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Determinants of Nonperforming Loans: Evidence from Commercial Banks in Ethiopia

By

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DECLARATION

I, the under signee declare that this study entitled as “Determinant of Nonperforming Loans: Evidence from Commercial Banks in Ethiopia” is my own work. I have carried out the research work independently with the guidance and support of the research advisor. This study had not been submitted to any degree/diploma in this or any other institution.

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CERTIFICATION

This is to certify that Kibur Minas has completed his thesis entitled as “Determinant of Nonperforming Loans: Evidence from Commercial Banks in Ethiopia.” In my opinion all the materials used for the thesis has been duly acknowledged and his thesis is appropriate to be submitted as a partial fulfillment of the requirement for the Degree in Master of Business Administration in Finance (MBA in Finance).

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This is to certify that the thesis, "Determinant of Nonperforming Loans: Evidence from Commercial Banks in Ethiopia," was carried out by Kibur Minas under the supervision of Dr. Abebaw Kassie, submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

The aim this study is to examine three bank specific and three macroeconomic determinants of nonperforming loans proposed by the literature in the Ethiopian banking system for the period 2005 to 2013 using Arellano Bond (1991) first difference GMM estimation method. The three bank specific factors are ROA, capital to asset ratio and loan to deposit ratio and the three macroeconomic factors are real GDP growth, unemployment and inflation. The estimation result indicates that the coefficient of lagged dependent variable was between 0 and 1 as expected. Profitability and capital adequacy both showed significant ($p<0.05$) negative effect on NPL. Loan growth has also shown significantly ($P<0.05$) and positively effect on NPL. However the three macroeconomic factors have insignificant ($p<0.1$) effect on NPLs. The model was tested for over identification problem by Sargan test as recommended by Aellano Bond (1991). Further two autocorrelation test, AR (1) and AR (2) were conducted to test the assumption of no autocorrelations in the error term. The test result rejected the null hypotheses confirm the validity model assumptions. The results of the research benefit specifically bank managers and financial sector regulatory body.

Keywords: Nonperforming loans, bank specific determinants, macroeconomic determinants, GMM estimation

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Acronym

2SLS: Tow stage least square

BCBS: Basel committee on banking supervision

CAR: Capital to asset ratio

DFE: Dynamic fixed effect model

FE: fixed effect model

GMM: General methods of moment

IMF: International monetary fund

INF: Inflation

KYC: Know your customer

LTD: Loan to deposit ratio

NPLs: Nonperforming loans

OLS: Ordinary least square

RE: Random effect model

RGDP: Real gross domestic product

ROA: Return on asset

UNEMP: Unemployment

VaR: Value at Risk

1 Chapter One: Introduction

1.1 Background the Study

Bank insolvency has been a major problem in countries. Among others asset quality deterioration is the leading cause for bank insolvency. Banks asset quality deterioration has gained significant attention especially after the recent financial crises and economic recession. Traditionally, banks create asset through their lending activity, and a rise of nonperforming loans (NPLs) in their portfolio is a pressing issue to the bank managers and regulators. Therefore, identifying and understanding factors that significantly determine the level of NPL has been the focus of researches before and after the 2007-2008 financial crises Demitros *et.al.* (2016).

The empirical literatures on the topic can be categorized in to three strands. The first strand of the literatures has given more emphasis on the bank specific factors of NPLs. The second strand of literatures has given emphasis on the macroeconomic determinants of NPLs. Recently, literatures have been found to incorporate macroeconomic and bank specific determinants in their models to comprehensively explain (using aggregate and/or disaggregate data) the problem of NPLs.

Among the empirical studies that have investigated the bank specific factors of NPLs, Berger and DeYoung(1997) is notable example. The study tested four bank management-related hypotheses on the relationship among loan quality, cost efficiency and level of capital. These hypotheses are bad luck hypothesis, 'bad management' hypothesis, the 'skimpinghypothesis' and the 'moral hazard' hypothesis. Continuing this line of research Podpiera and Weill (2008), Zhang

(2016), Li *et al.* (2007) and Breuer (2006) investigated the hypotheses suggested by Berger and DeYuong (1997) and confirmed the findings of the original research.

The other line of empirical research gave much attention on the macroeconomic determinants of nonperforming loans. These empirical studies have examined the influence of the macroeconomic environment on NPLs. Rinaldi and Sanchis-Arellano (2006), Berge and Boye (2007) Boss *et al.* (2009),Cifter *et al*. (2009), Nkusu (2011) and Segoviano *et al.* (2006) investigated macroeconomic variables such as income, unemployment, interest rate etc.

Recently, few literatures investigated the determinants of nonperforming loans incorporating both bank specific and macroeconomic variables in their model. Among these are Dimitrios *et.al* (2016) and Ghosh(2015). These authors have studied bank specific and macroeconomic determinants of NPLs using General Method of Moment (GMM) estimation method and both authors have found macro variables such as unemployment and economic growth to exert a significant influence on NPLs and bank specific factors such as management skills and risk preferences were found to shape future NPLs.

1.2 Statement of the Problem

The global financial crisis that occurred in 2007-2008 was due to a surge in non-performing loans in US and other countries including sub-Saharan African countries. A rising NPLs in the loan portfolio of banks put greater risks on banks liquidity and profitability. A rising NPLs also erode the banks' balance sheet. Bank failure and banking crises has been linked to a surge in NPLs thus regulators and bank management put NPL on the spotlight Demitros *et.al.* (2016).

Deterioration of banks asset quality has an immediate deleterious effect on the stability of the banking system and the border financial system. It has been long recognized that deteriorations

of banks reduce economic efficiency, impair social welfare and slow down economic activity Ghosh(2015).To some scholars such as Gonzales-Hermosillo (1999) and Zeng (2012) NPLs are "financial pollutions" that adversely affects economic success.

Therefore, minimizing NPLs is primary to ensure sound banking system, overall financial stability and the real economy. While before any policy response to resolve problem of NPLs, regulator and bank's management need to identify the underlying determinants and their relative significance.

To address the issue of NPLs, many studies have been conducted in different countries (developed and developing economies). However, the findings overall are inconsistent. To mention a few example Marki *et al.* (2014), Godliwiski *et al.* (2005), Garsiya and Fernandez (2007) have suggested that ROA and ROE are good indictors of management quality. In their view profitability is among others what distinguishes good management from bad ones. However, negative and significant correlation between these factors and NPLs was reported by Godlewski (2005), Radivojevic and Jovovic (2017) while positive relationship was reported by Garsiya and Fernandez (2007).

The observed inconsistency is due to the non-experimental nature of the economic investigation and heterogeneity of countries economic and regulatory settings. Moreover, the difference may arise from a difference in panel data, model and estimation method. Hence a need arises to investigate the problem of NPLs in the context of a particular economic and regulatory setting with advanced model and estimation method.

In the context of Ethiopia, for example Zelalem(2013) and Mekides(2017) has investigated the issue of NPLs. Zelalem (2013) has studied bank specific and determinants of NPLs(loan growth,

operational efficiency, financial performance, real gross domestic product (GDP) growth, inflation) using classical multiple linear regression model and ordinary least square estimation method using data collected from eight commercial banks across the period 2000 to 2011.

Similarly, Mekides (2017) using classical multiple linear regression and ordinary least square estimation method studied bank specific and macroeconomic determinants of NPLs (loan to deposit ratio, capital adequacy, GDP, unemployment rate) on data collect form nine commercial banks across the period from 2006 to 2016.

These studies vary in both spatial and inter temporal dimensions. Moreover, they differ in their selection of factors that determine NPLs. Zelalem (2013) investigated bank specific factors such as loan growth, operational efficiency, financial performance, income diversification, ownership of banks and bank size. From the macro economic factors the author has studied real GDP interest rate, inflation rate and exchange rate. While Mekides (2017) investigated bank specific factors such as loan to deposit ratio, interest margin, capital adequacy ratio, return on equity and loan loss provision. The macro economic factors are GDP and Unemployment. Hence a parallel comparison of their finding is not feasible. However, both studies have employed similar model and estimation method; they employed classical linear regression model and ordinary least square (OLS) estimation method.

In this study main bank specific and macroeconomic determinants are investigated as proposed by literature (including Zelalem (2013) and Mekides (2017)). However, unlike Zelalem (2013) and Mekides (2017, this research takes in to account the dynamic (time persistent) nature of NPLs (many economic relationships show this) and specifies a dynamic panel data model and estimates the model using Arellano Bond (1991) first difference GMM estimation method. Classical multiple linear regression model and OLS (ordinary least square) leads to specification.

GMM estimation method is also selected because unlike the other estimation methods such as OLS it is believed to be robust and have few assumption on the data generation process of the population that allows to exploit more information from the data set.

1.3 Objectives and Hypothesis

General Objective:

In the context of the gap observed in the literature (inconsistent model specification, estimation method selection and research findings) and the observed trend on the growing use of dynamic pane data model and GMM estimation method to investigate the issue of NPLs, the general objective of the study is to investigate main bank specific and macroeconomic determinants of NPLs as proposed by literature. The specific objectives are outlined as follows.

Specific Objectives:

I. To investigate the effect of loan growth to deposit ratio on NPLs of Banks
II. To examine the relationship between return on asset and NPLs of Banks
III. To identify the movement of capital to asset ratio and NPLs of Banks over time
IV. To determine the effect of unemployment on NPLs of Banks
V. To examine the effect of inflation rate on NPLs of Banks
VI. To measure the effect of real GDP growth on NPLs of Banks

To achieve the general objective, the following hypotheses are formulated based on previous research as accounted in the literature review section .These hypotheses have gained supported from empirical researches across different countries and economies. Berger and DeYuong (1997), Podpiera and Weill (2008), Zhang (2016), Li *et.al.* (2007) and Breuer (2006) are notable studies on the link between bank specific factors and NPLs. On the other hand Rinaldi and

Sanchis-Arellano (2006), Berge and Boye (2007), Boss *et.al*. (2009), Cifter *et.al*. (2009), Nkusu (2011) and Segoviano *et.al.* (2006) are among the studies that investigated macro economic factors included in the present study. The full account of these hypotheses is discussed under hypothesis development section.

Hypothesis of the study:

HP1: There is significant and positive relationship between loan growth to deposit ratio and NPLs.

HP2: There is significant and negative relationship between return on asset and NPLs.

HP3: There is significant and negative relationship between capital to asset ratio and NPLs.

HP4: There is significant and positive relationship between unemployment and NPLs.

HP5: There is significant and negative/positive relationship between inflation rate and NPLs

HP6: There is significant and negative relationship between real GDP growth and NPLs

1.4 Significance of the Study

The result of the study has important practical implications and benefits commercial banks' managers and banks' regulatory authority to devise appropriate credit policy and policy response to resolve the issue of problem loans.

The problem of NPLs has gained significant attention thus far outside Ethiopia. However, in the context of the economy of Ethiopia there are only few studies have been done so far. Even these studies disregard the dynamic nature of NPL and use classical multiple linear regression model and OLS estimation method. Therefore, this study employs dynamic panel data model and first

difference GMM estimation method which have gained popularity in the recent literature to investigate the issue of NPLs.

1.5 Scope and Limitations of the Study

The presents study address three bank specific factors (ROA, capital to asset ratio and loan growth to deposit ratio) and three macroeconomic factors (real GDP growth, unemployment rate and inflation rate) which have extensively researched. In the study, samples of nine banks were included mainly because the other banks were not chartered before 2005.

The study includes time series data on the factors mentioned here in above only from 2005 to 2013. The main reason is that Commercial Bank of Ethiopia (CBE), the leading commercial bank in the banking sector in Ethiopia, is one of the nine commercial banks included in the sample. However, since 2014 audited financial statements were not submitted to National Bank of Ethiopia (NBE). The unaudited financial statements can be accessed from CBE itself however the reliability and accuracy of the financial information are not guaranteed. Moreover, excluding CBE from the sample and expanding the time series data for at least to 2018 is an option. However, the sample may not represent the population given the significance of CBE in the banking sector and long history in the banking landscape.

The aim of the study is to estimate the coefficients of the model which are expected to be stable in temporality and not the current level of either the response variable or the explanatory variables. Therefore, except for the possibilities that the amount of information contained in the time series data is limited to estimate the coefficients of the model the findings identify the determinants of NPL.

1.6 Organization of the Thesis

The rest of the thesis is structured in four chapters. The second chapter presents the literature review. In the literature review both theoretical and empirical literatures that have direct relevance to the problem of NPLs are reviewed. The third chapter presents the design and the methodology of the research. Chapter four presents the result of analysis and discussion of the result. Finally, the fifth chapter presents conclusions and recommendations of the study.

2 Chapter Two: Literature Review

In the sub sections that follows banking operation and regulation related theories and practices, the role of banks in the macro economy and empirical research findings on the study of NPLs from country specific to cross country studies are discussed at length. Based on the reading of these literatures, knowledge gab is identified and overall summary is presented.

2.1 Banking Theory and Practice

Banks are arguably the most important finical institutions for an economy. The crisis that started in summer of 2007 underlines how important banks are to the economy. Banks provide various services to the economic agents and assist the smooth functioning and growth of the economy. Banks innovate and operate the payment system. They play their intermediation role between depositors and credit demanders efficiently which otherwise be a costly transaction. They are expert in creating liquidity to the economy through their ability to transform relatively illiquid assets (loans) to liquid liabilities (deposits).

Through diversification and derivative activities, banks reduce various risks of the public. Among others liquidity risk, credit risk and interest rate risk are notable examples. Levine, 2005 suggest that well developed banking system stimulate economic growth by providing fund for investment and selecting investment activities worth financing (systematic resource allocation).

The role of banks in the general financial system can be noticed from Figure 2-1 that shows an overview of the component parts of the system as well as their interconnectedness and their roles within the system. According to Allen *et al.*(2004)the primary sources of funds for lending are households and firms. The ultimate users of funds are also households, firms and governments.

Lenders have two avenues to supply the fund to borrowers. One way is through financial markets which consist of money markets, bond markets and equity markets. The other way is through banks and other financial intermediaries.

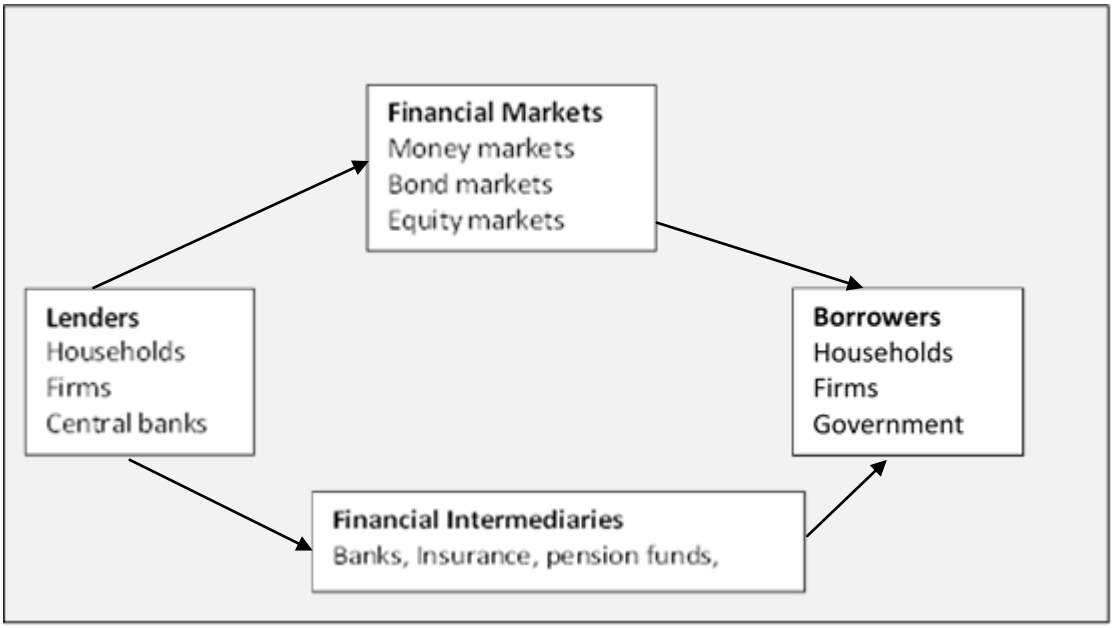

Figure 2-1 Financial Flow

Source: Allen et al.(2004, P.491)

However, there are ongoing arguments on the role of banks vs. financial markets to best serve the needs the economy. According to Allen *et al*. (2004) in the developed economies such as the euro zone the economy can be said bank based the UK being the exception which has significant bond market and equity market. In the US the economy can be categorized under financial market based system. In Japan both have been found to be significant.

Those who are in favor of the bank based system argue that banks are in a better position to solve the problem of information asymmetry. According to proponent of this view lenders must incur fixed cost to monitor the behavior of borrowers on how the fund is being used. However, in the

financial markets with many lenders there is a free rider problem (leaving the monitoring cost to someone else).

Stimulating economic growth is another important role of banks. Geerschenkorn(1962) argued that bank based system allows closer relationship between banks and industrial firms which may not be possible through financial market based system. The author explained that the main factor in the relative fast growth of Germany than UK in the nineteenth is due to the bank based system in Germany during that period. Tadesse (2002) found also that under developed financial sectors bank based system outperform financial based system. Others suggested that banks and financial markets are complimentary Demirguc-Kunt and Maksimovic(1998), Beck and Demirguc-Kunt(2009).

According to these authors the 2007 financial crisis also signaled some financial institutions are Too Big to Fail (TOTF). These institutions are regarded as critical for the functioning of the financial system. Stability of the financial system and the real economy would be endangering if they are allowed to fail. In response to this the Basel committee on banking Supervision (BCBS) has developed methodology to identify globally important banks.

In general banks have a number of important functions in the financial system and the economy. They play monitoring role and insure efficient resource allocation. They smooth fluctuating risk and share risks through diversification. However, banks due to their pivotal roles in the financial system and the economy are also the center of financial crisis. This has been underlined in the 2007 financial crisis.

2.2 Lending Process

2.2.1 Credit Information

Lending requires adequate and accurate information about customers to base lending decision. Adequate knowledge of customers, traditionally known as KYC (Know Your Customer) is vital in business of lending. Banks use various means to obtain such information about the existing or potential customer. Ross *et al.* (1998) lists some of the potential source of information about customers for lending activity. These are financial statements, credit report from credit bureau and customers' history with the lending institution.

According to The Federal Reserve (2005) a credit report is an organized presentation of information about an individual's and/or company's credit record that a credit bureau communicates to those who request information about the credit history of an individual's and/or company's experiences with credit, leases, non-credit-related bills, collection agency actions, monetary-related public records, and inquiries about the individual's credit history. In our country this role is assigned to the national bank of Ethiopia. Further according to Ferreti (2007), credit information is usually integrated with data from other sources such as court judgments, electoral rolls and other private information provided by other organizations, which compile additional information referring to a consumer. This naturally is ideal source of input for credit analysis.

The purpose of information sharing is to communicate relationship information from existing lending relationships to outside lenders Gehrig and Stenbacka (2007). Credit providers use credit information to conduct credit risk analysis of prospective borrowers in order to mitigate credit risk. Kallberg and Udell (2003) highlight that information sharing is useful both at the

origination stage and after credit has been extended. Especially at the origination phase, information sharing reduces the problems of adverse selection.

In fact the exchange of credit information improves non-performing loan ratios, leads to fewer losses through write offs and decreases interest rates for good credit risks Jentzsch(2008, p.538). Jentzsch (2008) further supports that sharing credit information between lenders intensifies competition and increases access to finance. Jappelli and Paggano (2005) indicate that credit information sharing results in improved bank's knowledge of applicant's character, easing adverse selection and reduce the informational rents that banks could otherwise extract from their customers. 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.

Further, Gehrig and Stenbacka, (2007) highlight 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. According to Khuzwayo (2008), greater information sharing of trade credit data, particularly in the informal sector, could greatly expand credit access for small and medium enterprises.

Barth, Lin, Lin & Song (2008) report that information exchange will assist in minimizing lending corruption in banks by reducing information asymmetry between consumers and lenders, improving the bribery control methods and reducing informational rent, and hence the bargaining power of lenders. The exchange of consumer credit information disciplines borrowers to repay loans because borrowers do not want to damage the good report which can make it difficult for

them to get credit (Swiss National Bank 2008). Once credit information on the loan request is obtained bank officers precede with credit assessment. The next section would thus discuss process involved in credit analysis or assessment.

2.2.2 Credit Analysis

Credit analysis is the first step in the process to tailor-make a solution to fit the customer's needs. The analysis starts with an understanding of the customer's needs and capacities to ensure there is a good fit in terms of the financing solution. Credit analysis is the most important safeguard to ensure the underlying quality of the credit being granted and is considered an essential element of credit risk management (Cade 1999).

The credit quality of an exposure generally refers to the borrower's ability and willingness to meet the commitments of the facility granted. It also includes default probability and anticipated recovery rate (Saunders & Cornett, 2003). Credit analysis thus involves assessing the risks involved in financing and thereby anticipating the probability of default and recovery rate. A widely adopted credit analysis model that is used by the credit official to evaluate a borrower's credit worthiness is the five C's (Strischek 2000). The five C's stands for character, capital, capacity, collateral and the cyclical aspect of the economy.

The credit analysis process employed today is not significantly and fundamentally different from the process used by the first bank (Caouette *et.al.* 1998, Rose, 2002). The author claims that the five C's are considered the fundamentals of successful lending and have been around for approximately 50 years. Initially only character, capacity and capital were considered. However, over the years collateral and conditions were added. These have provided an even more comprehensive view and clearer understanding of the underlying risk and resulted in better

lending decision (Beckman and Bartels 1955, Reed *et al.* 1976, Sinkey 2002). Murphey (2004a) suggested that these principles should be the cornerstone of every lending decision.

Character: Rose (2002) defines character as the borrower's reputation and the borrower's willingness to settle debt obligations. In the process of evaluating character the author advice those indicative factors such as the borrower's honesty, integrity and trustworthiness should be assessed. The borrower's credit history and the commitment of the owners are also evaluated. A company's reputation, referring specifically to credit, is based on past performance. A borrower has built up a good reputation or credit record if past commitments were promptly met (observed behavior) and repaid timely (Rose 2002, Koch and McDonald 2003). Character is considered the most important and yet the most difficult to assess (Koch and MacDonald 2003).

Companies with strong and competent management teams not only survive in an economic downturn but also lead their companies' success. Bankers recognize the essential role management plays in a company's success. Critically analyzing quality of management has been one of the ways of assessing character. The history of the business and experience of its management are critical factors in assessing a company's ability to satisfy its financial obligations. The quality of management in the specific business is evaluated by taking reputation, integrity, qualifications, experience and management ability of various business disciplines such as finance, marketing and labor relations into consideration (Sinkey 2002, Nathenson 2004).

Capacity: Capacity refers to the business's ability to generate sufficient cash to repay the debt. An analysis capacity usually starts from a border scope such as industry analysis and then to narrower scope the applicant's business (Koch and MacDonald 2003, Nathenson2004). Evaluating the specific industry within which the business is operating plays a significant role

since each industry is influenced by various internal and external factors. The factors that form the basis of this analysis includes: Type of industry, Market share, Quality of products and life cycle, whether the business is labor or capital intensive, the current economic conditions, seasonal trends, the bargaining power of buyers and sellers, competition and legislative changes. These factors lead the banker to form a view of the specific company and industry.

Assessment of the applicant's businesses plan, management accounts and cash flow forecasts (demonstrating the need and ability to repay the commitments) will give a good indication of the capacity to repay (Sinkey 2002, Koch and MacDonald 2003). Moreover, the financial position the firm is also a critical indication of a business' capacity. The company's financial position is evaluated by assessing past financial performance and projected financial performance.

A company's past financial performance is reflected in their audited financial statements (Koch and MacDonald 2003). According to these authors commercial banks employ financial spreadsheet to undertake financial analysis based on the audited financial statements. Commercial banks utilize the financial spread (i.e. audited financial statement analysis and ratio calculations - DuPont) and it is applied through the Moody's Risk Advisor. The model also performs a peer comparison and calculates the probability of default (Koch and MacDonald 2003).

The other segment of position analysis is future oriented and commercial banks utilize financial projections that consist of projected cash flows to demonstrate the need for the facility and the ability to repay the facility (Sinkey 2002). In this regard at least three years audited financial statements (balance sheet and income statement) are required for data analysis and assumptions are made about the direction and rate of movement of the elements of the financial statements.

Based on these assumptions proforma financial statements developed for a better lending decision.

The projections also reveal the purpose, amount and type of finance required. It also provides insight into the company's ability to generate sufficient cash flow to service the debt (Murphey 2004b, Nathenson 2004). Banks must ensure that the type of financing is aligned to the purposed of finance (Rose 2002).

Generally, assessment of the financial capacity of a company should always include an evaluation of trends. Evaluating trends over a three to five year period gives a clear picture of the direction a firm is heading. Ratio analysis results should always be compared to a peer group of or an industry comparison. In this regard making a maximum use of ratios by comparing the firm to its peers using established benchmarks is so vital. Comparison of the company to firms in the same line of business, geographic area and employee size provides a more accurate comparison.

Analysis of the financial capacity of the organization should also be carried out in order to determine a borrower's ability to meet financial obligations in a timely manner. Watching customer payment habits over time is an excellent indication of cash flow. Also, checking bank and trade references, as well as any pending litigation or contingent liabilities are pivotal. Further checking for a parent company relationship is important as a parent company's guarantee may be available. Intercompany loans might affect financial solvency. Agency ratings that predict slow payment or default should be carried out before completion of investigating capacity of a borrower.

Capital: Capital refers to the owner's level of investment in the business (Sinkey 2002). Banks prefer owners to take a proportionate share of the risk. Although there are no hard and fast rules,

a debt/equity ratio of 50:50 would be sufficient to mitigate the bank's risk where funding (unsecured) is based on the business's cash flow to service the funding (Harris 2003). Lenders prefer significant equity (own contribution), as it demonstrates an owner's commitment and confidence in the business venture.

Conditions: Conditions are external circumstances that could affect the borrower's ability to repay the amount financed. Lenders consider the overall economic and industry trends, regulatory, legal and liability issues before a decision is made (Sinkey 2002). Once finance is approved, it is normally subject to terms and covenants and conditions, which are specifically related to the compliance of the approved facility (Leply 2003).

Banks normally include covenants along with conditions when credit facilities are granted to protect the bank's interest. The primary role of covenants is to serve as an early warning system (Nathenson 2004). Covenants can either be negative or positive (Sinkey 2002). Conditions normally stipulate that all the security relevant to the loan should be in order before any funds will be advanced.

Collateral: Collateral (also called security) is the assets that the borrower pledges to the bank to mitigate the bank's risk in event of default (Sinkey 2002) .It is something valuable which is pledged to the bank by the borrower to support the borrower's intention to repay the money advanced. Security is taken to mitigate the bank's risk in the event of default and is considered a secondary source of repayment (Koch and MacDonald, 2003).

Supporting of the aforementioned, Rose (2002) define secured lending in banks as the business where the secured loans have a pledge of some of the borrower's property (such as home or

vehicles) behind them as collateral that may have to be sold if the borrower defaults and has no other way to repay the lender.

The purpose of security is to reduce the risk of giving credit by increasing the chances of the lender recovering the amounts that become due to the borrower. Security increases the availability of credit and improves the terms on which credit is available. The offer of security influences the lender's decision whether or not to lend, and it also changes the terms on which he is prepared to lend, typically by increasing the amount of the loan, by extending the period for which the loan is granted and by lowering the interest rate (Norton and Andenas 1998, p. 144).

The security value of an asset is based on the estimated re-sale value of the assets at the time of disposing of it (McManus 2000). The specific type of property is valued by the bank to determine the property's market value for security purposes (Rose 2002). Besides the physical collateral a third party can provide a surety-ship for the debt of the borrower. Should the borrower not be in a position to repay the debt, the bank will then call on the surety for repayment (Koch and MacDonald, 2003). It is normal banking practice for the banks to take the surety-ships of the shareholders/directors when funds are advanced to a company (Rose 2002, Vance 2004).

Commercial banks have employed the five C's widely known as credit risk assessment models to assess whether the bank will agree to lend to a specific business (Sinkey 2002). Based on the credit information obtained about the borrower and credit assessment carried out, either by quantitative or qualitative model (through the use of the five C's) or combination of both, credit sanctioning is done.

2.2.3 Credit Approval

Extending credit is the careful balance of limiting risk and maximizing profitability while maintaining a competitive edge in a complex, global marketplace. Banks go through a thorough process in approving credit to hit the balance. Credit approval is the process of deciding whether or not to extend credit to a particular customer. It involves two steps: gathering relevant information and determining credit worthiness (Ross *et al.* 1998).

According to these authors the credit analysis process consists of a subjective analysis of the borrower's request and a quantitative analysis of the financial information provided. The individual steps in the credit approval process and their implementation have a considerable impact on the risks associated with credit approval. The quality of credit approval processes depends on two factors, i.e. a transparent and comprehensive presentation of the risks when granting the loan on the one hand, and an adequate assessment of these risks on the other. Furthermore, the level of efficiency of the credit approval processes is an important rating element.

The authors also argue due to considerable differences in the nature of various borrowers and the assets to be financed as well the large number of products and their complexity, there cannot be a uniform process to assess credit risks. The quality of the credit approval process from a risk perspective is determined by the best possible identification and evaluation of the credit risk resulting from a possible exposure. The credit risk can be distributed among the following risk components: Probability of default (PD), Loss given default (LGD) and Exposure at default (EAD).

2.2.4 Credit Follow Up

According to Ross *et.al* (1998) lending decision is made on sound credit risk analysis /appraisal and assessment of creditworthiness of borrowers. But past records of satisfactory performance and integrity does not guarantee the future, though they serve as useful guide to project trend in performance. A loan granted on the basis of sound analysis might go bad because of the borrower may not meet obligations per the terms and conditions of the loan contract. It is for this reason that proper follow up and monitoring is essential.

The authors classify loan follow up system in to three types. These are: Physical follow up, financial follow up and legal follow up. Physical follow-up helps to ensure existence and operation of the business, status of collateral properties, correctness of declared financial data, quality of goods, conformity of financial data with other records (such as taxes ,register books), availability of raw materials, labor situation, marketing difficulties observed ,undue turnover of key operating personnel, change in management set up among others.

These authors also suggests financial follow up is required to verify whether the assumptions on which lending decisions was taken continues to hold good both in regard to borrowers' operation and environment , and whether the end use is according to the purpose for which the loan was given. Whereas the purpose of legal follow up is to ensure that the legal recourse available to the Bank is kept alive at all times. It consists of obtaining proper documentation and keeping them alive, registration, proper follow up of insurances. Specific issues pertaining to legal follow up include: ascertaining whether contracts are properly executed by appropriate persons and documents are complete in all aspects, obtaining revival letters in time (revival letters refer to renewal letter for registration of security contracts that have passed the statutory period as laid

down by the law), ensuring loan/mortgage contracts are updated timely and examining the regulatory directives, laws, third party claims among others.

2.3 Risk Management in Banks

According to Allen et.al (2004) banks exist to take on the risks of its customers and manage these risks. Banks offer products to their clients at a price that reflect the cost of managing the risks inherent in the offerings. They are risk intermediaries which require them to actively identify measure and manage risks to maintain their solvency. As in 2007 financial crises, when banks fail to accurately measure risk and misprice the risks banking crisis become prevalent which further cripple the financial system. The sources of bank risks are market risk, credit risk, liquidity risk and operational risk. In this paper only credit risk, Interest are risk and market risk are reported. The following paragraphs on credit risk are brief summary of the authors account on credit risk.

Credit Risk: Credit risk arises because of the possibility that promised cash flows on financial claims held by FIs, such as loans or bonds, will not be paid in full. Virtually all types of FIs face this risk. However, in general, FIs that make loans or buy bonds with long maturities are more exposed than are FIs that make loans or buy bonds with short maturities. Banks, thrifts, and life insurance companies are more exposed to credit risk than are money market mutual funds and property–casualty insurance companies.

If the principal on all financial claims held by FIs was paid in full on maturity and interest payments were made on the promised dates, FIs would always receive back the original principal lent plus an interest return. That is, they would face no credit risk. If a borrower defaults, however, both the principal loaned and the interest payments expected to be received are at risk.

As a result, many financial claims issued by corporations and held by FIs promise a limited or fixed upside return (principal and interest payments to the lender) with a high probability and a large downside risk (loss of loan principal and promised interest) with a much smaller probability.

In the event of default, however, the FI earns zero interest on the asset and may lose all or part of the principal lent, depending on its ability to lay claim to some of the borrower's assets through legal bankruptcy and insolvency proceedings. Accordingly, a key role of FIs involves screening and monitoring loan applicants to ensure that FI managers fund the most creditworthy loans. The potential loss an FI can experience from lending suggests that FIs need to monitor and collect information about borrowers whose assets are in their portfolios and to monitor those borrowers over time. Thus, managerial monitoring efficiency and credit risk management strategies directly affect the return and risks of the loan portfolio.

One of the advantages FIs have over individual household investors is the ability to diversify some credit risk away by exploiting the law of large numbers in their asset investment portfolios. Diversification across assets, such as loans exposed to credit risk, reduces the overall credit risk in the asset portfolio and thus increases the probability of partial or full repayment of principal and/or interest, that is, moderates the long-tailed downside risk of the return distribution.

Interest Risk: According to Saunders and Cornett (200) asset transformation involves by financial institutions (FIs) involves buying primary securities or assets and issuing secondary securities or liabilities to fund asset purchases. The primary securities purchased by FIs often have maturity and liquidity characteristics different from those of the secondary securities FIs sell.

A bank is exposed to interest rate risk when the maturities of the bank's assets and liabilities are mismatched (Saunders and Cornett 2003). The authors reports that interest rate risk arises from the possibility of a change in the value of assets and liabilities in response to changes in market interest rates. If interest rates rise and a mismatch occur in maturities by holding longer-term assets than liabilities, the market value of the assets will decline by a larger amount than the liabilities.

Bessis (2002) states interest rate risk is a critical treasury function, in which financial institutions match the maturity schedules and risk profiles of their funding sources (liabilities) to the terms of the loans they are funding (assets). The author also states that interest rate risk could result in economic losses and insolvency. Interest rate risk is also one of the market risks.

Market Risk: According to Bessis (2002) market risk arises when FIs actively trade assets and liabilities (and derivatives) rather than hold them for longer-term investment, funding, or hedging purposes. Market risk is closely related to interest rate, equity return, and foreign exchange risk in that as these risks increase or decrease, the overall risk of the FI is affected.

However, the author argues that market risk adds another dimension resulting from its trading activity. Market risk is the incremental risk incurred by an FI when interest rate, foreign exchange, and equity return risks are combined with an active trading strategy, especially one that involves short trading horizons such as a day. Conceptually, an FI's trading portfolio can be differentiated from its investment portfolio on the basis of time horizon and secondary market liquidity. The trading portfolio contains assets, liabilities, and derivative contracts that can be quickly bought or sold on organized financial markets. The investment portfolio (or in the case of banks, the so-called banking book) contains assets and liabilities that are relatively illiquid and held for longer holding periods. The author also contends that traditionally, the banking book

contains the majority of loans and deposits plus other illiquid assets. The trading book contains long and short positions in instruments such as bonds, commodities, foreign exchange (FX), equities, and derivatives.

The author reports that with the increasing securitization of bank loans (e.g., mortgages), more and more assets have become liquid and tradable. Of course, with time, every asset and liability can be sold. While bank regulators have normally viewed tradable assets as those being held for horizons of less than one year, private FIs take an even shorter-term view. In particular, FIs are concerned about the fluctuation in value or value at risk (VAR) of their trading account assets and liabilities for periods as short as one day so called daily earnings at risk (DEAR) especially if such fluctuations pose a threat to their solvency.

Risk Measurement Tools: According to Allen *et.al* (2015) various risk measurement tools are available. Some however are difficult to practically implement others are too simplistic to capture the complex nature of the risks. Harry Markowitz theory of portfolio risk measurement was not widely adopted mainly because hard to get data requirement. The capital asset pricing model is another in the tool kit. It has gained popularity due to its assumption that the relevant risk is market risk and thereby decreasing required data. However, measured risk by the model is found to fails to strongly explain the return.

According to the authors the search for better risk measuring tool that is inexpressive and accurate lead the development of Value at Risk (VaR). VaR was adopted by bank conglomerate such as JP Morgan and the Bank of International Settlement (BIS) to calculate capital requirement. However, VaR model requires estimation of probability distribution of return or loss which is assumed to be normally distributed. This assumption however was not supported by empirical evidence. Moreover, credit event such as default is rare that limit the application of

VaR. As a result banks often use credit scoring models. Credit scoring models apply discriminant analysis to a class of borrowers by identifying key factors that determine the probability of default and weight them in to a quantitative score. The score allow banks to separate good borrowers from bad ones.

2.4 Theoretical and Empirical Literature Review on NPL

In chapter one, background information that have direct relevance to the problem are reviewed and based on the information research problem is synthesized, general objective of the study and the research hypothesis are formulated. The scope is also delimited and the limitations are discussed. In this chapter in-depth review of the theoretical and empirical literatures on the issue of NPLs is presented.

2.4.1 Theoretical Literature Review on NPL

Financial Accelerator Theory and Business Cycle Model

The empirical literature on the determinants of NPL and the interactions between NPL and bank specific and macroeconomic performance is grounded in theoretical models as well as empirical regularities.

The first general theoretical framework with an explicit role for financial intermediation is business cycle models. The model is a good background for modeling NPL as it highlights the counter cyclicality of credit risk and business failures (Williamson, 1987). In the spirit of these models, the financial accelerator theory discussed in Bernanke and Gertler (1989), Bernanke and Gilchrist (1999) and Kiyotaki and Moore (1997) has become the most prominent theoretical framework for thinking about macro-financial linkages. As such, it is influential in the modeling of both NPL and its interaction with macroeconomic performance.

Three main questions have been explored in those literatures :(i) which financial shocks really matter? (ii) how important are financial shocks in shaping real economic fluctuations? and (iii) are the macro-financial linkages heterogeneous across countries and over time? Overall, the main findings show that shocks to assets prices, banking sector net worth, and financial stress significantly affect the real economic activity. Importantly, the reported results also suggest that macro-financial linkages are characterized by a high degree of cross-country heterogeneity.

Empirical regularities, which tend to substantiate the financial accelerator theory, shape the modeling of NPL. These regularities include the cyclical nature of bank credit, NPL, and loan loss provisions. In particular, in upturns, contemporaneous NPL ratios tend to be low and loan loss provisioning subdued. Also, competitive pressure and optimism about the macroeconomic outlook lead to a loosening of lending standards and strong credit growth, sowing the seeds of borrowers' and lenders' financial distress down the road. The loosening of lending standards in upturns depends on the existing regulatory and supervisory framework. In downturns, higher-than-expected NPL ratios, coupled with the decline in the value of collaterals, engenders greater caution among lenders and lead to a tightening of credit extension, with adverse impacts on domestic demand.

According to Nkusu(2011) against this background, the determinants of NPL are both institutional/structural and macroeconomic. The institutional or structural indicators pertain to financial regulation and supervision and the incentive structure therein. Intuitively, disparities in financial regulation and supervision affect banks' behavior and risk management practices and are important in explaining cross-country differences in NPL. The macroeconomic environment influences borrowers' balance sheets and their debt servicing capacity. The set of macroeconomic variables used varies across previous studies, but broad indicators of

macroeconomic performance, such as GDP growth and unemployment are generally included in the three strands of the literature considered on the determinants of NPL. The finding of a negative relationship between NPL and economic growth is a common thread among studies surveyed by the author.

Asymmetric Information Theory

The second general theoretical framework that has been in use for long is the asymmetric information theory. Following the seminal work of Akerlof (1970) and Stiglitz and Weiss (1981), large theoretical literatures have stressed the key role of asymmetric information in financial markets. These literatures have shown that asymmetric information can generate market failures such as credit rationing, inefficient provision, mispricing of risk and, in the limit, market breakdown. Indeed, the recent financial crisis can be seen as an extreme manifestation of the problems that asymmetric information can cause. The fact is well captured in the definition by Mishkin (2012), "*a financial crisis is a nonlinear disruption to financial markets in which adverse selection and moral hazard problems become much worse*." Deepening our understanding of the extent and causes of asymmetric information is crucial for the design of a regulatory framework that limits their negative consequences.

Lenders do not know the credit worthiness of borrowers (hidden information) and/or cannot detect inefficient behavior of borrowers after lending (hidden action). For fear of lending to borrowers with poor creditworthiness or those that take inefficient behavior, lenders are unwilling to provide their own fund, which creates severe financial frictions. This is the problem of adverse selection (in the case of hidden information),or of moral hazard (in the case of hidden action).Therefore, the theory of asymmetric information can be based upon to highlight the behavioral aspects of NPLs.

Similarly, Arestis and Sawyer (2001) states that adverse selection problem occurs before the transaction takes place, in the event that the lender's inability to distinguish between a high-risk borrower and a low-risk borrower is compromised. According to these authors the problem of moral hazard is also the result of information asymmetry between the contracting parties. A borrower may have incentives to misallocate funds for personal use and to undertake investment in unprofitable projects that serve only to increase their personal power or stature. Thus, a lender is subjected to the hazard that the borrower has incentives to engage in activities that are undesirable from the lender's point of view: that is, activities that make it less likely that the loan will be paid back. In addition, banks credit managers may intentionally provide loans to lower quality debtors.

Asymmetric information often leads to the emergence of the economic and financial problems particularly NPLs in the credit market. Therefore, in the absence of sufficient market information, the general economy as well as the credit market will not attain operational efficiency.

In conclusion, the general business cycle model and the related financial accelerator theory have been the background theoretical framework that shape empirical researches on the problem of NPLs and its linkage with macroeconomic performance. Form the bank specific perspective the theory of asymmetric information shapes the empirical research on the problem of NPL and the endogenous determining factors.

2.4.2 Empirical Literature Review on NPL

In recent years, the literature on nonperforming loans has occupied the interest of several academicians and practitioner. Particularly, much attention has been given in understanding the

causal factors that affect financial vulnerability (Khemraj and Pasha 2009). This vulnerability is explained by the role of bad debt as exposed by the strong relationship between NPL and banking crises. Indeed, Sorge (2004) recommend the use of such variables (nonperforming loans and loan losses provisions) to assess the vulnerability of the financial system tests.

According to Nkusu (2011) NPLs empirical literatures can be categorized under three line of research. The first part of the literature has focused on explaining the NPL in credit institutions in the country demonstrating the role of macroeconomic performance, quality of management and political choices (Dash and Kabra 2010, Espinoza and Prasad 2010,Louzis *et al*, 2010). The second part of the literature analyzing the relationship between NPL and macro-financial conditions showing the positive impact of NPL on the probability of crisis and subsequently the key role played by the NPL in predicting banking crises (Caprio and Klingebiel 1996, Kaminsky and Reinhart 1999).

The third branch of the literature focuses on explaining or predicting the NPL at the macro level. These aggregates may relate to total loans in one economy (total debt) or certain types of loans (Rinaldi and Sanchis-Arellano 2006, Pesola 2007, Jappelli *et al*. 2008, Nkusu 2011). Therefore, factors explaining NPL may be related to the macroeconomic environment or to the specific characteristics of bank.

In the first line of research Berger and DeYoung (1997) examined exclusively the bank specific factors that hypothesized to affect NPL. Specifically, they investigate inter temporal relationship between problem loans, cost efficiency and financial adequacy using granger causality models to test four related hypotheses. The purpose of the study is to determine whether cost efficiency, (included in 'bad management' hypothesis), in banks pre-dates loan quality, whether loan quality pre-dates cost efficiency, or both. Pooled cross section-time series data on nonperforming loans,

operating cost efficiency, equity capital ratios, and other variables for U.S. commercial banks were collected to test the hypotheses. The result of the study suggests that the inter-temporal relationships between loan quality and cost efficiency run in both directions. The finding proved the bad luck and bad management hypothesis in favor of skimping hypothesis.

Increases in nonperforming loans tend to be followed by decreases in measured cost efficiency, suggesting that problem loans cause banks to increase spending on monitoring, working out, and/or selling off problem loans. Berger and DeYoung(1997) focus on the links between bank-specific characteristics (institutional efficiency) and problem loans.

Continuing the line of research by Berger and DeYong (1997), Podpera and Weill (2008) examine the causality between non-performing loans and cost efficiency in order to explain whether either of these factors is the deep determinant of bank failures. The study provides empirical evidence in favor of a negative relationship between decreased cost efficiency and future NPLs. The study findings support the bad management hypothesis, according to which deteriorations in cost efficiency precede increases in non-performing loans. Accordingly they advise banking supervisors to focus on enhanced cost efficiency of banks in order to reduce the likelihood of bank failures in transition countries.

Keeton (1999) investigated another bank specific factor, the impact of credit growth on loan delinquencies, in the US across the period 1982-1996. The author used vector auto regression model (VAR) to analyze the relationship. The finding suggested that rapid credit growth, which is associated with lower credit standards, contributed to higher loan losses in certain states in the US. In the same study a strong credit growth loan delinquencies relationship was reported.

From a data set comprising 500 banks across the period 2005 to 2007 Shehzad *et al*. (2001) concluded that ownership proxied by three levels of shareholding (10%, 20%, and 50%) has a positive impact on the quality of loan when the ownership concentration level was at 10% but a negative impact was observed when the level of ownership concentration was at 50%. The study finding suggested that high ownership concentration level may have adverse effect on the quality of loans extended, but in case of a strong controlling owner bank's management becomes more efficient leading to lower Non-Performing Loans.

Similar finding is reported by Hu *et al*. (2004) with a panel dataset covering the period 1996-1999, used a regression analysis and to uncover the relationship between NPLs and ownership structure of commercial banks in Taiwan. The study showed that banks with higher government ownership recorded lower non-performing loans. The finding of the study showed that bank size is negatively related to NPLs while diversification may not be a determinant.

Li *et al.* (2007) investigates the effect of incentive contracts on performance. In the context of China's economic transition, the study finds that incentive contracts have a positive effect on managerial efforts to reduce NPLs in the Chinese banking system. The study notes that the incentive contracts have a positive effect on the bank manager's performance in deposit taking and nonperforming loan reduction. The study finding is robust when the endogeneity of incentive contracts is controlled for. The results thus present evidence on the positive effects of incentive-based banking reforms in rural China.

Gorter and Bloem (2001) argue poor risk management is the root cause of NPLs. Poor risk management is a situation whereby the bank credit officials do not properly assess the suitability of advancing credit to individual credit case a lack of adherence to prudent lending principles. The authors reports that in practice all affected banks display similar symptoms; insider lending;

poor monitoring of loan accounts, under qualified staff, little or no cash flow appraisal of loan requests, continuous monitoring of customer conditions and proper follow up on how the loan has been utilized to uncover sign of diversion that leads to project failure.

Breuer (2006) examines the influence of a very wide range of institutional variables on NPLs while considering problem bank loans as the outcome of decisions made by banks in the dual role they serve as bank intermediaries. The study finds that the dual role introduces conflicts of interest that can lead to bank mismanagement and consequently problem bank loans.

Kiayai (2003) explained that the poor fiscal policy had resulted to high inflation rates and that this could be one of the contributors of rising NPLs. Inflationary expectation is a factor that is embedded in the interest rate. Interest will remain high if investors believe that the government will introduce inflation in future by adding money in circulation through extended credit form the central bank.

Some of the literatures that investigated the macroeconomic factors that are hypothesized to affect NPL are Nkusu (2011), Berge and Boye (2007), Rinaldi and Sanchis-Arellano (2006), Mohammadreza and Junaina (2013) and Messai and Fathi (2013). A brief account of these literatures is presented in the following paragraphs.

Nkusu (2011) analyzes the link between nonperforming loans (NPL) and macroeconomic performance from a sample of 26 advanced countries. The study finds that a sharp increase in NPL triggers long-lived tailwinds that cripple macroeconomic performance from several fronts. The impulse response functions (IRFs) indicate that, of all the variables included in the model, NPL is the only one that has both a statistically significant response to and predictive power on-every single variable over a 4-year forecast period.

The author's finding suggested that the signs of the IRFs are broadly in agreement with expectation, the magnitudes of the responses of NPL and indicators of macroeconomic performance to shocks affecting each other are very meaningful in the advanced economies' context. Regardless of the factors behind the deterioration in loan quality, the evidence suggests that a sharp increase in aggregate NPL feeds on itself leading to an almost linear incremental response that continues into the fourth year after the initial shock. The confluence of adverse responses in key indicators of macroeconomic performance, GDP growth and unemployment, leads to a downward spiral in which banking system distress and the deterioration in economic activity reinforce each other.

Berge and Boye (2007) analyzed the macro economic factors which function as driving forces behind developments in bank's problem loans. The study found that problem loans are highly sensitive to the real interest rates and unemployment for the Nordic banking system over the study period. The study notes that the volume of problem loans is highly sensitive to cyclical developments and will usually increase during economic downturns.

To understand the extent to which an increase in the debt to income ratio is related to a riskier financial position for the banking sector, Rinaldi and Sanchis-Arellano (2006) analyzed household NPLs for a panel of six European countries. The research finding reviled that disposable income, unemployment and monetary conditions have a strong impact on NPLs. The study also suggests that, in the long-run, an increase in the ratio of indebtedness to income is associated with higher levels of arrears. However, if the rise in the debt ratio is accompanied by a rise in disposable income, the negative effect is more than offset. Moreover increases in real disposable income would allow relatively higher increases in the debt to income ratio combined

with a same level of the ratio of arrears. Monetary conditions are also important because rising inflation and lending rates significantly worsen financial conditions.

Mohammadreza and Junaina (2013) analyzed relationship between banks loans quality and macroeconomic variables by using a dynamic panel data model on Malaysian commercial banking system for the 1997-2012 periods. The results show that there is a strong evidence of cyclical sensitivity of loan quality in Malaysia's commercial banking system. Based on the results lending interest rate and foreign direct investment (FDI) net outflow (% GDP) are the most effective factors on NPL ratio with simultaneous positive effects and a reverse effect with one year delay.

Messai and Fathi (2013) for a sample of 85 banks in three countries (Italy, Greece and Spain) for the period of 2004-2008 detected that problem loans vary negatively with the growth rate of GDP, the profitability of banks assets and positively with the unemployment rate, the loan loss reserves to total loans and the real interest rate.

The third line of research on problem loans has focused on selecting and determining their effect on NPLs. Some of the authors contributed to this stand of investigation are Salas and Saurina (2002), Louzis *et al.* (2012), Dimitrios *et.al.*(2016) and Koju *et.al.*(2018).The following paragraphs present finding of these authors.

Using a dynamic model and panel data set covering the period 1985-1997, Salas and Saurina (2002) investigated bank specific and macroeconomic determinants of problem loans in Spanish Commercial and Savings Banks. Macroeconomic variables such as real growth in GDP and bank specific factors such as rapid credit expansions, bank size, and capital ratio and market power are found to explain variation in NPLs.

Louzis, *et al*. (2012) examine the determinants of nonperforming loans NPLs) in the Greek banking sector, separately for each loan category (consumer loans, business loans and mortgages). The study is motivated by the hypothesis that both macroeconomic and bank-specific variables have an effect on loan quality and that their effects vary between different loan categories.

The results show that, for all loan categories, NPLs in the Greek banking system can be explained mainly by macroeconomic variables (GDP, unemployment, interest ratesand public debt) and management quality. Differences in the quantitative impact of macroeconomic factors among loan categories are evident, with nonperforming mortgages being the least responsive to changes in the macroeconomic conditions.

Dimitrios *et al.* (2016*)*using GMM and quarterly data of euro-area banks in the 1990–2015 periods found macro variables such as unemployment and growth to exert a strong influence on NPLs. Furthermore, bank specific variables related to management skills and risk preferences were found to shape future NPLs. The study is also investigates the role of tax on personal income and the output gap as potential explanatory variables. Both were found to be significant determinants of NPLs.

Using data collected from 30 Nepalese commercial banks over the period 2003-2015, Koju *et al.* (2018) investigated seven bank-specific and five macroeconomic variables to assess the impact of banking management and economic indicators on NPL. The findings show that NPLs have significant positive relationship with the export to import ratio, inefficiency, and assets size and a negative relationship with the GDP growth rate, capital adequacy, and inflation rate.

Another researches which investigated the issue of problem loans but difficult to clearly categorized under the three research lines is the research done by Boudriga *et al.* (2009).These authors empirically analyses the cross countries determinants of nonperforming loans and the potential impact of regulatory factors on credit risk exposure using banking, financial, economic and legal environment using data for a panel of 59 countries over the period 2002-2006.

The study finds that higher capital adequacy ratio and prudent provisioning policy seem to reduce the level of problem loans. The study findings do not support the view that market discipline leads to better economic outcomes and to reduce the level of problem loans. In contrast, all regulatory devices either exert a counterproductive impact on bad loans or do not significantly enhance credit risk exposure for countries with weak institutions, corrupt business environment and little democracy.

In general according to Radivojević *et.al.*(2019), NPLs has been considered the primary cause for banks instability. According to the author, a surge in the rate of NPLs coupled with its detrimental effect in the banks stability has leads to an interest in the study of NPLs occurrence, movement and determinants. The topic has attracted the attention of bankers, academicians and has become the subject of much research. However the results of these researches are inconsistent and contradictory.

To mention a few example Marki *et al.* (2014), Godliwiski *et al.* (2005), Garsiya and Fernandez (2007) have suggested that ROA and ROE are good indictors of management quality. In their view operational efficiency and profitability are what distinguish good management from bad ones. However, negative and significant correlation between these factors and NPLs was reported by Godlewski (2005), Radivojevic and Jovovic (2017) while positive relationship was reported by Garsiya and Fernandez (2007).

The differences in the findings are evident, not only in terms of the intensity and significance of individual factors in the occurrence and movement of NPLs, but also in terms of sign. So, for example, many authors like (Marki *et. al.*2014, Godliwiski *et. al.* 2005, Garsiya and Fernandez 2007) point out that ROA and ROE are the most important indicators of efficiency, profitability, i.e. the quality of bank management, but they found different impact these factors have on NPLs. Godlewski (2005), Radivojevic and Jovovic (2017) found that there is a negative and significant correlation between these factors and NPLs, while Garsiya and Fernandez (2007) and Boudriga *et. al.*(2009) identified positive relationship between these factors and NPLs. Similarly the findings of other authors who investigated macro and bank specific factors of NPLs (such as unemployment rate, interest rate, exchange rate, house price index, market capitalization, the bank's capital to assets ratio, size banks, ER, loan loss provision and etc.) have reported inconsistent findings.

One possible source of difference in findings is the differences in panel data, but some of the disagreements and contradictions in discoveries and findings can be attributed to differences in the methods used for the estimation of the parameters of the panel data models. Different estimation methods have been in use to estimate the parameters of the NPLs models. Most of the researches in Ethiopia and some in other countries have used simple techniques, such as pooled Ordinary Least Square (OLS) or two-stage Least Square (2SLS) other have used advanced estimation methods in their order such as Dynamic Fixed Effect (DFE), Random Effect (RE), and one or the two-steps (difference or system) GMM estimator.

According to Mandelbrot (1963) and Fama (1965), most often economic time series data from financial markets are not identically and independently distributed rather they tend to show autocorrelation and heteroscedasticity. If the time series data have this kind of features, pooled

OLS regression leads to biased and inconsistent estimate. In this situation FE model is recommended. The FE model allows one to capture the time constant unobserved heterogeneity between entities. According to Wooldridge (2014), "It allows to remove the effects of those time-invariant characteristics, in such a way that it allows the predictor's net effect to be assessed only." However, it suffers from the 'dynamic panel bias' problem, which results from the possible endogeneity of the lagged variable and the fixed effects in the error term which leads to biased estimates.

Therefore OLS, 2SLS and DFE estimators produce unbiased and consistent estimates of parameters if the assumptions on which they are based are met. It has been mentioned that financial time series data often don not fulfill the assumptions of these models and estimation methods. However, unlike theses estimators, the main advantage of GMM is that it can be used even when the assumptions of other estimators are not met. GMM can be viewed as a generalization of many of these methods and many others (Chausse 2010).

In conclusion, NPLs study has shown a rapid rate of growth especially after the recent financial crisis. However, these studies findings were influenced by difference in panel data set and models and estimation methods. Hence, contradiction and inconsistency have been observed in the findings. Simple techniques, such as pooled Ordinary Least Square (OLS) or two-stage Least Square (2SLS) have been found to be used to study NPLs. More advanced methods such as fixed effect and Random effect models are good to remove time invariant unobserved effect however, in the presence of endogenit66y as in lagged NPLs the estimates become biased. Unlike theses estimators, GMM has no many of the restrictive assumptions on the data generation process. GMM can be viewed as a generalization of many of these methods and many others (Chausse 2010).

2.4.3 Conceptual Framework

The study proposes six exogenous variables and one endogenous variable to affect the response variable. The response variable is NPLs and the explanatory variables are selected from bank specific and macroeconomic factors. The bank specific factors are capital to total asset ratio, return on asset and total loan to total deposit ratio. The macroeconomic factors are real GDP growth, rate of unemployment and ate of inflation. The endogenous variable proposed to affect NPLs is current year NPLs lagged by one year. The overall interdependence relationship is schematically outlined in the flowing conceptual framework.

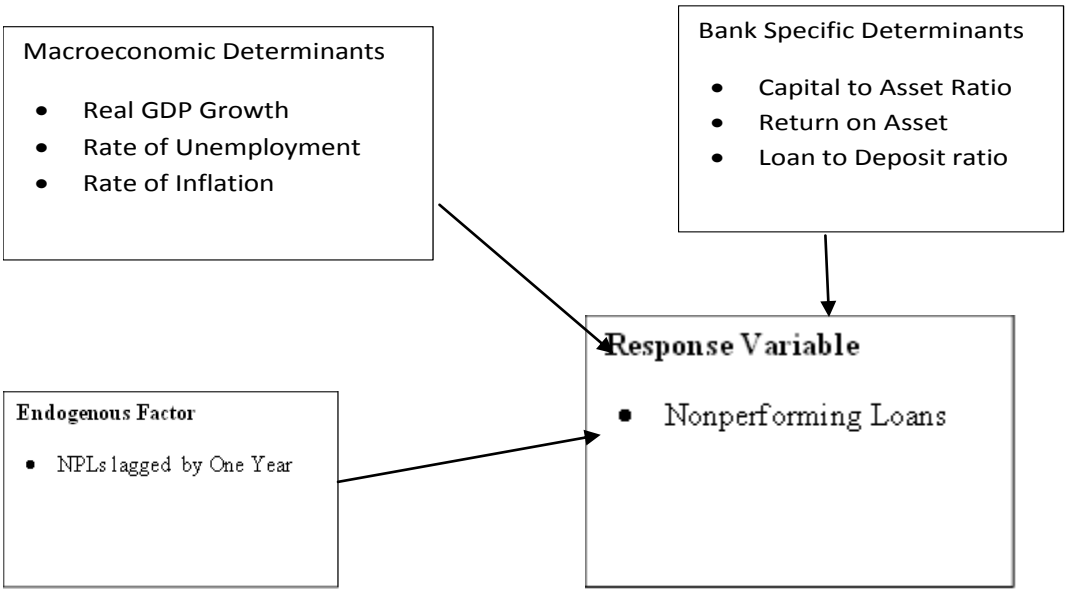

Figure 2-2 Conceptual Framework

3 Chapter Three: Research Methodology

3.1 Research Design

A research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. The plan is the complete scheme or programme of the research. It includes an outline of what the investigator will do from writing the hypotheses and their operational implications to the final analysis of data.

Based on the nature of the problem of this study i.e. the relationship between NPLs in banks and bank specific and macroeconomic determinants and the formulated objectives an explanatory research design is employed. Specifically, longitudinal or dynamic panel model research is used. This is because all the variables are either financial or economic and they can be measured with reasonable accuracy. The panel study approach is especially useful to answer questions that are not amenable to cross sectional or time series studies which also is the case in this study.

3.1.1 Research Approach

Creswell (2009) classify the research approaches in to three. These are qualitative, quantitative and mixed research approaches. Qualitative research usually involves in emerging questions and procedures. Its purpose is limited to describing and understanding rather than explaining the phenomena. Most often data are collected in the participant's setting i.e., the research and the respondents actively engage in conversation. The other feature of this approach is that its considerable use inductive reasoning i.e. from data to theory. Qualitative research approach has five common strategies of inquiry. However, the specific strategy under the qualitative research approach can vary depending on the nature of the problem or phenomena. Some of the strategies

which have gained popularity are case study, ethnography, phenomenological study, grounded theory and content analysis.

The other major research approach is quantitative research. It is an approach especially suitable to test hypothesis and theories proposed by theoretician or commonsense. It heavily relies on deductive reasoning. The researcher first collects the data and then empirical test the propositions. It is also suitable to examine the relationship among variables.

These variables allow measurement and hence one can use statistical procedures to generalize the finding. Moreover, unlike the qualitative approach it is protected against subjective bias and immune to alternative explanations. In general, it is grounded in objectivity and verifiability (Creswell 2013). Quantitative research can be implemented approach in two different line of inquiry. The first is survey design which provides a quantitative or numeric description of trends attitude or opinion of a population by studying a sample of that population. From the sample, the researcher generalizes about the population. The second type is experimental design used to test the effect of intervention on an outcome controlling all other factors which may influence that outcome. In experiment design researcher may also identify a sample and generalize to a population (Creswell 2009). Experimental designs are research approach for obtaining information about causal relationship and also allowing research to assess the correlation between one variable and another (Kothari 2004).

The other approach is mixed method research approach. It is an approach that combines both qualitative and quantitative approach (Creswell 2009). There are times when the phenomena can be investigated through qualitative and quantitative data. In this circumstance applying ether of the two approaches will limit our understanding of the phenomena.

3.1.2 Population, Sampling and Sample Size

Population of the Study: The study population consisted of commercial banks in Ethiopia, either private or public (governmental) owned. According to NBE (2012/13), there are eighteen commercial banks in the year 2012/13. These are Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Bank of Abyssinia S.C (BOA), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Cooperative Bank of Oromia S.C (CBO), Lion International Bank S.C (LIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Buna International Bank S.C (BUIB), Birehan International Bank S.C (BIB), Abbay Bank S.C (AB), Addis International Bank S.C (AIB), Debub Global Bank S.C (DGB), and Innat Bank S.C (ENTB). According to NBE (2016/17), the number of commercial banks in the county has reduced to seventeen. This is due to CBB, a public bank merged with CBE by the government decision based on the reason that there is role duplication.

Sampling and Sample Size: the sample consists of a total of nine commercial banks. Out of this total, seven of them are private commercial banks and two of them are public commercial banks. To increase the time dimension of the study and increase the sample size at the same time, the time period was selected to span from 2005 to 2013. However, the absence of full organized data on the macroeconomic factors to the recent years, it was not possible to increase the time dimension further than 2013.

3.1.3 Data Set:

The data set is a balanced panel data collected from supervisory authority (National Bank of Ethiopia) and Central Statistical Authority. Time serious data for bank specific variables were

collected from the supervisory authority. For the macroeconomic variables, time series data were collected from both the NBE and Central Statistical Authority. The time serious data covers from 2005 to 2013. The banks included in the study are Commercial bank of Ethiopia, Construction and Business Bank, Awash bank, Abyssinia Bank, Dashen Bank, Wegagen Bank, United Bank, Nib Bank, and Cooperative Bank of Oromyia.

3.1.4 Hypothesis Development

Review of the literatures on the determinants of NPLs reveals that the level NPLs is responsive to both endogenous (bank specific) and exogenous (macroeconomic) factors. Some of the studies that examined a linkage between bank factors and NPLs are Berger and DeYuong (1997), Podpiera and Weill (2008), Zhang (2016), Li *et.al.* (2007) and Breuer (2006). These authors have proved that poor credit management and operational efficiency are the leading cause of a rise in the level NPLS.

The other branch of NPL studies focused on macroeconomic sensitivity of NPLs. Several macroeconomic indicators that can explain a variation in NPLs are investigated. Notable examples are Rinaldi and Sanchis-Arellano (2006), Berge and Boye (2007) Boss *et.al*. (2009), Cifter *et.al*. (2009), Nkusu (2011) and Segoviano *et.al.* (2006). This line of inquiry has gain attention from scholars after the incidence of the "Great Depression". Recent literatures in NPLs research have included the bank specific and macroeconomic factors in their models. A few examples are Dimitrios *et.al* (2016) and Ghosh (2015).

In the present study based on the findings of the above researches and many other which are discussed at length in the empirical literature review section, both the bank specific and macroeconomic determinants of NPLs which are found to affect NPLs are selected and

investigated. The variables are selected because they have found extensive empirical evidences that suggest positive or negative influence on NPLs. The bank-specific variables used are return on asset (ROA), capital asset ratio (CAR) and the ratio of loans to deposits (LTD) as proxies for quality and riskiness of management. The macroeconomic determinants are unemployment, inflation and real GDP growth. Such macro variables have been found to affect the vulnerability of the banking sector and, thus, enhance the explanatory power of the empirical model. Details for each variable are provided below:

3.1.5 Bank Specific Variables:

Capital to Asset Ratio (CAR): the level of capital indicates the riskiness of a bank and Berger and DeYoung (1997) investigate capital adequacy (measured by CAR) as one bank specific factor and tested it as part of the moral hazard hypothesis. These authors investigated the inerter-temporal relationship among loan quality, cost efficiency and bank capital. Therefore, the present study includes and tests the 'moral hazard' hypothesis (capital adequacy) which has also found significant support from the findings of Podpiera and Weill (2008) and Salas and Saurina (2002).

H1: 'Moral hazard' hypothesis: low-capitalization of banks leads to an increase in NPLs.

The justification lies on in the 'moral hazard incentives' on the part of banks' managers, who increase the riskiness of their loan portfolio when their banks are thinly capitalized.

Return on Asset (ROA): one way to measure profitability is ROA. Dimitrios *et.al* (2016), Louzis *et.al.* (2012) and Podpierra and Weil (2008) found negative relationships between ROA and NPLs. The authors assert that more profitable banks are better managed and more prudent in their granting of credit so that higher profitability in the past leads to lower NPL. Therefore, the

study formulates the following hypothesis and expects negative relationship between ROA and NPLs.

H2. Return on asset has a significant and negative relationship with Nonperforming loans.

Loan to deposit (LTD) ratio: a number of scholars (example Louzis *et.al.* 2012, Makri *et.al*. 2014 and Swamy 2012) have found that LTD ratio has positive and significant effect on the level of NPLs in banks. Jimenez and Saurian (2006) suggested that loan growth is one of the primary important causes of problem loans. Sinkey and Greenwalt (1991)explain that a rapid expansion of loan is not a problem by itself but such expansion often leads to poor screening and lending to borrowers of inferior quality (problem of adverse selection). Hence a rise in loan to deposit ratio is hypothesized to lead to a general increase in NPLS.

H3. Loan to deposit ratio has positive significant effects on Nonperforming loans of banks.

3.1.6 Macroeconomic Variables

The State of the Economy: real GDP rate, unemployment rates and inflation rate are used as indicators of the economic status. Economic activities are postulated to affect the banking sector. These economic indicators will reveal the effect of the economy performance on NPLs.

Real Gross Domestic Product Growth rate (real GDP growth rate): literature provides evidence that real GDP is an important macroeconomic determinant of NPLs. For instance Salas and Saurina (2002), Ranjan and Dhal (2003), Jiménez and Saurina (2006), Dash and Kabra (2010), Khemraj and Pasha (2009) and Fofack (2005) have found a negative link between NPLs and GDP. They argue that during high economic growth the debt servicing capacity of borrowers will improve. Conversely, during economic slowdown or stagnation unemployment rises and

borrowers will likely face difficulty to repay their dept. thus in line with the empirical evidence in this study a negative relationship is expected between Real GDP and NPLs.

H4. Real GDP negatively affects NPLs of banks

Inflation: is also considered to be a significant macroeconomic determinant of NPLs. Yet, its effect on NPLs is ambiguous. For instance the empirical evidence from Fofack (2005) establishes inflation positively affect NPLs while Khemraj (2009) has found negative and positive effect depending on the time period the relationship examined. The explanation is that higher inflation can make debt servicing easier by reducing the real value of the outstanding loan, which causes NPLs to remain low but higher inflation can also make the repayment of debt more difficult by reducing the borrowers' real income. Also, in countries where loan rates are variable, greater inflation leads to increased lending rates, which impedes the payment of the debt. Therefore, positive or negative relationship is expected.

H5. Inflation negatively/positively affects NPLs.

Unemployment (UNEMP): Konstantakis *et.al.*(2016) and Dimitrios *et.al.* (2016) have included unemployment in their explanatory variable for NPLs and found strong positive relationship with NPLs. The argument is that increasing unemployment signals weak economic condition and leads to more borrowers to unable to meet their debt obligations. Hence, unemployment is expected to have positive relationship with NPLs.

H6: Unemployment and NPLs have positive relationship

3.2 Model Specification

3.2.1 Variable Description

Nonperforming loan (NPL):

At a theoretical level there is no universally accepted definition of NPLs Hou (2006) and Bloem and Gorter(2002). The term has been referred differently by different authors. For example, 'bad loans' in Basu (2003), 'problem loans' in Berger and De Young, (1997) and 'impaired loans' in Fofack (2005). Variations are also observed in terms of the classification system, the scope, and contents across economies of the world. Hou(2006) pointed out that such problem potentially adds to disorder and uncertainty in the NPL issues. Thus, the definition of NPLs varies from one banking system to another according to banking laws and regulations (Issa 2009).

In practices, credit institutions use quantitative and qualitative criteria to identify the quality of a particular loan. According to Bloem and Gorter(2002) a quantitative criterion can be numbers of days or months to determine the weakness of borrowers to repay their debt, while a qualitative criterion can be all the information about the future of loans and borrowers.

According to National bank of Ethiopia (NBE) directive (2012), NPLs 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". It further provides alternative broad definition for short term loans such as overdraft facility: *"Short term loans are NPLs when principal and/or interest is due and uncollected for 90(ninety) consecutive days or more beyond the scheduled payment day or maturity. Medium and long term loans are NPLs when principal and/or interest is due and uncollected for 12(twelve) consecutive months or more beyond the scheduled payment day or maturity".*

Moreover, NBE instructs commercial banks to classify their loans as pass, special mention, substandard, doubtful and loss in accordance with the flowing specifications.

Pass: loans in this category are fully protected by the current financial and paying capacity of the borrower and not subject to any criticism.

Special mention: Short term loans past due for 30 days or more, but less than 90 days and medium and long term loans past due for 6 month or more, but less than 12 months.

Substandard: Short term loan past due for 90 days or more, but less than 280 days and medium and long term loans past due for12 months or more, but less than 18 months.

Doubtful: Short term loan past due for 280 days or more, but less than 360 days and medium and long term loans past due for18 months or more, but less than 3 years.

Loss: Short term loan past due for 360 days or more, and medium and long term loans past due for 3 years or more.

The same directive also requires all Ethiopian commercial banks to hold provisions for each loan to absorb the potential losses in their loans portfolio. The minimum provision requirements are indicated below:

Table 3-1 Loan Classification and Provisions

SN	Loan Classification	Minimum Provisional requirement
1	Pass	1%
2	Special Mention	3%
3	Sub standard	20%

4	Doubtful	65%
5	Loss	100%

Source: NBE directive (2012)

Hence, in this study in accordance with NBE definition all loans below special mention category are used and a ratio is taken between these loans and total loans granted as a measure NPLS.

As it has been described at length in the literature review section the study of determinants of NPLs have been focused on two sources. One branch of literature has investigated the bank specific factors (endogenous to the banking sector) the other one has focused on macroscopic factors. However, recent literatures have investigated both the bank specific and macroeconomic determinants of NPLs good examples are Ghosh (2015), Lousiz *et.al* (2010) and Dimitrios *et.al*(2016).The bank-specific variables are internal factors and controllable by bank managers while the macroeconomic factors are external hence uncontrollable.

This study like other literatures in recent time investigates selected bank specific and macroeconomic factors that have been found to explain variation in NPLs. Therefore, here under the description of the variable follows.

Loan growth: is measured as a ratio of annual total loan to total deposit of a bank. The ratios are calculated for each bank from their financial statements. The source of the financial statements is National Bank of Ethiopia. Based on the financial statements of each bank nine years of loan to deposit ratios are calculated. The rationale behind inclusion of this factor in the study is claims of previous studies, among others, reported by Fernandez *et.al.* (2001) to maximize benefit in the short run bank managers have two moves. First, they can increase the quantity of loanor second they can decrease the interest rate.

The move for rapid growth of loans however has tradeoffs. The bank will invite the problem of adverse selection and credit portfolio quality deterioration. The finding of Sinkey and Greenwalt(1991), Weinberg (1995), Keeton (1999) Salas and Saurina (2002), Jimenez and Saurina (2006) and Louzis *et.al,* (2010) support the proposition. These authors have found strong positive relationship between rapid credit growth and NPLs. In this study to measure the effect of rapid loan growth on NPLs loan to deposit ratio is used as a proxy.

Profitability: a measure of profitability is ROA and it offers clues about the ability of the bank to undertake risks investment and expand its activity. ROA is computed by dividing the annual net income to total asset of each bank for nine years. The justification for inclusion of the factor is reported by Makri *et.al.*(2014). An increasing trend on banks' return on asset reflects the risk taking behavior of bank management. Hence, managers who achieve very good performance on profitability are less forced to engage in risky credit offering. ROA measures the amount of net income returned as a percentage of total asset of the firm. It reveals how much profit a company generates with the invested total assets.

Capital Adequacy (CAR): to measure the capital adequacy of the each bank total capital to total asset ratio is computed for each bank for nine years. The source of the capital and asset data for each bank is the financial statements reported to the National Bank of Ethiopia. According to Berger and DeYoung (1997), thinly capitalized banks generally grant loans to riskier borrowers, which can potentially lead to higher NPLs, 'moral hazard hypothesis.'

Keeton and Morris (1987) also suggested that managers in banks with low capital bases have a moral hazard incentive to engage in risky lending practices along with poor credit scoring and monitoring borrowers. This 'moral hazard' hypothesis implies an inverse relationship between equity capital and NPLs.

Real GDP: Real GDP measures value of products and services an economy produces within a given period of time adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP). Data for real GDP were collected from 2005 to 2013 from the report compiled by the National Bank Ethiopia. The relation between the economic growth and loan quality has been investigated in the literature especially the link between the phases of the business cycle and banking stability see example Salas and Saurina(2002), Fofack (2005) Jimenez and Saurina(2006) and Khemraj and Pasha (2009). These authors have found a negative association between NPL and real GDP growth.

The explanation for the observed linkage is that higher positive level of real GDP growth generally increases income. This improves debt payment capacity of borrowers which in turn reduces the quantity of problem loans. Conversely, during economic recession (slowed or negative growth of GDP) the debt servicing capacity of borrower deteriorates hence the level of bad debts in banks will increase.

Unemployment: Unemployment rate is computed as percentage of the unemployed population over the total number of economically active population. Unemployed population includes aged ten years and above. The actual unemployment rate for the nine years periods were collected from the Central Statistical Authority.

Inflation: an overall increase in prices is called inflation**.** Inflation rate data from 2005 to 2013 were collected from report compiled by the National bank of Ethiopia. The literature documented inconsistent relationship between on the inflation rate and NPLs. For example in his study of the Sub Saharan banks Fofack (2005) has found that a rise of inflation aggravates level of problem loans in these banks. He argues that high inflation rate erode banks' equity and worsen the credit

risk of these banks. Similarly Nkusu (2011) has found positive relationship between inflation ate and NPLs. However, the finding of Khemraj (2009) is both negative and positive. According to this author inflation has negative relationship with NPLs at time but positive impact at the lagged period.

The literature has explanation for the observed mixed finding on inflation NPLs nexus. On one hand inflation can make debt servicing easier especially when the loan is fixed i.e. inflation erodes the real value of outstanding loans on the other hand, it can also weaken some borrower' debt service ability by reducing their real income. However, when loan rates are variable(adjusted in accordance to the inflation change), inflation is likely to reduce borrowers‟ loan servicing capacity as lenders adjust rates to maintain their real returns or simply to pass on increases in policy rates resulting from monetary policy actions to combat inflation.

3.2.2 Econometric Model and Estimation Method

The study used dynamic panel data models to examine the effect of Lagged NPL and selected exogenous factors from bank specific and macroeconomic factors which have supporting evidence from theory as well as empirical researches. One of the advantages of panel data is that it allows the researcher to better understand the dynamics of adjustment. These dynamic relationships are characterized by the presence of a lagged dependent variable among the regressors and a typical model that captured the dynamicity is as follows:

$y_{i,t} = \beta 0 + \beta 01 y_{i,t-1} + X_{i,t} + \varepsilon_{i,t}$ where $\varepsilon_{i,t} + \eta_i + \upsilon_{i,t}$, $i = 1, \ldots, N$; $t = 1, \ldots, T$

Based on the above argument in the present study NPLs is modeled as in:

$NPLs_{i,t} = \beta 0 + \beta 1 NPLs_{i,t-1} + \beta 2 ROA_{i,t} + \beta 3 CAR_{i,t} + \beta 4 LTD_{i,t} + \beta 5 RGDP + \beta 6 UNEMP_{i,t} + \beta 7 INF_{i,t} + \varepsilon_{i,t}$

Where:

εi,t = ηi + υi,t, i = 1, . . . , N; t = 1, . . . , T, εit is composed of the time invariant bank specific effect (heterogeneity) ηi and bank 'i' in year t. the usual idiosyncratic error term for error term υi,t

LTD= represent Loan to deposit ratio = total loan/total deposit

LTD t-1=represent lagged Loan to deposit ratio

ROA= return on asset = Net income/ total asset

CAR= capital to asset ratio= total capital including reserves/total asset

RGDP= % increase in Real GDP= real GDP is price of goods and services produced in a given country in one year adjusted for inflation.

UNEMP= unemployment rate= total number of unemployment/total number of labor force

INF= Inflation rate proxied by consumer price index

β0= an intercept,

β1, β2, β3, β4, β5, β6, and β7, = estimated coefficient of explanatory variables and constant

3.2.3 Econometric Model Assumptions and Assumptions Tests

The source of the model and estimation method for this study is Arellano and Bond (1991). According to Arellano and Bond (1991) three assumptions are sufficient to validate the model and asymptotic property of the parameter estimates. One of these assumptions is that there is no over identification problem. Too much information create problem to effectively fix the true estimates (unbiased and efficient) of the parameters. The other assumptions are there are no

autocorrelations among the white noise (error term) at different time period i.e. E ($u_t u_s$) = 0 when $t \neq s$. The model after estimated by the one step difference GMM as formulated by Arellano and Bond (1991) was tested for over identification restriction by Sargan test and Arellano and Bond (1991) test for autocorrelations, autoregressive order one, AR (1) and autoregressive order two AR(2)

3.2.4 Theoretical Basis of GMM

According to Mandelbrot (1963) and Fama (1965) most often economic time series data from financial markets are not identically and independently distributed rather they tend to show autocorrelation and heteroscedasticity. If the time series data have this kind of features, pooled OLS regression leads to biased and inconsistent estimate. In this situation FE model is recommended. The FE model allows one to capture the time constant unobserved heterogeneity between entities. According to Wooldridge (2014), "It allows to remove the effects of those time-invariant characteristics, in such a way that it allows the predictor's net effect to be assessed." However, it suffers from the 'dynamic panel bias' problem, which results from the possible endogeneity of the lagged variable and the fixed effects in the error term which leads to biased estimates.

In general OLS, 2SLS and DFE estimators produce unbiased and consistent estimates of parameters if the assumptions on which they are based are met. However, it has been mentioned that financial and economic time series data often don not fulfill the assumptions of these models and estimation methods.

Unlike theses estimation methods, the main advantage of GMM is that it can be used even when the assumptions of other estimators are not met. GMM can be viewed as a generalization of

many of these methods and many others (Chausse 2010). GMM framework is credited for its robustness as general framework and only few assumptions are needed to be made on the data generation process Arellano and Bond (1991). These assumptions and the associated test are described in the section 3.2.2. Therefore, in the present study of the available two-step and one-step GMM, one-step GMM estimator is chosen. It has been confirmed that in smaller sample sizes one-step GMM estimator tends to be less biased (Bolt and Tieman2004, Garsiya and Fernandez 2007).

4 Chapter Four: Result and Discussion

The section begins with the descriptive statistics of the variables. Then the regression analysis results are reported followed by hypothesis tests and model assumption tests results. Based on the findings, discussion of the results follows.

4.1 Descriptive Statistics

The descriptive statistics of the factors is presented in Table 4-1.As it can be seen from Table 4-1 loan to deposit ratio has the highest variability among the seven variables of the model. Return on asset has shown the least variability.

Table 4-1 Descriptive Statistics Result for the Variables of the Model

Variable	Observations	Mean	Sat. Dev.	Min	Max
NPL	90	0.440014	0.0396159	0	0.21
ROA	90	0.0265027	0.0099976	-0.0187054	0.046814
CAR	90	0.132631	0.0992931	0.0420095	0.868217
LTD	90	0.6547975	0.1924665	0.2	1.295918
RGDP	90	0.1100949	0.0134143	0.869952	0.134607
UNEMP	90	0.183	0.0153762	0.165	0.212
INF	90	0.166502	0.1577042	0.0270686	0.552413

Source: Own Computation

4.2 Regression Analysis Result

In this section, the regression result of the dynamic panel data model is presented. Specifically, the result of parameters estimation and assumption tests is described. The specified model is selected to explain the determinants of nonperforming loans (NPLs) in commercial banks in Ethiopia. Accordingly, estimation of the model, hypotheses tests on the estimated coefficients and model assumptions were computed by Arellano- Bond (1991) generalized method of moment (fist difference GMM) estimation method via STATA version-13 software.

The dynamic model is selected to effectively account for the time persistent nature of the NPLs and first difference GMM is used to overcome the problems of endogenous, time invariant bank characteristics, and autocorrelation from lagged dependent variable.

The result of estimation for the model parameters, standard errors, the p-values and the three model assumptions test statistics suggested by Arellano and Bond (1991) are tabulated in Table 4-2. The assumptions of the model are: there is no over identification problem and no autocorrelation in the error term in the same period and different period. To test these assumptions Arellano and Bond employed Sargan test (over identification restrictions test) and Arellano-Bond test for AR (1) and AR (2) were computed. The test result rejected the null hypotheses (there is over identification problem) and there is autocorrelation in the error term. Therefore, the results suggest that the model is valid and estimation based on the model is appropriate.

Table 4-2 Arellano Bond First Difference GMM Estimation Result

Explanatory Variable	Coefficients	Std.Err.

Lagged Non Performing Loan	0.710277	0.0597971***
Real Gross Domestic Product Growth Rate	0.0734182	0.1301934*
Unemployment Rate	0.1793819	0.1240549*
Inflation rate	0.0006055	0.010003*
Return on Asset	-0.547187	0.2544468**
Capital to Asset Ratio	-0.2034556	0.0480039***
Loan to Deposit Ratio	0.0700573	0.012772***
Constant	-0.0379055	0.0321861
Sargan test of overid. restrictions: chi2(35) = 54.8581 Prob> chi2 = 0.0175		
Arellano-Bond test for AR(1) in first differences: z = -1.496 Pr> z = 0.1347		
Arellano-Bond test for AR(2) in first differences: z = -0.65994 Pr> z = 0.5093		
Note: The number of stars(*) denote significance level: *** denotes significance at p-value <0.01, ** denotes significance at p-value <0.05, * denotes insignificance at P-value =0.05		

NPLs are time persistent, which would suggest that the response of credit losses to the macroeconomic cycle could take time to materialize, although it would also imply that NPLs would then cumulate to high levels (Klein 2013). As a consequence, a dynamic model by including a lagged value of NPLs to capture the issue of persistence of NPLs is specified.

In the presence of a lagged dependent variable, using a fixed effect model is erroneous as the error term is correlated with the lagged NPLs term thus leading to inconsistent estimates. To deal with this, first difference GMM estimation developed by Arellano and Bond (1991) is used.

Table 4-2 reports the result of dynamic data model estimation via first difference GMM estimation developed by Arellano and Bond (1991). The bank specific factors are found to significantly affect the level of NPLs. the effect of ROA is significant at $p<0.05$ and its direction in relation to NPLs is negative. Similarly, the effect of CAR on NPLs is significant at $p<0.01$ and its sign in relation to NPL is negative. The effect of LTD on NPLs is also significant at $p<0.01$ but positive in sign in relation to NPLs. All of the three macroeconomic factors are insignificant at $P< 0.05$ and all have positive sign in relation to NPLs.

The result confirms some of the findings in the empirical literature in terms of direction of the coefficients and their significance; however, some of the result does not support the theoretical argument and empirical evidences. The bank specific factors, bank profitability (ROA), capital adequacy (CAR) and the riskiness of the management (LTD) are found to strongly affect NPLs in the direction as evidenced by the findings of empirical literatures and postulates of theories on NPLs. Moreover, the lagged dependent variable used as instrument also found to strongly affect NPLs as theory and empirical evidence dictate. The result proves that NPLs are time persistent and the choices of dynamical panel data model as well as use of GMM estimation method was proved to be right.

Contrary to some of the empirical literatures, the macroeconomic factor, business cycle (real GDP growth rate) does not strongly affect NPLs. The direction in which it affects NPLs is also reversed as opposed to the theory and empirical evidence. The direction in which other macroeconomic factors such as inflation rate and unemployment affect NPLs is in agreement with the previous empirical findings. However, unlike some of the previous researches the degree with which they affect NPLs was not found to be strong.

In general, the results indicate that the banking industry's NPLs in Ethiopia are highly sensitive to bank specific factors such as ROA, CAR and LTD. Whereas, it appears that NPLs are barely responsive to macroeconomic factors such as real GDP, unemployment rate and inflation rate. A fairly close examination of the result in the context of the relevant empirical literatures is discussed in the following section.

4.3 Discussion

There are numerous studies that have empirically examined the relationship between NPLs and macroeconomic variables as well as NPLs and bank specific factors. The general review of these literatures is presented in the literature review section. However as a background and context to the discussion section a brief review of some of the empirical literatures on the macroeconomic and bank specific factors are presented before discussion of each of the variable result.

4.3.1 Bank Specific Factors

Salas and Saurina (2002) found that credit growth, capital ratio, bank size, and market power are the explained factors of the variations in bad debts. Some authors have used the profitability of the bank to explain the behavior of risk managers.

Mismanagement may then involve weak monitoring for both operating costs and the quality of loans, and this is supposed to induce high levels of capital losses. Managerial inefficiency may also positively affect the NPL.

Podpiera and Weill (2008) and Louzis et al., (2010) concluded that inefficiency is positively associated with future increases in non-performing loans. The authors argue that regulators should focus on managerial performance in order to improve the stability of the financial system. Berger and DeYoung (1997) studied the existence of a causal link between loan quality, profitability and capital of banks. Godlewski (2005) used return on assets (ROA) as a performance indicator. The author shows that the impact of banks' profitability is negative on the level of NPL ratio.

Rapid credit growth is another bank specific factor often related with impaired loans in the literature. Bercoff et al. (2002) found that credit growth have an impact on the impaired loans. Excessive loans offered by banks are habitually considered as a main determinant of impaired loans (Keeton and Morris, 1987; Sinkey and Greenwalt, 1991; Keeton, 1999; Salas and Saurina, 2002; Jimenez and Saurina, 2006). Jimenez and Saurina (2006), they attributed the increase of loans to the herd behavior and agency problems that could encourage managers of banks to lend excessively during periods of crisis. Several studies have confirmed the presence of this positive relationship such as the studies of Khemraj and Pasha (2009) and Dash and Kabra (2010).

Return on Asset (ROA): The estimation result for ROA from table 4-2 indicates that the effect of profitability on NPLs is significant ($P<0.05$) and the coefficient has negative sign which are in agreement again with the moral hazard hypothesis. The result of the present study supports the bad 'management 'hypotheses by Berger and DeYoung (1997). ROA is the ratio of net income to total assets of the bank and it used to measure bank profitability. Highly profitable banks have

fewer incentives to engage in high-risk activities. So profitability is expected to negatively impact NPLs, following the 'bad management' hypothesis of Berger and DeYoung (1997). However, in contradiction with Berger and DeYong(1997) hypothesis and empirical finding, Rajan (1994) in a model showed that higher profits could also increase NPLs.

According to the author credit policy is not determined solely by the maximization of banks' earnings but also by the short-term reputation concerns of banks' management. Consequently, bank managers may attempt to manipulate current earnings resorting to a 'liberal credit policy. In this manner, a bank may attempt to convince the market for its profitability by inflating current earnings at the expense of rising NPLs in the future.

Capital Adequacy (CAR): the result from table 4-2 indicates that capital adequacy effects on NPLs is significant ($P<0.05$) and the coefficient has negative sign. The result is compatible with and supports the moral hazard hypothesis (Berger and DeYoung, 1997).According to the authors thinly capitalized banks generally grant loans to riskier borrowers, which can potentially lead to higher NPLs. Keeton and Morris (1987) also suggested that managers in banks with low capital bases have a moral hazard incentive to engage in risky lending practices along with poor credit scoring and monitoring borrowers. This 'moral hazard' hypothesis implies an inverse relationship between equity capital and NPLs.

Loan to Deposit Ratio: The results from table 4-2 show loan to deposit ratio has positive and significant ($p<0.05$) effect on NPLs. The result supports 'moral hazard hypotheses. The loan to deposit ratio measures liquidity and reflects the risk attitude of bank managers (riskiness of management). The authors claim that in order to increase profitability, banks grant loans haphazardly without maintaining credit standard, which may in turn lower the loan quality. Deterioration of credit quality of banks then leads to surge in NPLs in the book of a bank.

However, the result did not support the finding of Dimitrios *et al.* (2016) which found negative significant effect on NPL. Unlike the present study, Jameel (2014), Makri *et al.* (2014), and Cheng *et al.* (2016) reports insignificant effect of loan to deposit ratio on NPLs.

Lagged NPLs: The sign of lagged nonperforming loans coefficient is positive sign and it has significant ($P<0.05$) effect on the leading NPL. The result supports the theory that states many economic phenomena including NPLs are time persistent. This theory suggests that NPLs are time consistent i.e. previous year NPL level affect current year NPLs. The present study result supports the findings of Jiménez and Saurina (2006), Makri *et al.* (2014), Ghosh (2015), and Dimitrios *et al*. (2016) studies. However, it is in contradiction to the findings of Sorge and Virolainen (2006) and Louzis *et al.* (2012) in the panel of the Finnish banking system and the Greek banking system, respectively.

4.3.2 Macroeconomic Factors:

The macroeconomic environment has an impact on the ability of borrowers to have a loan and their ability to pay their depts. It has been hypothesized that an expansionary phase of the economy features relatively low NPLs, as both consumers and firms face a sufficient stream of income and revenues to service their debts. As a result, real GDP growth and employment are negatively associated with the NPL. Conversely, unemployment is positively related to the NPL. Several empirical studies have found a negative association between NPL and real GDP growth (Salas and Saurina 2002; Fofack, 2005; Jimenez and Saurina, 2006; Khemraj and Pasha, 2009; Dash and Kabra, 2010).

The justification provided in the empirical literature of this association is that higher positive level of real GDP growth habitually entails a higher level of income. This improves the capacity

of the borrower to pay its debts and contributes to reduce bad debts. When there is a downturn in the economy (slowed or negative growth of GDP) the level of bad debts will increase.

Fofack (2005) argues that economic growth among other macroeconomic variables such real interest rate is important determinant of bad loans in the sub-Saharan African countries. He attributes the relationship between macroeconomic factors and doubtful accounts to the undiversified environment of some economies and their high exposure to external shocks. Jimenez and Saurina (2006) present evidence that the NPL ratio is explained by GDP growth, real interest rates and credit conditions. Khemraj and Pasha (2009) found that GDP growth is negatively associated to the NPL, suggesting that the improvement in GDP leads, in real economy, to decrease NPL.

Louzis et al. (2010) studied the real rate of GDP growth, the unemployment rate and the real interest rate along bank specific factors using the method of dynamic panel data to explain the problem of NPL. The results show that impaired loans is related to GDP, unemployment rate and the interest rate.

Real Gross Domestic Product (GDP): The model estimation result suggests that the effect of GDP on NPLs is insignificant ($P<0.1$) and positive. Whereas, Salas and Saurina (2002), Messai and Jouini (2013), Fofack (2005), Jiménez and Saurina (2006), Louzis *et al.* (2012) and Dimitrios *et al.* (2016) report negative and significant effect. The argument is that the economic growth indicates an improvement in business performance where a payment capacity is positively increased. Likewise, lower growth induces NPLs as economic slowdown is likely to raise unemployment, which may cause borrowers to have greater difficulties in repaying their debt.

However, Vuslat (2016) studied the impact of the global crisis on the dynamics of NPLs in the Turkish banking sector by an ownership breakdown during 2002Q4-2013Q3. The study was designed in such a way that the researcher able to see the effect of the global crisis on the determinants of NPLs. Estimations were conducted separately for the pre-crisis and post-crisis periods, which cover 20 02Q1-20 0 08Q4 and 2009Q1-2013Q3, respectively. The author reports that the global economic crisis causes the real GDP growth to be negatively significant to the dynamics of NPLs for state banks, while it is insignificant before the crisis and in the overall analysis.

In contrast, scholars such as Salas and Saurina (2002), Messai and Jouini (2013), Fofack (2005), Jiménez and Saurina (2006), Louzis *et al.* (2012) and Dimitrios *et al.* (2016) include GDP in their model alarmed by the global economic recession. Therefore, in light of these findings and the period in which the data were collected by these authors, the author of the present study based on the present research finding incline to postulate that in a growing economy the effect of GDP on NPLs is insignificant. However, further research is needed to confirm the claim or otherwise.

Inflation: The result of the present study suggests that inflation has positive and insignificant ($p<0.1$) relationship with NPL. The result is not compatible the findings of Nkusu (2011) and Rinaldi and Sanchis-Arellano (2006). These authors found significant and positive relationship between inflation and NPL. However, the present study result supports finding of Castro (2013) who found an insignificant effect of inflation on NPL.

Inflation is a general increase in the price of goods and services within a given period. It is considered to affects borrowers' debt servicing capacity through different channels and its impact on NPL can be positive or negative. On one hand higher inflation can make debt

servicing easier either by reducing the real value of outstanding loans or simply because it is associated with low unemployment as the Phillips' curve suggest

On the other hand it can also weaken some borrowers' ability to service debt by reducing real income when wages are sticky. Moreover, when loan rates are variable, inflation is likely to reduce borrowers' loan servicing capacity as lenders adjust rates to maintain their real returns or simply to pass on increases in policy rates resulting from monetary policy actions to combat inflation. Therefore, the relationship between NPL and inflation can be positive or negative.

Unemployment:

The result in table 4-2 from model estimation on the relationship between unemployment rate and NPLs shows positive but insignificant ($P<0.1$) effect on NPL. The result is not compatible with the findings of Fofack (2005) and Khemraj and Pasha (2009) in terms of degree of significance.

In view of these authors a growing economy is suggested to be associated with rising incomes and employment which leads to another suggestion that claim a rising incomes and employment negatively affect NPL. Conversely, unemployment is positively related with NPL.

5 Chapter Five: Conclusion and Recommendation

5.1 Conclusion:

In his study a dynamic panel data model was specified that consists of bank specific and macroeconomic factors. The bank specific factors are ROA, CAR and LTD while the macroeconomic are GDP growth rate, inflation rate and unemployment.

To estimate the model, data were collected from year 2005 to 2013 for nine commercial banks in Ethiopia from National Bank of Ethiopia and Central Statistical Authority and estimation was made by the first difference GMM estimation method as formulated by Arellano and Bond (1991). The estimation result suggests that variation in the level of NPL across the nine banks included in the study and in the year 2005 to 2013 is explained more strongly by the bank specific factors than the macroeconomic factors.

The estimated coefficient of ROA is significant ($P<0.05$) and has negative sign which are in agreement with the moral hazard hypothesis. Similarly, CAR (measure of capital adequacy) is significant ($P<0.05$) and the coefficient has negative sign. ROA and CAR reduce the level of NPLs while loan to deposit ratio has positive and significant ($p<0.05$) effect on NPLs an increase in loan to deposit ratio explain an increase in NPLs. Though, insignificant effect was observed from the result by macroeconomic factor on NPL, the directions of effect on the NPL by these factors are in line with most of the literatures on the issue.

5.2 Recommendation

The findings of the present research confirm that bank specific factors are more important in explaining the problem of NPL than macroeconomic factors. Therefore, the following recommendations are a direct consequence of the findings.

First, bank Supervisory authority should strongly follow specially those banks which have low capital in relation to their asset. The 'moral hazard hypothesis' suggests and confirmed by the findings of the present study that when the capitalization is low in banks, managers or owners may incline to finance high risk investments. This may leads to a raise in NPLs and deterioration credit portfolio in the banks book. This again further leads to bank failure and financial system instability or crises.

Second, both bank managers should formulate and implement sound credit policy and procedure that insures the profitability and cost efficiency of the credit business. Profitability reduces NPLs in bank. Moreover, managers should consistently observe the movement of loan to deposit ratio to effectively gauge and control the movement of NPL in the bank's credit portfolio.

Lastly, even though the present findings do not confirm strong effect by macroeconomic factors on NPL, it is well known that positive economic outcomes are good for profitability and growth to any business. Hence, bank managers should follow periodic economic reviews on domestic and global economies and plan accordingly.

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