement. 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.

3.3. Population and Sampling Design

The total population of the study is all private and public commercial banks in Ethiopia (sixteen private and three public owned banks). According to NBE (2012/13), there are nineteen commercial banks in the year 2012/13. The sampling frame for drawing sample included those commercial banks having at least ten years working experience in Ethiopia (i.e. from 2004 to 2013). In Ethiopia there are eight commercial banks having at least ten years experience which include: Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), Dashen

Bank S.C (DB), Awash International Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB) and Bank of Abyssinia S.C (BOA).Therefore, the matrix for the frame is 10*8 that includes 80 observations.

Sample is the portion of the study population and used when addressing the total population in the study is not possible. Different authors show that the need for considering different factors in deciding on the desired sample size. These factors include the availability of time and resources, homogeneity of the target population, the accuracy required and the aim of the research (Sarantakos 2005, sited in Wollela, 2008). In this case, since the number of banks in our country is small, the study assumed the data of all banks without taking sample. Or there will be no need of taking sample from the frame. Therefore, the sampling frame and the sample was the same. According to Brooks (2008, p 105), while there is no definitive answer for an appropriate sample size for model specification, it should be noted that most testing procedures in econometrics rely on asymptotic theory. This theory says that as the sample size approaches to the population, the results from the sample estimates are more appropriate for generalizing to the general population. Thus in this case the sample size was almost equal to the population which enabled to make appropriate generalization to the overall population.

3.4. Data Collection, Presentation and Analysis Techniques

3.4.1.Data Collection

Quantitative data collection methods are centered on the quantification of relationships between variables. The current study used only secondary data. In this study the researcher used both firm-level and macroeconomic data for eight commercial banks that operated during the 2004 to 2013 period. The dataset also includes macroeconomic variables such as the annual inflation

rate, real interest rate and annual growth in real GDP over the period of analysis. The firm-level data were obtained from the audited financial statement of selected Commercial Banks while the macroeconomic variables were obtained from National Bank of Ethiopia and from MOFED. Besides, related books, journals articles and various manuals also used as sources of Secondary data.

3.4.2. Data Presentation and Analysis

In order to achieve the objective of the study and to test the proposed hypotheses, the collected data analyzed by using Eviews 6 software package descriptive statistic and then, correlation analyses between dependent and independent variables were made. Finally, balanced panel fixed effect regression model is employed including testing of all CLRM assumptions (normality of the error distribution, linearity, homoscedasticity (equal variance) and multicollinearity).

3.4.2.1. Formulation of Empirical Model

The nature of data that was used in this study enable the researcher to use panel/longitudinal data model which is deemed to have advantages over cross sectional and time series data methodology. Panel data involves the pooling of observations on the cross-sectional over several time periods. As Brook (2008) stated the advantages of using panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross-sectional data alone.

In summary, the fundamental Thus, the general panel/longitudinal regression model was as follows:

$y_{i\,t} = \alpha + \beta x_{i\,t} + u_{i\,t}$

With subscript *i* denote the cross-section and *t* representing the time-series dimension. The left-hand variable *yi t* is the dependent variable, α is the intercept term, β is a $k\times1$ vector of parameters to be estimated on the explanatory variables, and *xi t* is a $1 \times k$ vector of observations on the explanatory variables, t = 1, . . . , T ; i = 1, . . . , N.

Therefore the general models which incorporate all of the variables to test the hypotheses of the study were:

NPL=f(CEF, SOLV, LTD, DR,GDP,IR,INF ε)……..(1)

Where ε contains other variables not explicitly included in the model.

The explicit form of equation (1) above was represented as follows:

NPLs=β0+β1(CEF)+β2(SOLV)+β3(LTD)+β4(DR)+β5(GDP)+β6(IR)+β7(INF)+ε……th e general model and variables

NPL= Nonperforming loan

CEF= Cost efficiency

SOLV= Solvency Ratio

LTD= Loan to Deposit ratio

DR= Deposit rate

GDP=Economic growth rate

IR= Lending interest rate

INF= Inflation rate

ε=Error term

➢ Variables of the study

For analyses purpose, nonperforming loan treated as the dependant variable; NPL rate calculated by using the ratio of impaired loan to total loan ratio and cost efficiency, banks financial capital, loans to assets ratio and deposit rates treated as independent variable from bank specific factors. And GDP, lending interest rate, and inflation as independent variables from macroeconomic factors.

Table 3.1: Summary of Potential factors that influences on the level of NLPs, corresponding measures, hypothetic effects on nonperforming loan.

Factors	**Measurement (proxies)**	**Expected sign**
Nonperforming loan	impaired loan to total outstanding loan	
Cost efficiency	Operating expense to Operating Income	-
Banks financial capital(Solvency ratio)	Owned capital to Total asset	-
Loan to deposit ratio	Total loans to total deposit	+
Deposit rates	Interest expense to Total Deposit	+
GDP	Annual growth rate in real GDP	-
lending interest rate	Real interest rate(annual average IR)	+
Inflation	Inflation rate	+

CHAPTER FOUR

4. Results and Discussion

Introduction

In the preceding chapters important literatures relating to the topic that gives enough understanding about the subject matter and used to identify knowledge gap on the area were reviewed. To meet research objective and to answer research questions and also to test research hypotheses under it the research design used for this study also discussed in the preceding chapter. In this section, the researcher will be presented the important finding of the analysis.

The current chapter has five sections. Under section 4.1 tests of classical liner regression model/CLRM assumptions will be performed. Descriptive statistics of dependent and independent variables will be presented under second section (4.2.) followed by correlation analysis under section 4.3. Section 4.4 will be provide the rationale behind choosing the appropriate model. Then, the results of regression analysis will be presented under section 4.5. Finally, the results of regression analysis will be discussed under section 4.6.

4.1. Test Results for CLRM Assumption

For the econometric estimation to bring robust, unbiased/reliable and consistent result, it has to fulfill the basic linear classical assumptions. The basic assumptions include: (i) linearity in parameters of the regression model, for a given explanatory variables the mean value and the variance of disturbance term (Ui) is zero and constant (homoscedastic), the covariance between the error terms over time is zero. In other words, it is assumed that the errors are uncorrelated

with one another (multicollinearity). And the stochastic (disturbance) term Ui is normally distributed. (Gujarati, 1995).

4.1.1. Test for average value of the error term is zero

The first assumption required is that the average value of the errors is zero (E (ut) = 0). In fact, if a constant term is included in the regression equation, this assumption will never be violated (Brooks, 2008). Therefore, since the constant term (i.e. α) was included in the regression equation, the average value of the error term in this study is expected to be zero.

4.1.2. Test for Homoscedasticity

For test of homoscedasticity (Var (ut) = $\sigma 2$) the researcher used white's test. Hence, in each case, both the F and $\chi 2$ versions of the test statistic give the same conclusion that there is no evidence for the presence of heteroscedasticity, since the p-values are considerably in excess of 0.05. There is no evidence for the presence of heteroscedasticity, since the P-values are considerably in excess of 0.05. Both the *F*- and $\chi 2$ -test statistic give the same conclusion that there is evidence for the absence of heteroscedasticity. Since the *p*-values in all of cases were above 0.05, the null hypothesis of heteroscedasticity should be rejected. The null hypothesis of heteroscedasticity should be rejected at 10% level for the F-statistics and $\chi 2$ test statistic. The third version of the test statistic, "Scaled explained SS", as the name suggests it is based on a normalized version of the explained sum of squares from the auxiliary regression, also give the same conclusion. Generally, in all of the regression models used in this study it was proved that the variance of the error term is constant or homoscedastic and the researcher had sufficient evidence to reject the null hypothesis of heteroscedasticity.

Heteroskedasticity Test: White

F-statistic	1.301506	Prob. F(7,72)	0.2621
Obs*R-squared	8.985805	Prob. Chi-Square(7)	0.2537
Scaled explained SS	18.88744	Prob. Chi-Square(7)	0.1085

Source**:** financial statement selected banks and own computation through eview6.

4.1.3. Test for absence of autocorrelation assumption

The test for autocorrelation (cov(*ui , uj*) = 0 for *i* _= *j*) was made by using both Durbin--Watson (DW) and Breusch-Godfrey Serial Correlation LM Test. Durbin--Watson (DW) is a test for first order autocorrelation -- i.e. it tests only for a relationship between an error term and its immediate previous value where as Breusch-Godfrey Serial Correlation LM Test is more general than the *DW* test, and can be applied in a wider variety of circumstances since it does not impose the *DW* restrictions on the format of the first stage regression. The null hypothesis for the DW test is no autocorrelation between the error term and its lag. From the regression result the value of Durbin-Watson Statistics (D-W stat.) was 1.735 which is approaching to 2, hence no evidence for the presence of autocorrelation. In addition, Breusch-Godfrey Serial Correlation LM proved that both the *F*- and $\chi 2$ -test statistic give the same conclusion that there is evidence for the absence of autocorrelation since the *p*-values in all of the cases were above 0.05.

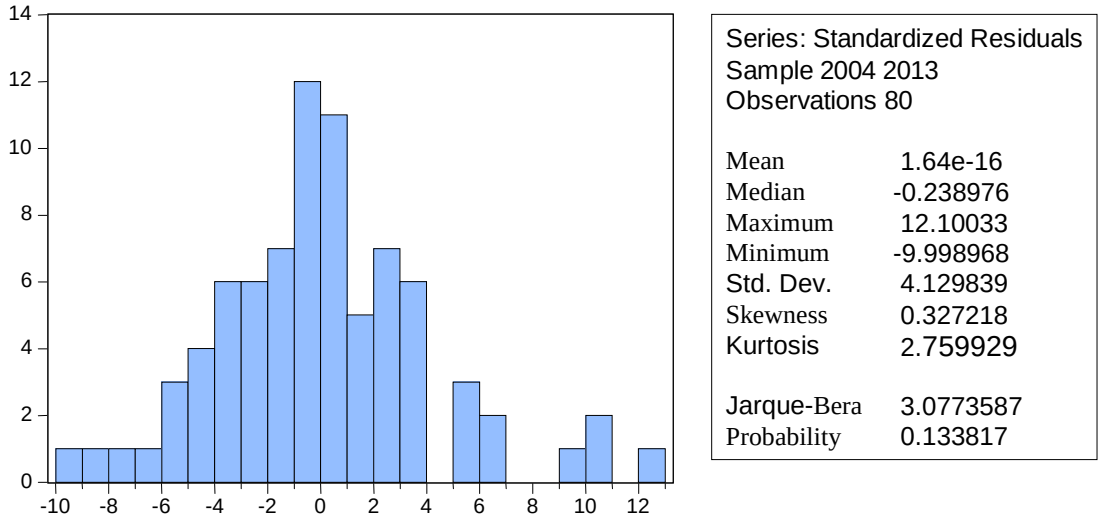
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.485285	Prob. F(10,62)	0.1665
Obs*R-squared	15.46108	Prob. Chi-Square(10)	0.1161

Source**:** financial statement selected banks and own computation through eview6.

4.1.4. Test for Normality assumption

Normality assumption (ut ~ N(0, σ2) state that a normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Bera-Jarque formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis are zero and three respectively. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. The Bera-Jarque probability statistics/P-value is also expected not to be significant even at 10% significant level (Brooks 2008). As shown bellow in the histogram the value of kurtosis is 2.7959 and the Jarque-Bera statistics was not significant even at 10% level of significance as per the P-values shown in the histogram is). Hence, the null hypothesis is the error term is normally distributed should not be rejected and it seems that the error term in all cases follows the normality assumption.



4.1.5. Test for multicollinearity assumption

If an independent variable has exact linear combination with the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks 2008). This assumption is concerned with the relationship exist between explanatory variables. There is no consistent argument on the level of correlation that causes multicollinearity. According to Gujarati (2004), the standard statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in order to examine the possible degree of multicollinearity among the explanatory variables, correlation matrixes of selected explanatory variables were presented in table 4.1. Usually the multicollinearity exists if the correlation between two independent variables is more than 0.75 (Malhotra, 2007). As it appears in the correlation matrix table 4.1, there were no such high correlation between the explanatory variables. Thus, there is no problem of multicollinearity for this study. The results in the following correlation matrix show that the highest correlation of -0.6093, which is between GDP and inflation. As it appears in the correlation matrix table there were no such high correlations between the explanatory variables. Thus, in this study the problem of multicollinearity did not appear.

Table 4.1. Correlation matrix of explanatory variables

	CEF	SOLV	DR	LTD	IR	INF	GDP
CEF	1						
SOLV	0.2752	1					
DR	-0.3089	0.0390	1				
LTD	-0.3194	0.1089	0.5318	1			
IR	0.1707	0.1640	-0.0372	-0.4858	1		
INF	0.0765	0.1988	0.0104	0.2647	0.5046	1	
GDP	-0.0441	-0.1600	0.0483	-0.1718	-0.5689	-0.6093	1

Source: Structured review of financial statements and own computation

4.2. Descriptive Statistics of the Data

The descriptive statistics for dependent and independent variables are presented bellow. For both dependent and independent variables value of minimum, maximum, mean and standard deviation are presented. The dependent variable is non-performing loan and measured by impaired loan (bad loan) to total loan. The remaining are independent variables such as: cost efficiency, deposit rate, solvency ratio, loan to deposit ratio, Interest rate, gross domestic product and inflation rate. Table 4.2 bellow Present the descriptive statistics of dependent and independent variables.

Table 4.2. Descriptive statistics of dependent and independent variables

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
NPL	0.0799	0.0636	0.3325	0.0663	0.0663	80
CEF	1.9613	1.937	3.3964	1.0673	0.4436	80
LTD	0.6829	0.6653	1.2117	0.2969	0.1854	80
SOLV	0.0 877	0.0849	0.1923	0.0373	0.0301	80
DR	0.02497	0.023	0.0854	0.0101	0.0125	80
IR	0.1139	0.1169	0.1250	0.1050	0.0077	80
GDP	0.1123	0.1145	0.1265	0.08837	0.0111	80
INF	0.17	0.1466	0.364	0.028	0.1105	80

Source: Financial statement of sampled commercial banks and own computation through Eviews 6.

The mean value for NPL (impaired loan to total loan) of banks was 7.99 percent with a standard deviation of 6.63 percent. The average value of nonperforming loan for ten consecutive years was above the average requirement of national bank of Ethiopia (5%) and there were a big variation across the sample banks NPL ratio. NPL for the sample period was ranged from 6.63 percent to 33.25 percent, the minimum and maximum value respectively. The minimum value (6.63%) also shows that nonperforming loan is still a big problem for Ethiopian commercial banks as a whole.

Among bank specific independent variables the mean value of banks cost efficiency is 196.13 percent. The mean value implies that almost all commercial banks in Ethiopia are efficient on their cost allocation. There were great differences between banks cost efficiency. Because the standard deviation is very high(44.98 %). The maximum and minimum values were 339.64

percent and 106.73 percent respectively. The maximum value indicated commercial bank of Ethiopia (CBE), Awash international bank (AIB) and wogagen bank(WB) and the minimum value was some of privately owned commercial banks in Ethiopia such as Dashen bank and united bank. The standard deviation also explains there is a great variation between banks cost efficiency.

The mean value of loan to deposit ratio was 68.29 percent which shows that the average value of banks loan to deposit ratio was very high, again it tells us on average loans are the most important asset for commercial banks in Ethiopia. The standard deviation 18.5 percent reveals that there was high variation towards the mean among banks in Ethiopia. The maximum and minimum values were 121.17 percent and 29.69 percent respectively.

The mean value of solvency ratio was 7.65 percent; indicate that on average almost all commercial banks in Ethiopia are solvent. Standard deviation of 3.64 percent tells us there was a little difference between banks solvency ratio. The maximum and minimum values were 19.23 percent and 1.33 percent respectively, this implies that there was a huge gap between banks level of solvency.

The last bank specific independent variable is deposit rate, the mean value of 2.45 percent, which indicate the average value of banks deposit rate was small and there were no difference between banks deposit rate because the standard deviation was 1.2 percent. The maximum and minimum value of deposit rate was 8.54 percent and 1.07 percent respectively.

The remaining independent variables are macroeconomic indicators that can affect banks nonperforming loan over time. The mean value of real GDP growth rate is 9.2 % indicating the average real growth rate of the country's economy over the past 10 years was a good one, there

was a stable economic growth because the standard deviation is one percent. The maximum growth of the economy was recorded in the year 2005 (i.e. 12.6%) and the minimum was in the year 2003 (i.e. -2.1%). The general inflation rate of the country over the past ten years was more than the average GDP (i.e. 13.1%). The rate of inflation was highly dispersed over the periods under study towards its mean with standard deviation of 11%. The maximum inflation rate was recorded in the year 2009 (i.e. 36.4%) and the minimum was in the year 2011 (i.e. 2.8%).

Finally, the mean value of lending interest rate over the period under study was 11.4 %, on average commercial banks lending interest rate in Ethiopia is 11.4% and there is a modest variation on interest rate margin toward its mean value over ten consecutive years because the value of standard deviation is below one percent (0.07%). with the maximum and minimum values of 12.8 % (in the years 2010 and 2011) and 10.5 % (in the year 2004-2008) respectively.

4.2. Correlation Analysis

Correlation is a way to indicate the degree to which two or more variables are associated with or related to each other. The most widely used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which is used in this study. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship).

Sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. As a sample size approaches to 100, the correlation coefficient of about or above 0.20 is significant at 5% level of significance (Meyers et al. 2006). The sample size of the study is 8*10 matrixes of 80 observations which is come close to 100 hence the study

used the above justification for significance of the correlation coefficient. Table 4.2 bellow shows correlation coefficient between dependent variables and independent variables.

Table 4.3. Correlation among dependent and independent variables matrix

	NPL	CEF	DR	LTD	SOLV	IR	GDP	INF
NPL	1.0000	-0.2804	0.4231	0.2015	-0.1333	0.4911	- 0.2978	-0.2664

Source: Financial statement of sampled commercial banks and own computation through Eviews6.

As Brooks (2008), if it is stated that *y* and *x* are correlated, it means that *y* and *x* are being treated in a completely symmetrical way. Thus, it is not implied that changes in *x* cause changes in *y*, or indeed that changes in *y* cause changes in *x* rather, it is simply stated that there is evidence for a linear relationship between the two variables, and movements in the two are on average related to an extent given by the correlation coefficient.

According to the above table cost efficiency is negatively correlated with non-performing loan with the coefficient of -0.29489 and the linear relationship between CEF and NPL is statistically different from zero/statistically significant. Non-performing loan is positively correlated with deposit rate with the coefficient of 0.4231 and statistically different from zero/statistically significant. Loan to deposit ratio is positively correlated with the dependent variable (NPL) with the coefficient of 0.28040 and statistically different from zero/statistically significant. The last bank specific variable is solvency ratio, its correlation coefficient is the smaller one from all variable (-0.13339).

Among the macroeconomic factors affecting non-performing loan gross domestic product and inflation rate is negatively correlated with non nonperforming loan. And the correlation

coefficient of interest rate is parallel to the research hypothesis. The value for inflation rate is opposite to the research hypothesis.

- **Choosing Random effect (RE) versus fixed effect (FE) models**

According to Gujarati (2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model/FEM and random effect model/REM. Hence the choice here is based on computational convenience. On this score, FEM may be preferable. Since the number of time series (i.e. 10 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks), FEM is preferable in this case. According to Brooks (2008); Verbeek (2004) and Wooldridge (2004), it is often said that the REM is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a FEM is more plausible when the entities in the sample effectively constitute the entire population/sample frame. Hence, the sample for this study was not selected randomly and equals to the sample frame FEM is appropriate.

4.3. Results of Regression Analysis

As shown in chapter three, the model used to find out and explain the association between the dependent variable and the independent variables is:

$NPLs=\beta0+\beta1(CEF)+\beta2(SOLV)+\beta3(LTD)+\beta4(DR)+\beta5(GDP)+\beta6(IR)+\beta7(INF)+\varepsilon$……the general model and variables

NPL= Nonperforming loan
CEF= Cost inefficiency
SOLV= Banks financial capital (Solvency Ratio)
LTD=loan to deposit ratio
DR= Deposit rates
GDP=Economic growth rate

IR= Lending interest rate

INF= Inflation rate

ε=Error term

Under the following regression outputs the beta coefficient may be negative or positive; beta indicates that each variable's level of influence on the dependent variable. P-value indicates at what percentage or precession level of each variable is significant. R^2 values indicate the explanatory power of the model.

Table. 4.4. **Regression Output**

Dependent Variable: NPL
Method: Panel Least Squares
Date: 11/26/14 Time: 13:58
Sample: 2004 2013
Periods included: 10
Cross-sections included: 8
Total panel (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	76.39368	15.56431	4.908261	0.0000
CEF	-0.040993	0.014945	-2.742926	0.0079*
SOLV	-0.032076	0.235880	-0.135983	0.8923
DR	3.220066	0.541393	5.947741	0.0000*
LTD	0.143417	0.048460	2.959503	0.0043*
IR	5.198001	0.960511	5.411706	0.0000*
INF	-0.001935	0.057508	-0.033656	0.9733
GDP	-0.084054	0.585009	-0.143679	0.8862

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.711802	Mean dependent var	7.991588
Adjusted R-squared	0.649729	S.D. dependent var	6.633355
S.E. of regression	3.925865	Akaike info criterion	5.740411
Sum squared resid	1001.807	Schwarz criterion	6.187041
Log likelihood	-214.6164	Hannan-Quinn criter.	5.919478
F-statistic	11.46712	Durbin-Watson stat	1.735779
Prob(F-statistic)	0.000000		

Source: Financial statement of sampled commercial banks and own computation through Eviews 6**.**

* Significant at 1%

Notes: R^2 =0.711802; Adj R^2 = 0.649729; F-statistics = 11.46712and prob (F-statistics = 0.000000), and Durbin-Watson stat =1.735779.

Table.4.5. presented the regression result of nonperforming loan (NPL) as dependent variable and four bank specifics and three macroeconomic factors as independent variables for the sample of eight commercial banks in Ethiopia. The adjusted R-squared value for the model is around 65%, suggesting that almost 65% variance in Ethiopia commercial banks NPLs is explained by all mentioned explanatory variables. And also adjusted R^2 value show that the overall goodness of the model. Accordingly, the value of R^2 showing that model used in this study has good statistical health. F-statistics of the model has a p-value of 0, suggesting that all explanatory variables jointly can influence the rate of NPLs.

As it is shown in the above regression output variables like cost efficiency, loan to deposit ratio, deposit rate and interest rate are statistically significant factors affecting the level of nonperforming loan in Ethiopia commercial banks at 1% significant level. The rest, solvency ratio, inflation and gross domestic product had statistically insignificant impact on Ethiopia commercial banks nonperforming loan.

4.5. Discussions on Regression Results

The preceding sections present the overall results of the study. Thus, this section discusses in detail analyses of the results for each explanatory variables and their importance in determining nonperforming loan ratio in accordance with the above regression result. In addition, the discussions analyses the statistical findings of the study in relation to the previous empirical evidences.

4.5.1. Determinants of Nonperforming Loan – Discussion

- **Nonperforming Loan and Cost Efficiency**

The result of fixed effect regression model in table 4.4 indicated that cost efficiency have a negative impact on nonperforming loan, and statistically significant (p-value = 0.0079) at 1% significant level. Thus, the result is in accordance with the first research hypothesis (cost efficiency has a negative impact on NPLs). This implies that every one percent change (increase or decrease) in bank's cost efficiency keeping the other thing constant has a resultant change of 4.09% on the nonperforming loan in the opposite direction. There are a number of studies found negative relationships between efficiency and non performing loans. The result was consistent with the studies by Hassan.S.et.al by using Tobit simultaneous equation; the result was clearly indicated that higher non-performing loan reduces cost efficiency. Likewise, lower cost efficiency increases non-performing loans (The result indicates that there is an inverse relationship between bank efficiency and non-performing loans.). The current result also support the hypothesis of bad management (poor management in the banking institutions results in bad quality loans, and therefore, escalates the level of non-performing loans) proposed by Berger and DeYoung (1992). By taking into account risk and quality factors into the estimation of banks' cost efficiency in the Japanese commercial banks for the period of 1993 to 1996, Altunbas *et al*. (2000) found that the level of non-performing loans are positively related to bank inefficiency.

In recent years, studies on bank efficiency have taken into account asset quality, specifically non-performing loans. The omission of such a variable might lead to an erroneous bank efficiency measure (Mester, 1996). This is particularly true since a large proportion of non-performing loans may signal that banks use fewer resources than usual in their credit evaluation and loans monitoring process. In addition, non-performing loans lead to inefficiency in the banking sector as found by Altunbas *et al*. (2000), Fan and Shaffer (2004) and Girardone *et al.* (2004). This is

because efficient banks are better at managing their credit risk as highlighted by Berger and DeYoung (1997).

Therefore, the current result implies that cost efficiency is tangent to the survival of Ethiopian commercial banks as a whole. Banks should strive hard to manage their cost efficiently so that their objective of profitability can be achieved and the multiplier effects maintained to the maximum. Generally, the first research hypothesis fail to reject (i.e. there is negative and significant relationship between cost efficiency and bank nonperforming loan).

- **Nonperforming Loan and Solvency Ratio**

The equity ratio indicates a bank's ability to cover any kind of unexpected losses (due to lending or other activities). Strong banks are well-capitalized because they have developed appropriate management skills to obtain a sufficient compensation for risk (loan pricing policy and other lending terms) or to avoid future loan losses (loan exposure and credit portfolio management). Accordingly, the poor capitalization of weak banks may stem from a lacking ability to generate as "healthy" loan growth such as for the case of better capitalized banks. Therefore, banks are required to meet a minimum regulatory capital ratio under the regulation of NBE. In fact, most of the banks hold a considerable capital buffer above the required ratio. Solvency ratio was considered to be one of the key factors that can affect banks nonperforming loan in Ethiopia. Even if the P value of solvency ratio is statistically insignificant (0.8923), the regression output proved negative impact of on banks' nonperforming loan (-0.032076). The coefficient result is in line with the second hypothesis (there is a negative relationship between banks solvency ratio and nonperforming loan). The coefficient for solvency ratio of nonperforming loan is negative and statistically insignificant with the p-value of 0.8923. Though, negative sign confirms that insolvent banks are expected to have high nonperforming loan ratio which was consistent with

the previous finding, but insignificant result indicates that solvency ratio is not an important factor for Ethiopian banks that influence the level of nonperforming loan.

Similarly Keeton and Morris (1987), argues that banks with relatively low capital respond to moral hazard incentives by increasing the riskiness of their loan portfolio, which in turn results in higher non-performing loans on average in the future. Keeton and Morris (1987) indeed showed that excess loss rates were prominent among banks that had relatively low equity-to-assets ratio. The negative link between the capital ratio and NPLs was also found in Berger aDeYoung (1997), and Salas and Saurina (2002).

- **Nonperforming Loan and Loan to Deposit Ratio**

The coefficient sign of loan to deposit ratio shows that there is a positive relationship between banks nonperforming loan and loan to deposit ratio. Loan to deposit ratio had positive and statistically significant (p-value = 0.0043) at 1% significant level. The result is in line with the third research hypothesis which is based on the argument that when banks lending increase as compared to the deposits the level of NPL also increase. Because at the time of low loans to deposits ratio in order to earn more banks start lending even to the low quality borrowers and do not follow the standard loan allocation practices, which leads to the growth in NPLs. Therefore, the result implies that every one percent change (increase or decrease) in bank's loan to deposit ratio keeping the other thing constant has a resultant change of 14.34% on the nonperforming loan in the same direction. From the coefficient value loan to deposit ratio is a very important determinant of NPL in Ethiopian banking industry. So, third research hypothesis (i.e. there is a positive relationship between NPL and banks loan to deposit ratio) also fail to reject.

- **Nonperforming Loan and Deposit Rate**

P-value of the fourth determinant factor (deposit rate) is statistically significant at 1% (0.0000) and has a positive impact on the dependent variable, which is in line with the fourth research hypothesis (there is a positive relationship between NPL and deposit rate). The coefficient value of the variable (i.e. 3.220066) indicated a percentage rise/decline in deposit rate of banks resulted in more than 3 times rise/decline in banks nonperforming loan. The coefficient value tells us there is a strong positive relationship between deposit rate and NPL. From four selected bank specific variables deposit rate is the prominent explanatory variable that have strong impact on the level NPL in Ethiopia commercial banks. The justification for the positive relation is that with the increase in deposit rate, the interest spread rate and competitiveness of the banks decline, because of which deposit holders demand higher rates, in order to attract deposits banks has to pay higher rates. To pay for deposit holders banks lend funds at higher rates to the low quality borrowers and by using corrupt practices, or any other means ,as a result low quality borrowers do not repay loans, thus end result in the growth of NPLs (Ahmad and Bashir ,2013).

- **Nonperforming Loan and Interest Rate**

The choice of interest rate as the primary determinants of NPLs may also be justified from the theoretical literature of life-cycle consumption models. Lawrence (1995) examines such a model and introduces explicitly the probability of default. The model implies 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. Additionally, in equilibrium, banks charge higher interest rates to riskier clients. Rinaldi and Sanchis-Arellano (2006) extend Lawrence's model by Including the possibility that agents can also borrow in order to invest in real or financial assets. After solving the optimization problem of an agent, they derive the probability of default which

depends on lending rate and other macroeconomic variable. The interest rate affects the difficulty in servicing debt, in the case of floating rate loans. The current result indicated that lending interest rate has a strong positive coefficient and it is statistically significant at 1% significant level (0.0000). The result is in line with the fifth research hypothesis. The coefficient value of the variable (i.e. 5.198001) indicated a percentage rise/decline in banks lending interest rate, resulted in 5 times rise/decline in the NPL of banks in Ethiopia on the same direction. The coefficient value may suggest that from all determinants of NPL (from seven explanatory variables mentioned in this study) the most important one is interest rate and also NPLs rate highly influenced by lending interest rate.

- **Nonperforming Loan and GDP**

The coefficient signs of real GDP growth rate show that, economic growth has a negative impact on the growth of NPL. Unexpectedly the current econometric analysis suggest that real GDP growth is not the main driver of nonperforming loan ratio in Ethiopia banking industry. The result also suggests that GDP growth rate is not the most important determinant factor for Ethiopia commercial banks NPL. So, we reject the sixth research hypothesis (i.e. there is negative and significant relationship between GDP and banks nonperforming loan). Parallel to the current coefficient sign of GDP, Quagliarello (2007) found that business cycle affects the NPL ratio for a large panel of Italian banks over the period 1985 to 2002. Furthermore, Salas and Saurina (2002) estimated a significant negative contemporaneous effect of GDP growth on the NPL ratio and inferred the quick transmission of macroeconomic developments on the ability of economic agents to service their loans.

- **Nonperforming Loan and Inflation Rate**

Theories argue that inflation rate and non performing loan have positive relationship. Since market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment.

Though the magnitude of the coefficient of correlation between inflation and nonperforming loans is low, the sign is negative (-0.001935); unexpected rise in inflation under cyclical downturns is likely to negatively affect the performance of the banking sector and recovery of loans to private operators and investors. In the extreme case, hyper-inflation may erode banks assets and equity and weaken banks position through the interest rate channel (Piloiu.A et.,al.2013).

Therefore, even if the finding is insignificant (0.9733) the result disclosed that inflation rate has negative relationship with nonperforming loan. So, Inflation rate is not important determinants of NPL in Ethiopia commercial banks.

Table 4.5 Summary of actual and expected signs of explanatory variables on the dependent variables.

Explanatory variables	**Hypothesized impact on Nonperforming loan**	**Actual impacts**
Cost efficiency	Negative & Sig	Negative & Sig
Solvency ratio	Negative & Sig	Negative & Ins.
Loan to deposit ratio	Positive & Sig	Positive & Sig
Deposit rate	positive & Sig	positive & Sig
Interest rate	positive & Sig	positive & Sig
Gross Domestic Product	negative & Sig	negative & Ins.
Inflation Rate	Positive & Sig	negative & Ins.

Note: Sig- statistically significant

Ins- statistically insignificant

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

The preceding chapter presented results and discussion of the study, while this chapter will deals with conclusion and recommendation of the study based on the findings. Accordingly this chapter is organized into three sub-sections. Section 5.1 will be presented conclusion of the study and recommendation of the study will be presented under section5.2. Section 5.3 will be provide research limitations and future research directions

5.1. Conclusion

Non-performing loan can affect the ability of banks to play their role in economic development. The fast increase in NPLs not only increased banks' vulnerability to further shocks but also limited their lending operations with broader repercussions for economic activity. The current study attempted to ascertain determinants of NPLs. As well as to investigate and verify the effectiveness of common determinants of commercial banks nonperforming loan and how they affects the level of NPL in Ethiopia commercial banks. Seven variables (four bank specific and three macro-economic determinants) affecting commercial banks NPL were chosen and analyzed.

The panel data was used for the sample of eight commercial banks in Ethiopia from 2004 to 2013. Data was presented by using descriptive statistics. The balanced correlation and regression analysis for nonperforming loan was conducted. The model was tested for the classical linear regression model assumptions. The model fulfills assumptions of the CLRM. Fixed effect model/FEM was used based on convenience. Seven factors affecting banks loan and advance were chosen and analyzed. From the list of possible explanatory variables, only four of them

proved to be statistically significant. The results of models enable us to make following conclusions.

with respect to the bank specific variables, the study find that from four bank specific variables three of them (cost efficiency and loan to deposit ratio and deposit rate) were statistically significant and important factors that affect the level of NPL in Ethiopia commercial banks. From macroeconomic variable the study also find evidence for a significant and positive relationship between interest rate and non-performing loans. From mentioned variables interest rate have a very strong impact on NPL. Result also shows that the impact of lending interest rate on NPLs is instantaneous. The empirical results, however, reveals that GDP and inflation rate are important determinants of NPL, they were not an important determinants of NPLs in Ethiopia commercial banks.

Generally, the finding of the study failed to reject four research hypotheses that indicate the relationship between bank's nonperforming loan and cost efficiency, loan to deposit ratio, deposit rate and interest rate whereas, three hypotheses indicating the relationship between bank's nonperforming loan and bank solvency, gross domestic product, and inflation rate rejected (Solvency ratio and GDP growth rate had insignificant impact on bank's NPL in Ethiopia. The coefficient sign of inflation rate was opposite to the last research hypothesis).

A strong and resilient financial system is necessary for economic growth. It restores confidence and determines the elasticity of the system to shocks as well as enhancing the credibility of the financial institutions in the system.

5.2. Recommendation

Banks do not know ex ante the proportion of loans that will perform and even when they carry out appraisals. To cover credit risk, banks charge a premium whose size depends on the bank credit policy, interest on alternative assets, amount borrowed, and type of client and size of collateral. These increases the effective rates paid by borrowers and reduce the demand for loans. When left unsolved, nonperforming loan can compound into financial crisis, the moment these assets exceed bank capital in a relatively large number of banks.

Based on the current findings the researcher recommends the following points:

- It is apparent that banks need to seriously consider all the internal and external factors causing non performing loans as well as the impact of non-performing loans on the bank's overall performance in order to curtail the level of nonperforming loan.

- Commercial banks should develop credit procedures, policies and analytical capabilities and these efforts should be expanded into full credit management including origination, approval, monitoring and problem management tailored to the needs of each bank.

- Banks should apply efficient and effective credit risk management that will ensure that loans are matched with ability to repay and to avoid insider lending.

- Banks should also enhance periodic/regular credit risk monitoring of their loan portfolios and loan defaults are projected accordingly and relevant measures taken to minimize the level of NPL.

- Banks should be strengthening their supervision to prevent a sharp build up of NPLs in the future by avoiding excessive lending and maintaining high credit standards.

- Before lending decision, banks should consider their loans to deposits ratio and riskiness of their loan portfolio.

- There should be closer consultation and cooperation between commercial banks and the regulatory authorities so that the effect of regulatory measure on commercial banks will be taken into account at the stage of policy formulation.

Generally, internal factors can be easily controlled while external factors can be a threat to the viability of banks. Banks have to be vigilant in their lending decisions so as to avoid loan losses and the accumulation of non-performing loans. Banks need to concentrate on sectors that are performing well and avoid lending to those sectors which have already recorded a significant amount of non-performing loans. One thing to note is that, this result can be generalized to the whole banking sector in Ethiopia as almost all the banks have been affected by non-performing loans. Therefore, the recommendations generated are a prescription for all commercial banks in Ethiopia.

5.3. Research limitations and future research directions

This research tried to meet the gap between the existing literatures (that are mentioned in chapter one and two), but it also has its own imitations and those limitations can be addressed by other researchers in the future.

Accordingly, the study employed only a secondary data (banks audited financial statements) and used static panel data model and limited to the sample of only eight commercial banks. Even if there are so many bank specific and macroeconomic variable the researcher only see four bank specific variable (cost efficiency, solvency ratio, loan to deposit ratio and deposit rate) and three macroeconomic variables(GDP, interest rate and inflation). Hence, there are other variables

other than the above ones that can determine banks nonperforming loan i.e. from bank specific; return on asset(ROA) and return on equity (ROE), Credit growth and total liabilities to income etc. from macroeconomic factors such as real exchange rate and unemployment.

Therefore, the future researches should investigate by increasing the number of samples and by including new determinants of NPL. And also using other advanced techniques such as Fully Modified OLS or Two Step Least Square method and dynamic panel data techniques such as GMM.

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Appendices

Appendix 1:

Appendex 1: Heteroskedasticity Test

Heteroskedasticity Test: White

F-statistic	1.301506	Prob. F(7,72)	0.2621
Obs*R-squared	8.985805	Prob. Chi-Square(7)	0.2537
Scaled explained SS	18.88744	Prob. Chi-Square(7)	0.1085

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/02/14 Time: 15:44
Sample: 2004 2013
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	186.6097	111.6145	1.671913	0.1989
CEF^2	-5.22E-05	0.000418	-0.125030	0.9008
DR^2	-0.002688	0.805203	-0.003338	0.9973
LTD^2	-0.005385	0.003673	-1.465958	0.1470
SOLV^2	-0.171512	0.125087	-1.371145	0.1746
GDP^2	662.3165	4691.628	0.141170	0.8881
INF^2	71.61822	241.4487	0.296619	0.7676
IR^2	-10321.89	5659.891	-1.823691	0.0723

R-squared	0.108299	Mean dependent var	21.92332
Adjusted R-squared	0.021606	S.D. dependent var	62.85430
S.E. of regression	62.17158	Akaike info criterion	11.19231
Sum squared resid	278302.0	Schwarz criterion	11.43052
Log likelihood	-439.6925	Hannan-Quinn criter.	11.28781
F-statistic	1.249224	Durbin-Watson stat	1.142419
Prob(F-statistic)	0.287873		

Appendix 2: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.485285	Prob. F(10,62)	0.1665
Obs*R-squared	15.46108	Prob. Chi-Square(10)	0.1161

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/19/15 Time: 05:56
Sample: 2004 2013
Included observations: 80
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.086314	16.48757	0.490449	0.6255
CEF	0.003638	0.012739	0.285582	0.7761
SOLV	0.001455	0.195911	0.007426	0.9941
DR	0.114759	0.556383	0.206260	0.8373
LTD	0.017096	0.042505	0.402207	0.6889
IR	0.958815	0.982909	0.975487	0.3331
INF	-0.107031	0.068229	-1.568690	0.1218
GDP	-0.103183	0.678710	-0.152029	0.8797
RESID(-1)	0.527522	0.166870	3.161268	0.0024
RESID(-2)	-0.178834	0.144669	-1.236157	0.2211
RESID(-3)	-0.169205	0.157230	-1.076163	0.2860
RESID(-4)	0.131307	0.154425	0.850295	0.3984
RESID(-5)	0.096111	0.147078	0.653470	0.5159
RESID(-6)	0.000741	0.151345	0.004894	0.9961
RESID(-7)	-0.094345	0.148508	-0.635290	0.5276
RESID(-8)	-0.023780	0.149963	-0.158570	0.8745
RESID(-9)	0.023477	0.154321	0.152134	0.8796
RESID(-10)	-0.038553	0.151721	-0.254103	0.8003

R-squared	0.344861	Mean dependent var	-1.01E-14
Adjusted R-squared	0.165226	S.D. dependent var	4.481679
S.E. of regression	4.094729	Akaike info criterion	5.852386
Sum squared resid	1039.542	Schwarz criterion	6.388342
Log likelihood	-216.0954	Hannan-Quinn criter.	6.067266
F-statistic	1.919788	Durbin-Watson stat	2.063740
Prob(F-statistic)	0.302655		