Macroeconomic Determinants of Nonperforming Loans in Some Selected Banks of Ethiopia

A Thesis Submitted to the School of Graduate Studies of Jimma University in partial fulfillment of the requirement for the Award of Degree of Masters in Economics of Policy Analysis

By

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JIMMA UNIVERSITY

COLLEGE OF BUSINESS & ECONOMICS

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MAY 30, 2016

JIMMA, ETHIOPIA

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And

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CERTIFICATE

This is to certify that the research study entitles "Macroeconomic Determinants of nonperforming loans in some selected banks of Ethiopia", submitted to Jimma University for the award of Degree of Masters in policy analysis economics (Msc) and is a record of research work carried out by Mr Meketa Gebrekidan Measho, under our guidance and supervision.

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

Approved by the Board of Examiners:

Main Advisor   **Signature**

_____   _____

Co - Advisor   **Signature**

_____   _____

Examiner (External)   **Signature**

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Examiner (Internal)   **Signature**

_____   _____

Declaration

I hereby declare that the study entitled "Macroeconomic Determinants of nonperforming loans in some selected banks of Ethiopia ", has been carried out by me under the guidance and supervision of Dr. Wondaferahu Mulugeta and Mr. Jibril Haji (MSC).

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

Researcher's Name   Date   Signature

Meketa Gebrekidan   _____   _____

Abstract

loans have a vital contribution towards development of economy. However, its nonpayment also leads to incidence of huge loss on banks in particular and country in general. Hence, this study was conducted to examine macroeconomic (growth in Gross domestic product, lending rate, inflation and exchange rate) determinants of NPLs of selected banks in Ethiopia. To this end, the researcher has selected nine senior banks in Ethiopia judgmentally. This study used secondary sources of data, which is panel data in nature, over the period 2002-2013 These data were collected from MoFED, NBE and CSA. Furthermore, random effect model was used to examine the determinants of NPLs. This research is an explanatory research design that identifies the cause and effect relationships between the NPLs and its macroeconomic determinants.

Key words: Nonperforming loans, macroeconomic determinants, banks

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ABBREVIATION and ACRONYMS

AIB: - Awash International Bank

BOA: - Bank of Abyssinia

CBB: - Construction and Business Bank

CBE: - Commercial Bank of Ethiopia

CSA: - Center of Statistical Agency

DB: - Dashen Bank

DBE: - Development bank of Ethiopia

FDI: - Foreign direct investment

GDP: - Gross domestic product

IMF: - International Monetary Fund

M2:- Narrow money and Intermediate money

NBE: - National bank of Ethiopia

NIB: - Nib International Bank

NPA s: - Nonperforming Assets

NPL s: - Non performing loans

PRLR: - Project rehabilitation and loan recovery

OLS: - Ordinary Least square

ROA: -Returns on Asset

ROE: -Return on Equity

WB: - Wegagen Bank

UB: - United Bank

UNDP: - united nations development programme

USA: - united states of America

VIF: - Variance Inflation Factors

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

No one can deny the importance of financial institutions in any developed or developing economy. These financial institutions not only ease the credit flow in the economy but also enhance the productivity by revitalizing the investment (Richard, 2011). Economic growth in any country is not possible unless it is supported by a sound financial sector (Rajaraman and Vasishtha, 2002). Good performance of these financial institutions is the symbol of prosperity and economic growth in any country or region whereas poor performance of these institutions not only hamper the economic growth and structure of the particular region but also affects the whole world (Khan and Senhadji, 2001)

In the last few decades, many banking failures has been observed in all over the world (Brownbridge and Harvey, 1998), and due to these banking failures many banks have been closed by regulatory authorities (Brownbridge, 1998). These banking failures negatively affect the economy in many ways; firstly these banking failures causes banking crisis by harming the banking sector, secondly it also reduces the credit flow in the country which ultimately affects the efficiency and productivity of the business units (Brownbridge and Harvey, 1998). According to (Brownbridge, 1998) many empirical researches have shown that most of the time banking failures or banking crisis are caused by non-performing loans.

Non-performing Loans (NPLs) have gained world's attention in the last three to four decades as these increasing non-performing loans are causing banking crisis which are turning into banking failures (Barr and Siems, 1994). Non-performing loans are one of the main reasons that cause insolvency of the financial institutions and ultimately hurt the whole economy (Hou, 2007). By considering these facts it is necessary to control non-performing loans for the economic growth

in the country, otherwise the resources can be jammed in unprofitable projects and sectors which not only damages the financial stability but also the economic growth. In order to control the non-performing loans it is necessary to understand the root determinants of these non-performing loans in the particular financial sector.

It is important to understand the phenomena and nature of non-performing loans; it has many implications, as fewer loan losses is indicator of comparatively more firms financial system, on the other hand high level of non-performing loans is an indicator of unsecure financial system and a worrying signal for bank management and regulatory authorities, if we look into the causes of great recession 2007-2009 which damaged not only economy of USA but also economies of many countries of the world, we find that non-performing loans were one of the main causes of great recession (Adebola, Wan Yusoff, & Dahalan, 2011). As High risk loans were granted to the unqualified borrowers and these loans were secured against overestimated resources or against nothing, and when this economic boom "went bust" those high risk loans turned into non-performing loans and as loans were given to unqualified borrowers those turned into non-performing loans, as a whole this collection of non-performing loans irrespective of its causes was one of the main factor of great recession which not only hampered the American financial sector but also economy of the whole world (Clugston, 2009).

As far as the banking system of some selected banks of Ethiopia is concerned it is facing a lot of problem like the banking sectors of other underdeveloped economies, the most destructive problem faced by the Ethiopian banking sector is the enormous amount of non-performing loans which not only harming the Ethiopian banking sector but also hampering the Ethiopian economy to move as fast as possible. For instance, the volume of non-performing loan is rising every year as we can see that non-performing loans of development bank of Ethiopia was Birr 3.431 billion and the NPL ratio (the ratio of the total amount non performing loan to total loan outstanding of the bank) was 12.54 percent as at 2015 (DBE, 2015).

A strong financial system is very important for a country to flourish. The economic progress of a nation and development of banking is invariably interrelated. The Banking sector is an indispensable financial service sector supporting development plans through channelizing funds for productive purpose, intermediating flow of funds from surplus to deficit units and supporting financial and economic policies of government. The importance of bank's stability in a developing economy is noteworthy as any distress affects the development plans thereby the economic progress (Rajaraman and Vasishtha, 2002).

(Michael et al, 2006) emphasized that NPA in loan portfolio affect operational efficiency which in turn affects profitability, liquidity and solvency position of banks. (Batra, S, 2003) noted that in addition to the influence on profitability, liquidity and competitive functioning, NPL also affect the psychology of bankers in respect of their disposition of funds towards credit delivery and credit expansion. Non-performing loan generate a vicious effect on banking survival and growth, and if not managed properly leads to banking failures. The world financial crisis has put the financial sector again at the center of policy makers' attention across the developed and developing world. While in recent years, the financial sector debate across the African continent has been dominated by policies to increase access to financial services, minimizing the impact of the crisis currently tops the agenda.

1.2. Statement of the problem

The stability of banking is a pre-requisite for economic development and resilience against financial crisis. Like any other business, success of banking is assessed based on profit and quality of asset it possesses. Even though bank serves social objective through its priority sector lending, mass branch networks and employment generation, maintaining asset quality and profitability is critical for banks survival and growth. A major threat to banking sector is prevalence of Non-Performing Loans (NPLs). Non-performing Loans represent bad loans, the borrowers of which failed to satisfy their repayment obligations.

Issues of Nonperforming Loans (NPLs) gained increasing attentions in the past few decades. Poor loan management will contribute to NPLs. It is critical issue for every bank to manage bad loans. Many countries are suffering from Nonperforming Loans (NPLs) in which banks are unable to get profit out of loans (Petersson and Wadman, 2004). If the loan is well managed; it will increase the bank's profitability and sustainability in the future. However, if failed to do so, it will be the major threat to their survival

NPLs affect the bank`s liquidity and profitability which are the main components for the overall efficiency of the bank. An increase in NPLs provision diminishes income. Again, mismatch of maturities between asset and liability create liquidity risk for the banks that deteriorate bank`s overall credit rating including its image (Badar and Yasmin, 2013).Therefore, the determinants of NPLs should be given a due consideration because of its adverse effect on survival of banks as a result of this the country economy might be negatively affected .

The adverse effect of NPLs is attributable to bank managers' adverse selection of its borrowers (Brownbridge, 1998). NPLs are determined by different factors such as level of GDP, inflation, unemployment, volume of deposit, return on equity, return on asset, capital adequacy, total loan, liquidity, bank size, excessive lending, interest rate and credit growth. These factors are studied by different researchers in different countries (Ahmad and Bashir, 2013).

Though, there are a number of studies that are conducted at a global level to examine the determinants of NPLs, most of the studies were made with reference to developed countries like Italy, Spain, Greece, Europe and USA and the like. This means, the studies may not explain the issues for emerging market particularly for Ethiopian case.

The operation of modern and organized financial institution is the most crucial part for any country to ensure the economic growth and development. In case, financial sector of Ethiopian economy is dominated by banking sectors. So, it is important to examine their determinant factors of their loan.

Further, by having a lot of literature on the determinants of NPLs of banks across worldwide, it is important to examine in Ethiopia case. This is due to the fact that, it is difficult to make generalization about the NPLs for the developing economy based on the result of developed economy without making any research. Besides, since the majority of bank assets are hold by loans, unless the determinants of NPLs are visualized to enhance the quality of asset, it is hard for the survival of the banking sectors.

Generally, the basic motive for this study is that, different studies were done in Western Europe and few East African countries (Saba et al., 2012, Louzis et al., 2010 and Badar and Yasmin, 2013). However, the results of those studies were inconsistent. This inconsistency of results might be attributable to the method of data analysis used by different researchers and difference in the economic condition of the countries in which banking sectors are operating. For instance;

The study of (Saba et al., 2012) on the title of "Determinants of Nonperforming Loan on US Banking sector" found negative significant effect of lending rate and positive significant effect of real GDP per capital and inflation rate on NPL via OLS regression model. Similarly, the study of (Louzis et al., 2010) examined the determinants of NPLs in the Greek financial sector using dynamic panel data model and found as real GDP growth rate, ROA and ROE had negative whereas lending, unemployment and inflation rate had positive significant while loan to deposit ratio and capital adequacy ratio had insignificant effect on NPLs. However, (Swamy, 2012) examined the determinants of NPLs in the Indian banking sector using panel data and found as GDP growth rate, inflation, capital adequacy and bank lending rate have insignificant effect on NPLs.

In addition to the above facts, there has not been much research conducted to date on the determinants of NPLs in countries with emerging economy like Ethiopia except few studies made like by (Wondimagegnehu, 2012).The study of (Wondimagegnehu, 2012) was assessed the macroeconomic factors and bank specific factors affecting NPLs via OLS estimation model by the help of SPSS software. This study considers both macroeconomic factors such as inflation rate, tax rate and lending rate and, bank specific factors like loan to deposit ratio, return on

equity, return on asset and capital adequacy ratio as determinant factors of NPLs.

When the loans and advances become non-performing, banks liquidity and its earnings are adversely affected. It is based on this information this paper seeks to find out the determinants of Non-performing loans/ Assets on some selected banks of Ethiopian.

In light of the above facts and research gaps, the purpose of this study was to examine the determinants of NPLs in some selected banks of Ethiopia. To this end, this study tried to provide real information about the macroeconomic determinant factors affecting NPLs of banks and feasible recommendation for the effects of the identified variables on the levels of NPLs. Therefore, the researcher used panel data for the periods covering 2002 to 2013 that obtained from MoFED, NBE, CSA and world development indicator.

1.3. Research Questions

The research has the following research questions;

1. What are the trends of nonperforming loans (NPLs) of some selected banks in Ethiopia?
2. What is the effect of Growth in gross domestic product on nonperforming loans (NPLs) in the selected banks in Ethiopia?
3. What is the effect of average annual exchange rate on nonperforming loans (NPLs) in the selected banks in Ethiopia?
4. What is the effect of average annual lending rate on nonperforming loans (NPLs) in the selected banks in Ethiopia?
5. What is the effect of average annual inflation rate on nonperforming loans (NPLs) in the selected banks in Ethiopia?

1.4. Objectives of the study

The general objective of the research was to assess the determinants of Non-performing Loans in some selected Banks of Ethiopia.

The research has the following specific objectives;

1) To examine the trends of nonperforming loans (NPLs) of some selected banks in Ethiopia
2) To determine the effect of Growth in gross domestic product on nonperforming loans (NPLs) in the selected banks in Ethiopia.
3) To determine the effect of average annual exchange rate on nonperforming loans (NPLs) in the selected banks in Ethiopia.
4) To determine the effect of average annual lending rate on nonperforming loans (NPLs) in the selected banks in Ethiopia.
5) To determine the effect of average annual inflation rate on nonperforming loans (NPLs) in the selected banks in Ethiopia.

1.5. Significance of the study

The determinants of NPLs of banking sectors have been studied by many researchers across the world. However, the literature lacks more evidence regarding Ethiopian context. Accordingly, this study was conducted to examine the macroeconomic determinants of NPLs in the Ethiopian banks context to contribute its own effort for the empirical evidence to scholars, researchers bankers, stakeholders and policy makers.

Among the few works related to this research topic which were done in Ethiopia were the works of (Wondimagegnehu, 2012) under the topic determinants of nonperforming loans: the case of Ethiopian banks and (Anisa, 2015) under the topic of Determinants of nonperforming loan: an empirical study on commercial banks of Ethiopia. The works done by these and others were different from this study in the number of banks and variables, in bank selection and determinant factors selection.

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The finding of this study which deals with the macroeconomic determinants of nonperforming loan of some selected banks of Ethiopia is beneficial for different stakeholders such as Banking sectors(commercial Banks, developmental bank and National bank of Ethiopia) and for other researchers as follows.

This study was significant because first, it explained NPL, which is important on explaining the determinants of the nonperforming loan of the banking sector as it provides the policy makers and authorities with significant information, of which they can use to manage this important financial sector. Lastly for scholars it enriches the knowledge and provides a basis for further studies.

1.6. Scope of the study and delimitation of the study

The study attempted to explore the macroeconomic determinants of nonperforming loan by some selected banks of Ethiopia (That are three governmental and six private banks, namely Development bank of Ethiopia, Commercial bank of Ethiopia, Construction and business bank, Wegagen bank, Awash international bank, Nib international bank, Dashen bank, United bank and Bank of Abyssinia).

The study attempted to explore the root macroeconomic determinants of nonperforming loan in some selected banks of Ethiopia and it tried to look to the variables that affect this NPL. The study focused on the trends and macroeconomic determinants of nonperforming loans of the above selected banks and it generalized to other local banks. The target population were all the banks selected depending on their age judgmentally for the year 2002-2013 and hence all banks working in this year were considered.

1.7. Organization of the final study paper

This thesis is structured in five chapters as follows. Chapter one presents the introduction part of the study, Chapter two presents literature review, Chapter three provides the research design part of the study which includes research methodology and the adopted research design for the study, Chapter four provides research results and discussions part of the study and Chapter five provides final part of the study which is conclusion and recommendation.

1.8. Operational definition

A Non-performing Loan/ Asset is a credit facility in respect of which the interest and/or principal amount has remained past due for a specific period of time. According to (Alton and Hazen, 2001) non-performing loans are those loans which are ninety days or more past due or no longer accruing interest. (Hennie, 2003) agrees arguing that non-performing loans are those loans which are not generating income. This is further supported (Fofack, 2005), who define non-performing loans as those loans which for a relatively long period of time do not generate income that is, the principal and/or interest on these loans have been left unpaid for at least ninety days.

Non- performing loans are also commonly described as loans in arrears for at least ninety days. (Michael et al, 2006) emphasized that NPL in loan portfolio affect operational efficiency which in turn affects profitability, liquidity and solvency position of banks. In addition to the influence on profitability, liquidity and competitive functioning, NPL also affect the psychology of bankers in respect of their disposition of funds towards credit delivery and credit expansion. NPL generate a vicious effect on banking survival and growth, and if not managed properly leads to banking failures. According to this paper, non-performing Assets/ loans are loans that are ninety or more days delinquent in payments of interest and/or principal (Bexley and Nenninger, 2012). According to (Obamuyi, 2007) a loan is considered to be as non-performing loan (NPL) if its principal and interest is not being paid by the borrower in accordance with the agreed terms and conditions of loan payment.

As far as Ethiopia is concerned non-performing loans are divided into three main categories by (NBE). "Non-Performing Loans (NPLs)" shall mean bad debts as defined by NBE for financial institutions in the Directives No.SBB/52/2012 entered into force as of January 19, 2012, a loan whose principal or interest repayment is overdue for greater than 90 days for short term loan and for greater than 12 months for medium or long term loan is classified as "Substandard", the loan is classified as "Doubtful" if being overdue for greater than 180 days for short term loan and for greater than 18 months for medium or long term loan and a loan is classified as "Loss" if it is overdue for greater than 360 days for short term loan and for greater than 3years for medium or long term loan and this definition was adopted in my study.

Table 1.8.1. status of loan

Terms of loan	Status of loan				
	Pass	Special mention	Substandard	Doubtful	Loss
Short term loan	≥30 D	31-90D	91-180D	181-360D	<360D
Medium and long term loan	≥180 D	181D-12M	12M-18M	18M-3Y	<3Y

Source NBE –directive no. SBB/48/2010

REMARK:- D = days, M = months and Y = years and the loans with the status of substandard, doubtful and loss are categorized as NPLs as per this directive in Ethiopian context.

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

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

Table 1.8.2 provision for loans

Serial No.	Classification category	Minimum provision
1	Pass loan	1%
2	Special mention loan	3%
3	Substandard loan	20%
4	Doubtful loan	65%
5	Loss loan	100%

Source: Directive No. SBB/43/2007

The existence of the nonperforming loan tarnish the asset and total portfolio of the banks since these non performing loan would force the banks to held large amount of their capital for provision and the existence of these NPLs prevent banks from getting soft loans.

CHAPTER TWO

Review of Related Literature

As far as non-performing loans are concerned every country has different determinants which are responsible for loan losses in the country, so this review of the literature was divided into two parts. The first part of the literature focuses on the theoretical part. While the second part of literature focuses on the empirical macroeconomic variables i.e. lending interest rate, growth in gross domestic product ratio, inflation rate, exchange rate etc.

2.1. Theoretical Literature

First of all, the study focused on the previous theoretical literature on the determinants of non-performing loans and specifically on the studies conducted on the non-performing loans of Ethiopian banking sector. This research study attempted to highlight the determinants of non-performing loans in general and following to those, it attempted to look to those determinant factors which are functional in case of Ethiopia in particular.

Non-performing assets are a very sensitive element of a bank's operations. Non- performing loans are also a leading indicator of credit quality (Machiraju, 2003). Studies previously discussed indicated that loans and advances have constituted the primary source of income by banks. Like any business establishment, a bank also seeks to maximize its profit. As loans and advances are more profitable than any other assets, a bank is willing to lend as much of its funds as possible. Credit quality is, however, the main concern of the banks. Most of the time banks try to balance the issue of maximizing profit by lending and at the same time manage risk of loan default as it would impair profit and thereby the capital .

Indeed, a bank needs to be cautious in advancing loans as there is a greater risk which follows it in a situation where the loan is defaulted. In other words, loan loss or defaulted loan puts a bank

in a difficult situation especially when it is in greater amount. According to Tibebu (2011), the immediate consequence of large amount of non-performing loans and advances in the banking system is bank failure. Despite the fact that banks hold security for the loans they grant they cannot be fully certain as to whether they are paid or not. It is when such risks materialize that loans turn to be non- performing.

The concept of non-performing loans or assets has been defined in different literatures. According to (Petersson and Wadman, 2004), non- performing loans are defined as defaulted loans which banks are unable to profit from. They are loans and advances which cannot be recovered within stipulated time that is governed by the laws of a country. According to the International Monetary Fund (IMF, 2009), a non- performing loan and advance is any loan in which interest and principal payments are more than 90 days overdue; or more than 90 days worth of interest has been refinanced. (Fofack, 2005) also discussed that non-performing loans generally refer to loans which for a relatively long period of time do not generate income; that is the principal and/or interest on these loans has been left unpaid for at least 90 days. Non-performing loan assets are further defined as loans whose cash flows stream is so uncertain that the bank does not recognize income until cash is received (Machiraju, 2003).

According to (Brown, Mallett and Taylor, 1998) the loss from bad loans and advances affects bank's ability to grow and develop its business. Disclosure of the extent of these losses in its financial statements may also lead to a loss of confidence in the bank's management and reductions in its credit ratings which will in turn increase the bank's cost of borrowing in the wholesale market and make it more expensive or more difficult to raise capital. In extreme cases, it can also leads to a loss of deposits, the withdrawal of the bank's authorization and ultimately insolvency. Thus, Non-performing loan and advances have greater implication on the function of the banks as well as the overall financial sector development.

It is widely accepted that the magnitude of non-performing loans and advances is often associated with bank failures and financial crises in both developing and developed countries. Historically, the occurrence of banking crises has often been associated with a massive accumulation of non-performing assets which can account for a sizable share of total assets of

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

Non-performing loans are dangerous not only for the economy of one country but also for the whole world as we have seen the financial crisis created by these loans in East Asian countries, America and Sub-Saharan Africa, so the researchers believe that once the researcher identified these determinants then we can make policies to prevent any future happenings of these loans (Adebola, Wan Yusoff, & Dahalan, 2011). In this section the study focused on some existing literature.

The key economic determinants of non-performing loans can be chosen from the existing theoretical literature of life-cycle consumption models (Louzis; Vouldis & Metaxas, 2011). (Lawrence, 1995) studied life-cycle consumption model and presented the probability of default, according to this model low income borrowers have higher defaulting rates this is due to increased risk of unemployment and being unable to pay their loan obligations, furthermore bank charges higher interest rates to riskier clients, if a high interest rate is charged to those borrowers who have already substandard record to repay the loans is also a factor causing non-performing loans. (Rinaldi and Sanchis-Arellano, 2006) extended Lawrence's model according to them the probability of default actually depends on the current income and unemployment rate, which is actually associated with the insecurity of the future income and lending rates.

2.2. Empirical Literature

This part provides so many empirical evidences which identify the major determinants of bank loans, particularly, nonperforming loans. There are a plenty of variables that affect the NPLs of banking sectors. In this study, the researcher focused on macroeconomic determinants of NPLs of banks mainly related to lending interest rate, growth in gross domestic product (GDP), inflation rate and exchange rate .

(Keeton and Morris, 1987) conducted a research in America to identify the factors which are causing non-performing loans in the banking sector of this country by taking the data from 1979-85 and according to them bad performance of agriculture and energy sectors along with poor economic settings/conditions are the main factors causing non-performing loans. (Sinkey and Greenwalt, 1991) conducted other research in the same country between the period of 1984-87 to identify the causes of non-performing loans according to them high level of interest rate, unnecessary lending along with unpredictable funds are the factors which have positive relationship with the non-performing loans in the banking sector of America, furthermore according to the researchers poor economic conditions are also a cause of loan losses in American banking sector. (Gambera, 2000) also conducted a research in America having quarterly data from 1987-99 to highlight the effect of macro-economic variables on loan losses; the finding of this study indicated that income along with unemployment rates are macro-economic factors causing loan losses in America.

(Salas and Saurina, 2006) conducted a research in Spain to identify the factors which explains the variation in non-performing loans from 1984-2003 according to these researchers high interest rates, GDP growth and soft credit conditions determine the non-performing loans. Another study conducted in UK by (Hoggarth; Sorensen and Zicchino, 2005) considering time period between 1988-2004 according to the authors, inflation and interest rates have positive relationship with non-performing loans.

(Vogiazas & Nikolaidou, 2011) investigated determinants of non-performing loans in the

Romanian banking sector during the Greek crisis by taking the data from December 2001 to November 2010 according to them construction and investment expenditure, unemployment and inflation rate and Romania's external debt to GDP and M2 (Narrow money and Intermediate money) influence the credit risk of country's banking system.

(Kalirai and Scheicher, 2002) found lending rate, production of industry, stock market return and business confidence index are the factors which determine the level of loan quality in Australia while conducting a research taking data from 1990-2001. (Bofondi and Ropele, 2011) found that non-performing loans are positively associated with the unemployment rates, lending rates and negatively associated with the growth domestic product rate; they conducted their study in Italy by taking the quarterly data over the period of 1990-2010.

(Louzis, Vouldis and Metaxas, 2011) used dynamic panel data to highlight the factors causing non-performing loans in the Greek banking sector from 2003 to 2009 considering each loan category (corporate loans, consumer loans and mortgage loans) according to them economic growth (GDP), unemployment, lending rates, public debt and management quality are the determinants of non-performing loans in the banking sector of Greece. (Rinaldi and Sanchis-Arellano, 2006) investigated household non-performing loans for a panel of European countries and found that disposable income, unemployment and monetary conditions are determinants of non-performing loans. (Berge and Boye, 2007) found that non-performing loans are highly correlated with the lending rates and unemployment for the Nordic banking system covering the time span from 1993 to 2005.

The above literature was related to factors influencing non-performing loans in developed countries now the researcher reviewed literature regarding the factors influencing the non-performing loans in the developing countries. (Rajan and Dhal, 2003) observed that increase in gross domestic product has a strong relationship with the volume of non-performing loans in the Banking sector of India. According to (Shu, 2002) in Argentina non-performing loans have a negative relationship with GDP growth, inflation rate; increase in property prices whereas it has a positive relationship with interest rate.

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(Khemraj and Pasha, 2009) investigated the determinants of non-performing loans in Gyana considering the data between 1994-2004, according to the authors growth in gross domestic product has an inverse relationship with the volume of non-performing loans explaining it as a good performance in the economy causes reduction in non-performing loans furthermore according to the authors real effective exchange rate has a positive relationship with the non-performing loans in the Guyanese banking sector furthermore according to the authors banks who charge higher interest rate are likely to have high volume of non-performing loans indicating a positive relationship between lending rate and non-performing loans.

The above studies focuses on conventional banking but non-performing loans are not only the problem of conventional banking but also of Islamic banking, (Adebola, Wan Yusoff, & Dahalan, 2011) conducted a research in Malaysia to investigate the determinants of non-performing loans in the Islamic banking sector of Malaysia covering the period between 2007 to 2009 according to them interest rate has a positive significant relationship with the non-performing loans and producer price index has a negative and significant relationship with the non-performing loans in the Islamic banking sector of Malaysia.

(Skarica, 2013) conducted a study on the determinants of NPLs in Central and Eastern European countries. In the study, Fixed Effect Model and seven Central and Eastern European countries for 2007-2012 periods was used. The study utilized loan growth, real GDP growth rate, market interest rate, Unemployment and inflation rate as determinants of NPLs. The finding reveals as GDP growth rate and unemployment rate has statistically significant negative association with NPLs with justification of rising recession and falling during expansions and growth has an effect on the levels of NPLs. This shows as economic developments have a strong effect on the financial stability. The finding also reveals as inflation has positive impact with justification as inflation might affect borrowers' debt servicing capacities. Many empirical results show the significance and anticipated signs of the relationships between non-performing loans and the selected variables are as follows:

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For instance, lending interest rates are one of the primary economic determinant of non-performing loans/bad loans. There is an empirical evidence of positive correlation between the lending interest rate and non-performing loans (Nkusu 2011; Adebola, Yusoff, & Dahalan, 2011; Louzis, Vouldis and Metaxas, 2011; Berge and Boye, 2007). An increase in interest rate weakens loan repayment capacity of the borrower therefore non-performing loans are positively co related with the interest rates (Nkusu, 2011). As far as interest rate policy is concerned it plays very important role in NPLs growth rate in a country/economy, (Hoque and Hossain, 2008) examined this issue and according to them non-performing loans are highly correlated with the high interest rates which enhances the debt burden of the borrowers and causes loan defaults.

(Bloem and Gorter, 2001) studied the cause and treatment of NPLs. According to them frequent changes in the interest rate policy causes an increase in the bad loans. (Asari, et al., 2011) also found significant relationship between loan defaults and interest rates they also found that an increase in loan defaults also causes asset corrosion of banks and subsequently capital erosion. According to (Dash and Kabra, 2010) the banks with aggressive lending policies charging high interest rates from the borrowers incur greater non-performing loans. (Collins and Wanjau, 2011) also found interest rate as a primary factor boosting non-performing loans.

Moreover, there are significant empirical evidence of negative association between growth in gross domestic product and non-performing loans (Louzis, Vouldis and Metaxas, 2011, Khemraj and Pasha, 2009; Salas and Suarina, 2002 and Fofack, 2005). If you look into the explanation of this negative relationship provided by the literature the study found that growth in the gross domestic product usually increases the income which ultimately enhances the loan payment capacity of the borrower which in turn contributes to lower bad loan and vice versa (Khemraj and Pasha, 2009).

There are ample empirical evidence of positive relationship between the inflation in the economy and non-performing loans (Khemraj and Pasha, 2009; Fofack, 2005). While (Nkusu, 2011) has explained that this relationship can be positive or negative according to the author inflation affects loan payment capacity of borrowers positively or negatively, higher inflation can enhance

the loan payment capacity of borrower by reducing the real value of outstanding debt; moreover increased inflation can also weaken the loan payment capacity of the borrowers by reducing the real income when salaries/wages are sticky, moreover by highlighting the role of inflation in the presence of variable interest rate Nkusu further explains that in this scenario inflation reduces the debt servicing capacity of the loan holders as lenders adjust the lending interest rates to adjust their real return. So according to this literature, the relationship between inflation and non-performing loans can be positive or negative depending on the economy of operations.

However, empirical literature on the effect of exchange rate on NPLs provides mixed results. According to (Khemraj and Pasha, 2009) there is a positive relationship between real effective exchange rate and non-performing loans. An appreciation in exchange rates may have different implications i.e. it can adversely affect the loan payment capacity of export oriented firms (Fofack, 2005) on the other hand it can positively affect the loan payment capacity of those borrowers who borrow in foreign currency, the relationship between Nominal effective exchange rate (includes inflation) and non-performing loans is indeterminate.

From the above theoretical and empirical literature review the researcher identified the economic variables which have strong relationship with nonperforming loan. Several variables identified by the literature as important determinants of nonperforming loan but the researcher considered the following macroeconomic variables lending interest rate, growth in gross domestic product (GDP), inflation rate and exchange rate in its upcoming study.

CHAPTER THREE

Data source and Methodology

3.1. Research design

Research design is the research process that involves the overall assumptions of the research to the method of data collection and analysis (Creswell, 2009). It is a base to conduct a research since it is a plan of organizing a frame work for the study and also helps to know in advance what was done and the way how it was done. Research design fits in to the whole research process from framing a question to finally analyzing and reporting data. The choice of research design depends on the objectives of the research in order to be able to answer the research questions. Therefore, the research design used to describe the research elements in general before own philosophical stance.

The reason for selecting descriptive research design for this study was that, it is found to be relevant to establish the relationship between nonperforming loan and determinant variables affecting these NPL in the banks of Ethiopia. Descriptive research design involves the description of the extent of association between two or more variables. Descriptive Research describes some situation. Generally, things are described by providing measures of an event or activity. Descriptive Research design is usually structured and specifically designed to measure the characteristics described in a research question. A descriptive research is concerned with conditions, practices, structures, differences or relationships that exist, opinions held, processes that are going on or trends that are evident.

The characteristics of descriptive research design comprises of collecting data to determine whether, and to what extent, a relationship exists between two or more quantifiable variables. It is suitable for studies with both quantitative and qualitative data since it uses numerical data to explore relationships between two or more variables. The degree of relationship was expressed in

terms of a coefficient of correlation. If the relationship exists between variables, it implies that scores on one variable are associated with or vary with the scores on another variable. The exploration of relationship between variables provides insight into the nature of the variables themselves as well as an understanding of their relationships. If the relationships are substantial and consistent, they enabled to make predictions about the variables.

3.2.   Data source and data collection Techniques

This study adopted ex-post factor research (after the fact) design which implied that the events observed have taken place already. Hence, the research used secondary data from Ministry of Finance and Economic Development (MoFED), journals of national bank of Ethiopia (NBE), annual reports of the concerned banks, world development indicator, CIA world factbook and annual reports the selected banks of Ethiopia.

The banks that are included in this study were 8 senior commercial banks and development bank of Ethiopia that was (development bank of Ethiopia, commercial bank of Ethiopia, Construction and business bank , Awash international bank, Wegagen bank ,Nib International Bank, United Bank, Dashen Bank and Bank of Abyssinia); those all banks operating after 2002 and before 2013. In case, the data for this study was drawn from the nine banks for 2002 to 2013 periods. To this end, 108 observations were analyzed to examine the macroeconomic determinants of NPLs of banks in Ethiopia.

3.3. Study Variables

This study was examined by the macroeconomic determinants of NPLs. The macroeconomic determinants were growth rate in Gross domestic product (taken at constant market prices), annual average inflation rate (consumer price index), annual average lending interest rate and annual average exchange rate taken from Ministry of Finance and Economic Development

(MoFED), National bank of Ethiopia (NBE), annual reports of the concerned banks, world development indicator and CIA (Central Intelligence Agency) world factbook. Here NPL is dependent variable whereas growth rate in Gross domestic product, inflation rate, lending interest rate and exchange rate are explanatory variables in this study. Measurements and explanations of the above mentioned variables are presented in the following table 3.3.1 as follows:

Table 3.3.1. Explanation of Study Variables

Variables	Explanations
Nonperforming loan ratio(NPLs)	Calculated as nonperforming loan amount to gross loan of the banks
Growth in GDP $$\Delta GDP_t = \frac{GDP_t - GDP_{t-1}}{GDP_t} * 100\%$$	At constant market prices
Lending interest rate (LR)	Annual average lending rate of the country regulated by the central bank of Ethiopia i.e., NBE
exchange rate(ER)	Annual floating average exchange rate of the country
Inflation(INF) $$= \frac{CPI_t - CPI_{t-1}}{CPI_t} * 100\%$$	Calculated as consumers price index

Source: Ministry of Finance and Economic Development (MoFED), NBE, annual reports of the concerned banks, world development indicator and CIA world factbook.

3.4. Methods of data presentation and analysis

The researcher divided the data analysis into three parts, firstly descriptive analysis was discussed following this trend analysis was executed and lastly regression and correlation analysis was discussed. As noted by Kothari (2004), data has to be analyzed in line with the purpose of the research plan after data collection. Accordingly, secondary data collected from MoFED, NBE, CSA, world development indicator and head offices of each respective bank analyzed to determine its suitability, reliability, adequacy and accuracy. Thus, this study utilized both descriptive and econometric analysis based on a panel data from 2002-2013 to examine the relationship between the NPLs and its determinant factors in the selected banks of Ethiopia. The data collected from different sources has been coded, checked and entered to simple excel program to make the data ready for analysis. Then the collected data processed and analyzed through STATA version 11 software packages.

3.4.1. Descriptive Analysis

The descriptive analysis is used to study the mean, standard deviation, minimum and maximum of each variable in the study and the results of the descriptive statistics values reported to describe the characteristics of variables under investigation using table. The trend analysis presented the trend of nonperforming loan in the selected banks of Ethiopia and the trend of each explanatory variable against the dependent variable in addition to this the trend analysis depicts the trend of average NPLs of the banks in each year using figure.

3.4.2. Econometric analysis

The Econometric analysis used to study the significance of the model, the effect of each dependent variable on the independent variable that is to determine coefficients of the repressors, to show the amount of variance of the dependent variable explained by the dependent variable, for diagnosis testing, etc

Model specification

The study used static panel/longitudinal data model which involve the pooling of observations on the cross sectional over several time periods. Brooks (2008) stated the advantages of using panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time series or pure cross sectional data alone. Second, it is often of interest to examine how variables, or the relationships between them, change dynamically (over time). Third, by structuring the model in an appropriate way, the researcher can remove the effect of certain forms of omitted variables bias in regression results.

The multiple regression model used for this study was similar with that of (Anisa Umer, 2015). The random effect panel data model was selected and used for determining the result. According to (Oscar Torres-Reyna, 2007) the rationale behind random effects model is that, unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model. If you have reason to believe that differences across entities have some influence on your dependent variable then you should use random effects. The advantage of random effects is that you can include time invariant variables (i.e. random). In the fixed effects model these variables are absorbed by the intercept. Random effect allows to generalize the inferences beyond the sample used in the model.
The random effects model is:

$$y_{it} = \alpha + \beta x_{it} + u_{it} + \varepsilon_{it}$$

The general model and variables used in this study seemed the following.

$$NPL_{it} = \alpha_0 + \alpha_1 IR_{it} + \alpha_2 IN_{it} + \alpha_3 GDP_{it} + \alpha_4 ER_{it} + u_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots(1)$$

Where;
NPL= nonperforming loan ratio of bank "i" in year "t"

LR = annual average lending interest rate of bank "i'' in year "t''

INF = annual average inflation rate of bank "i'' in year "t''

GDP = gross domestic product at constant market prices of bank "i'' in year "t''

ER = annual average exchange rate of bank "i'' in year "t''

α_0 = an intercept,

$\alpha_1, \alpha_2, \alpha_3,$ and $\alpha_4,$ = estimated coefficient of explanatory variables for bank 'i' in year t

u_{it} = Between-entity error

ε_{it} = Within-entity error, for error terms for intentionally/unintentionally omitted or added variables.

This study used panel data models that comprises of random effect model to examine the relationship between NPLs and explanatory variables. To select either Random or Fixed Effect Model, the character of individual effects was tested through the Hausman specification test. Based on comparison result between random and fixed effect model through Hausman test, an appropriate model for this study was random effect model. Thus, the cause and effect relationship between NPLs and explanatory variables was examined by random effect model.

Table 3.4.2.1.:- Expected Sign (+/-) of Explanatory Variables in this Study

Serial No.	Variables	Expected sign
1	Lending Interest Rate(nominal)	+
2	Growth in Gross Domestic Product	-
3	Inflation rate (using CPI)	-
4	Exchange Rate	-

Source different literatures

Notes: A positive sign "+" indicates direct effect; whereas a negative sign "–" indicates an inverse effect of explanatory variables on dependent variable. Many theoretical and empirical works done by different researchers indicated that the relationship between the dependent variable and the explanatory variables outweigh to table 3.4.2.1 above signs and their justification also convinced the researcher.

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Furthermore, various diagnosis tests such as normality, heteroscedasticity, autocorrelation and multicolinearity test conducted to decide whether the model used in the study is appropriate and to fulfill the assumption of classical linear regression model. Thus, in order to examine the possible degree of Multicolinearity among variables, correlation matrixes and variance inflation factor was used.

To this end, the researcher used Static panel data regressions (Cameron and Trivedi, 2009) allow the researcher to study individual behavior in a repetitive environment. This study used random effect regression model analysis (after hausman test made to identify the appropriate model to be used here) to examine the effect of each explanatory variable on nonperforming loans (the independent variable) of the selected banks of Ethiopia. Thus, regression results presented in tables and figures form with the appropriate test statistics and then explanation of each parameter given.

- **Normality Test**: - One assumption of classical linear regression model (CLRM) is the normal distribution of the residual part of the model. As noted by (Gujarati, 2004), OLS estimators are BLUE regardless of whether the u_i are normally distributed or not. If the disturbances (ui) are independently and identically distributed with zero mean and constant variance and if the explanatory variables are constant in repeated samples, the OLS coefficient estimators are asymptotically normally distributed with means equal to the corresponding β's.

  However, as per the central limit theorem, if the disturbances are not normally distributed, the OLS estimators are still normally distributed approximately if there are large-sample data. Thus, since the sample size for this study is large enough, it was approximately considered as normally distributed. This implies that residuals are asymptotically normal in this study.

- **Heteroscedasticity Test**:-In the classical linear regression model, one of the basic assumptions is Homoskedasticity assumption that states as the probability distribution of the disturbance term remains same for all observations. That is the variance of each ε_{it} is the same for all values of the explanatory variable. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity (Bedru and Seid, 2005). Accordingly, in order to detect the heteroscedasticity problems, Breusch-Pagan test was utilized in this study. This test states that if the p-value is significant at 95 confidence interval, the data has heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem.

- **Autocorrelation Test: -** The researcher tested the autocorrelation assumptions that imply zero covariance of error terms over time. That means errors associated with one observation are uncorrelated with the errors of any other observation. As noted by Gujarati (2004), the best renowned test for detecting serial correlation is Durbin Watson test. Accordingly, if the d computed nearest to 2in application, it is assumed that there is no autocorrelation problem.

- **Multicolinearity Test: -** The term Multicolinearity indicates the existence of exact linear association among some or all explanatory variables in the regression model. When independent variables are multi collinear, there is overlapping or sharing of predictive power. Thus, if multicolinearity is perfect, the regression coefficients of the independent variables are undetermined and their standard errors are immeasurable (Gujarati, 2004). The multicolinearity makes significant variables insignificant by increasing p-value since increased p-value lowers the t-statistics value. Thus, the panel regression results with multicolinearity can show significant variables as insignificant variables. The multicolinearity problem is solved by dropping highly correlated variables (Ahmad and Bashir, 2013).Then, the result provide more significant variables than before.

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This is due to the fact that when explanatory variables are highly correlated with one another, they share the same information. Thus, the multicolinearity problem reduces the individual explanatory variables' predictive power. That is none of the predictor variables may contribute uniquely and significantly to the prediction model after the other independent variables is included (Theodros, 2011)

In case, Pearson correlation matrix and Variance inflation factor (VIF) was used for testing multicolinearity in this study. Pearson correlation matrix is a technique used for testing multicolinearity of explanatory variables by investigating their relationship and also useful to measure the propensity of how much the independent variables influence the dependent variable.

Then, to calculate the VIF factor the researcher used the following formula:

$$\text{VIF} = \frac{1}{1 - R_i^2}$$

Where R_i^2 is the multiple correlation coefficient

Table 3.4.2.2:-the researcher used the following guidelines to interpret the VIF

Serial No.	VIF	Status of predictors
1	VIF=1	Not correlated
2	1<VIF<5	Moderately correlated
3	5<VIF<10	Highly correlated
4	VIF>10	Multicollinearity problem

CHAPTER FOUR

RESULTS and DISCUSSIONS

In the preceding chapters, important literatures relating to the research topic has been stated that gives basic understanding about the subject matter and used to identify knowledge gap on the area were reviewed. To meet the research specific objectives and to answer research questions, the research design used for this study also discussed in the preceding chapter. In this section, the researcher presented the important finding of the analysis. This chapter deals with analysis of the results and discussions of the finding in order to achieve research objectives and set a base for conclusion. The static panel data was analyzed in terms of random effect model via Stata 11 version. The first section of this chapter was mainly start discussion for the result of descriptive statistics including trend analysis for nonperforming loans (NPLs) and the explanatory variables of the selected banks in Ethiopia. Furthermore, the second section presents the basic tests for the assumptions of classical linear regression model that is diagnosis analysis. Next to this, model selection and regression result were presented. Lastly, the result of the regression analysis was discussed in detail.

4.1. Descriptive Statistics

This section presented the descriptive statistics of dependent and explanatory variables used in this study. The dependent variable used in this study was NPLs ratio while explanatory variables are growth rate in gross domestic product, inflation rate, lending interest rate and exchange rate. Accordingly, the following table 4.1 reported the mean, maximum, minimum, standard deviation and number of observation for each variables used in this study. In case, the following table 4.1 shows that all variables except for NPLs ratio have 108 observations.

As noted by (Yuqi Li, 2006), the presences of missing value for some variables reduce the total observations for that variable. Thus, due to the missing value of NPLs for one year, NPLs have 107 observations implying missing reported figure. That means, NPLs missed one observation. Thus, number of observations, mean, standard deviation, minimum and maximum values of both dependent and explanatory variables for the selected Banks in Ethiopia from 2002-2013 were demonstrated as follows:

Table 4.1. Summary of Descriptive Statistics

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
NPL	107	13.60935	13.17306	0.0	60.00
GDP	108	9.108333	4.520692	-2.2	13.6
IFR	108	15.375	10.90233	1.7	36.4
LR	108	11.28208	0.6907172	10.5	12.25
ER	108	11.33083	3.622675	8.54	18.19

Source: own computation via stata version 11, data from Ministry of Finance and Economic Development (MoFED), NBE, annual reports of the concerned banks, world development indicator and CIA world factbook.

NPLs ratio was measured by Nonperforming loans divided by total loan ranges from 0.00 - 60.00 percent which indicated the disparity between the nonperforming loan ratio among the banks and in the examined period is relatively high. It has a mean of 13.61% and it has the highest standard deviation, 13.17. The average nonperforming loan ratio indicates that the banks in Ethiopia incurred 13.61% from its total loan. According to Ethiopian context, the banking sectors are required to maintain the ratio of NPLs at least below 5% (NBE, 2008). However, as indicated above in table 4.1, the nonperforming loan ratio average for the selected banks were more than the required threshold. Thus, NPLs problem was still serious for the selected banks of Ethiopia. The disparity between the nonperforming loan ratio among the banks and in the examined period is relatively high, ranging from 0.00 to 60.00

Regarding real GDP growth rate, that is measured by total GDP growth at Constant Market Prices of the year minus total GDP growth at Constant Market Prices of the previous year divided by total GDP at Constant Market Prices in the base year ranges from a minimum of -2.2% to a maximum of 13.6%. It has a mean of 9.11% with standard deviation 4.52. The country has shown the lowest GDP growth rate in 2012/13 but a year after the country registered the highest GDP growth rate.

As far as Annual average lending interest rate (LR) was concerned, lending interest rate is the bank rate that usually meets the financing needs of the private sector. This rate is normal differentiated according to the credit worthiness of borrowers and objectives of financing. The terms and conditions attached to these rates differ by country, however, limiting their capacity. Annual average nominal interest rate recorded its minimum of 10.50% and maximum of 12.25% with a mean value of 11.28% with the lowest standard deviation of 0.691 across the specified time period in the stated banks. The annual average nominal interest rate recorded the minimum deviation as compared with all the variables in the study.

On the other hand, Annual average exchange rate, ER recorded a minimum of 8.54% and maximum of 18.19% with a mean of value of 11.33%. The standard deviation of annual average exchange rate was 3.62 during these years the exchange rate of Birr/USD has dramatically increased. Finally, Annual average inflation rate, IFR ranges from minimum values of 1.7% to a maximum of 36.4% with annual average inflation rate of 15.38% and standard deviation of 10.90.

To sum up, NPLs had the highest deviation (13.17306) whereas annual interest rate had the lowest deviation (0.6907172) from its mean Value. Furthermore, average value of NPLs of the selected banks in Ethiopia are above the required threshold (<5%) showing a serious loss from loans.

4.2. Trend Analysis for Nonperforming Loans Form 2002-2013

This analysis was established to look the pattern for nonperforming loans (NPLs) for the selected banks operating in Ethiopia during the period under consideration, which is from 2002-2013 and across all the explanatory variables to be considered and to look the trend of each explanatory variables as compared with dependent variable. Accordingly, the following figure 4.2a provides a respective pictorial presentation for NPLs figure from 2002-2013. In the following figure 4.2a; x-axis represents the years whereas y-axis represents the level of NPLs of the 9(nine) selected banks in Ethiopia.

As it can be seen from the below fig 4.2a, generally, the trends of nonperforming loans of the selected banks in Ethiopia for the period from 2002 to 2013 were decreasing accept certain fluctuation in some banks, for instance Awash international bank has shown the highest NPLs in 2013. This significant decline of NPLs might imply the existence of robust macroeconomic factors, improvement in the levels of loan quality, being escaping of banks from providing loan, increase debt servicing habit of the borrowers, the increase in growth rate of the country or increasing the total loan granted. Even if, there is a decreasing trend in the level of NPLs ratio from 2002-2013, descriptive result shows that NPLs problem is still above the industry average for banks in Ethiopia. Thus, this result suggests the downward sloping trend of NPLs.

The trend of the dependent variable and the independent variables as indicated in the figure in appendix 1 more or less show similar trend that was, as the value in the independent variables increase/or decrease the trend of the dependent variable decrease/or increase. These indicated that the coefficients of the dependent variables were all negative.

To sum up, as shown in appendix 1A-D, in general, like other economies, there is a negative relationship between GDP and NPL. The explanation provided by the literature for this relationship is that strong positive growth in real GDP usually translates into more income, which improves the debt servicing capacity of borrower, which in turn contributes to lower non-performing loans. Increase in inflation rate and lending rate might have negative effect on the

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economy such as a decline in business production, as well as borrowers' capability to service debts. The increase exchange rate slightly and negatively affects nonperforming loan of the selected banks of Ethiopia, since it is affected by inflation rate and it affects the borrowers differently. That is, borrowers borrowing in local currency (Birr) are negatively affected but those borrowing in foreign currency (dollar) are positively affected, for this the borrowers will be almost always exposed to the foreign exchange rate of USD/BIRR and would lead to a higher NPLs ratio. In Ethiopian context almost all borrowers were local currency borrowers.

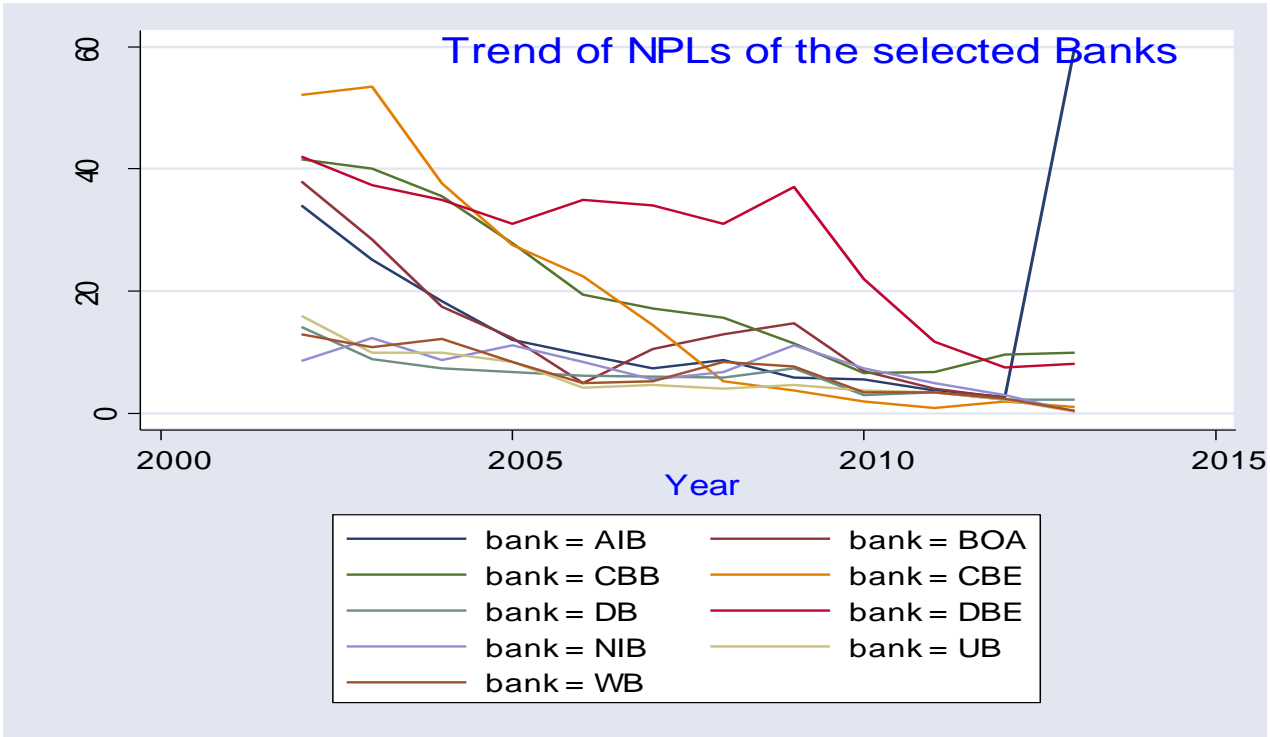**Fig 4.2a Moving Trend analysis of NPLs of each selected Bank**

Fig 4.2b Moving Trend analysis of Average NPLs of the selected Banks
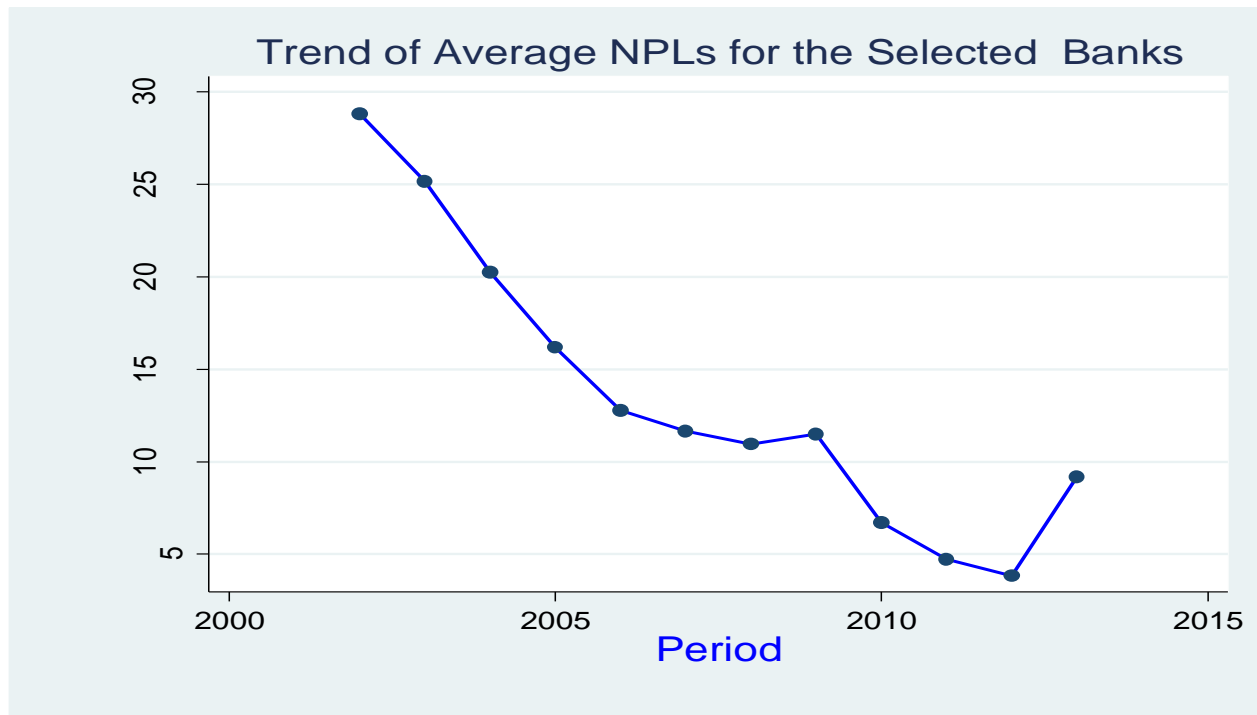
Source: Own computation via Stata version 11

4.3. Diagnosis Tests

In the descriptive statistics part, the study shows the mean, standard deviation, minimum and maximum values of the dependent and explanatory variables including the number of observation for each variable during the period under consideration, that is from 2002-2013. However, this section provide diagnosis test such as normality, heteroscedasticity, autocorrelation and multicolinearity tests.

The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Thus, in order to maintain the validity and robustness of the regression result of the research in CLRM, it is better to satisfy basic assumption CLRM. As noted by Brooks (2008), when these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there would be

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data that left out of the model. Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, normality, multicolinearity, autocorrelation and heteroscedasticity tests were made for identifying misspecification of data if any so as to fulfill research quality.

One assumption of classical linear regression model (CLRM) is the normal distribution of the residual part of the model. As noted by Gujarati (2004), OLS estimators are BLUE regardless of whether the u_i are normally distributed or not. If the disturbances (ui) are independently and identically distributed with zero mean and constant variance and if the explanatory variables are constant in repeated samples, the OLS coefficient estimators are asymptotically normally distributed with means equal to the corresponding β's.

However, as per the central limit theorem, if the disturbances are not normally distributed, the OLS estimators are still normally distributed approximately if there are large-sample data. Thus, since the sample size for this study is large enough, it is approximately considered as normally distributed. This implies that residuals were asymptotically normal in this study.

Furthermore, in the classical linear regression model, one of the basic assumptions is Homoskedasticity assumption that states as the probability distribution of the disturbance term remains same for all observations. That is, Heteroscedasticity is useful to examine whether the error terms have a constant variance, the variance of each u_i is the same for all values of the explanatory variable. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity (Bedru and Seid, 2005).

Accordingly, in order to detect the heteroscedasticity problems, whites' general test was utilized in this study. This test states that if the p-value is significant(less than 5%) at 95% confidence interval, the data has heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem. Thus, as shown in appendix 2A, there was no heteroscedasticity problem for this study since the p value is 36.68%, which shows

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insignificant value.

In addition to the above diagnosis tests, the researcher tested the autocorrelation assumptions that imply zero covariance of error terms over time. That means errors associated with one observation are uncorrelated with the errors of any other observation. Serial correlation tests apply to macro panels with long time series. Not a problem in micro panels (with very few years).The test used by the researcher for detecting serial correlation in this panel data was Cameron & Trivedi's decomposition of IM-test. Accordingly, the null is that there is not serial correlation and the alternative hypothesis is serial correlation in idiosyncratic errors Thus, as shown in appendix 2A the computed p-value was 0.1907 in this study which was insignificant at 5% level of significance implying the absence of serial correlation problem. Thus, this implied that error terms were not correlated with one another for different observation in this study.

Finally, the researcher tested multicolinearity. The term Multicolinearity indicates the existence of exact linear association among some or all explanatory variables in the regression model. When independent variables are multi collinear, there is overlapping or sharing of predictive power. Thus, if multicolinearity is perfect, the regression coefficients of the independent variables are undetermined and their standard errors are immeasurable (Gujarati, 2004). The multicolinearity makes significant variables insignificant by increasing p-value since increased p-value lowers the t-statistics value. Thus, the panel regression results with multicolinearity will show significant variables as insignificant variables.

The multicolinearity problem is solved by dropping highly correlated variables (Ahmad and Bashir, 2013).Then, the result provide more significant variables than before. This is due to the fact that when explanatory variables are highly correlated with one another, they share the same information. Thus, the multicolinearity problem reduces the individual explanatory variables' predictive power. That is none of the predictor variables may contribute uniquely and significantly to the prediction model after the other independent variables is included (Theodros, 2011).

In case, Pearson correlation matrix and Variance inflation factor (VIF) were used for testing multicolinearity in this study. Pearson correlation matrix is a technique used for testing multicolinearity of explanatory variables by investigating their relationship and also useful to measure the propensity of how much the independent variables influence the dependent variable (Wooldridge, 2005)

As noted by (Gujarati, 2004), the correlation analysis is made to describe the strength of relationship or degree of linear association between two or more variables. In Pearson correlation matrix, the values of the correlation coefficient range between -1 and +1. A correlation coefficient of +1 indicates that the two variables have perfect positive relation; while a correlation coefficient of -1 indicates as two or more variables have perfect negative relation. A correlation coefficient of 0, on the other hand indicates that there is no linear relationship between two variables (Bedru and Seid, 2005).Besides, as noted by (Brooks, 2008), zero correlation among explanatory variables is not occurring in any practical work. Thus, even if there is some indication for the existence of zero correlation among the explanatory variables, it does not have a great effect on the accuracy.

Accordingly, Pearson correlation matrix is applied to examine the association between NPLs ratio, gross domestic product, average inflation rate, average lending interest rate, and annual average exchange rates, where nonperforming loans ratio are considered as dependent variable and growth rate in gross domestic product, average inflation rate, average lending interest rate, and annual average exchange rate, are explanatory variables used in this study.

However, multicolinearity between explanatory variables may result wrong sign in the estimated coefficients and bias the standard errors of coefficients (Theodros, 2011). To overcome this problem, VIF (Variance Inflation Factor) test which quantifies the severity of multicollinearity was conducted. It provides an index that measures how much the variance (the square of the estimate's standard deviation) of an estimated regression coefficient is increased due to collinearity. That means, the larger the value of VIF indicates the more collinearity of the variables with each other.

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According to the rule of thumb, if VIF of a variable exceeds 10, the variable is said to be highly collinear (Bedru and Seid, 2005) and accordingly a VIF greater than 10 would be a cause of concern. If the VIF value lies in the range of 1-10 (VIF <1 or > 10), it may be concluded that there is no multicollinearity. If the VIF <1 or > 10, then it can be concluded that multicollinearity exists.

Thus, as it can be seen from appendix 2B, the result of Pearson correlation matrix indicates that NPLs has negative correlation with gross domestic product, average inflation rate, average lending interest rate and annual average exchange rate that is, with all the independent variables. Besides, the result of correlation analysis made in the appendix 2B clearly indicates that there is no significant multicolinearity problems among explanatory variables since each of them are not above 0.8 thresholds. As noted by in (Gujarati, 2004), a serious problem for Multicolinearity is occurred if the correlation is about 0.8 or larger.

Based on the result indicated in appendix 2C, there was no multicolinearity problem in this study. This is due to the fact that the mean of VIF of variables is 1.72 which is much lower than the threshold of 10.The VIF for each variable also very low. The table shows VIF values of 1.07, 1.24, 2.45 and 2.10 for GDP, IFR, LR and ER, respectively, meaning that the VIF values obtained are between 1 and 10. therefore, the researcher concluded that there were no multicollinearity symptoms. This indicated that the explanatory variables included in the model were not correlated with each other.

To sum up, beside the descriptive statistics, correlation analysis was made for explanatory variable to detect the multicolinearity problem in the regression model. In case, there was no multicolinearity problem between variables. Thus, the explanatory variables were the basic determinants of NPLs of the selected banks in Ethiopia. This of course, enhanced the reliability of regression analysis. However, to reach such conclusion, this has to be supported by regression result after the appropriate model is applied as discussed in the upcoming sections.

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4.4. Model Selection

4.4.1. Random Effect versus Fixed Effect Models

The panel data regression model used to examine the effect of gross domestic product, average inflation rate, average lending interest rate and annual average exchange rate on nonperforming loans of the banks in Ethiopia is either fixed-effects or random-effect model. The appropriate test used to decide whether fixed effect or random effect model is appropriate was Hausman Specification Test. Thus, Hausman Specification Test identifies whether fixed-effects or random-effect model was most appropriate under the null hypothesis that unobservable individual effects (ui) are uncorrelated with one or more of explanatory variables (X_i). As noted by (Gujarati, 2004), fixed effect model is most appropriate when null hypothesis is rejected whereas random effect is appropriate when null hypothesis is not rejected.

For Hausman test, the null and alternative hypotheses are as follows:

- H_o: ui is not correlated with X_i (random- effects model appropriate)
- H_1: ui is correlated with X_i (fixed-effects model appropriate)

Thus, to test the null hypothesis, it requires comparing the estimates from the random-effects and the fixed-effects estimator. Random-effect estimator is consistent under the null hypothesis, but inconsistent under the alternative hypothesis whereas fixed-effect estimator is consistent under both the null and alternative hypothesis. If the estimates for the random-effects estimators are not significantly different from the estimates for the fixed-effects estimator, then the null hypothesis is accepted and concludes that ui is not correlated with X_i, and therefore the random-effect model is the appropriate model. If the estimates for the random effect estimator are significantly differ from the estimates for the fixed-effect estimator, the null is rejected and conclude that ui is correlated with X_i, and therefore the fixed-effect model is the appropriate model for the study.

Accordingly, appendix 2D demonstrates the Hausman Specification Test that was used to decide the best model for this study. The decision rule, for Hausman Specification test is accepting the null hypothesis when the p-value is insignificant. Thus, as shown in Appendix 2D, the Hausman specification test for this study has a p-value of 1.0000 for the regression models. This indicates that the p-value is insignificant and then the null hypothesis is accepted justifying as random effect model is appropriate for the given data set in this study.

4.2.2. Testing for random effects: Breusch-Pagan Lagrange multiplier (LM)

The LM test helps you decide between a random effects regression and a simple OLS regression. The null hypothesis in the LM test is that variances across entities are zero. This is no significant difference across units (i.e. no panel effect).

 Accordingly, appendix 2E demonstrates The LM test that was used to decide the appropriate model. Since the p-value is 0.0000 we accept the null and conclude that random effect is appropriate. This is an evidence of significant differences across banks; therefore you cannot run a simple OLS regression.

4.5. Econometric results on macroeconomic Determinants of NPLs.

This section presented the multiple regression result of random effect model that was made to examine the determinant of NPLs of the selected banks of Ethiopia. Accordingly, the regression result was made and coefficients of the variables were estimated. As stated earlier in model selection part, random effect regression model is an appropriate model used in this study. Thus, the model used to examine the determinants of NPLs of the selected banks in Ethiopia in this study was:

$$\text{NPL}_{it} = \alpha_0 + \alpha_1 \text{LR}_{it} + \alpha_2 \text{INF}_{it} + \alpha_3 \text{GDP}_{it} + \alpha_4 \text{ER}_{it} + u_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Accordingly, table 4.5.1 below presents the result of Random Effect regression model made to examine the effect of explanatory variables on NPLs. Hence, NPLs ratio is dependent variable whereas gross domestic product, inflation rate, lending interest rate and exchange rate are explanatory variables. Thus, the regression result in the following table 4.5.1 demonstrates both coefficients of explanatory variables and corresponding p-values as follows.

Table 4.5.1. Results of Random effect regression model

Random-effects GLS regression

Group variable: bankcode

R-sq: within = 0.3990

    between = 0.0002

    overall = 0.2764

Random effects u_i ~ Gaussian

corr(u_i, X)   = 0 (assumed)

Number of obs   =   107

Number of groups = 9

Obs per group: min = 11

    avg = 11.9

    max = 12

Wald chi2(4)   =   63.03

Prob > chi2   =   0.0000

Npl	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]	
GDP	-.9194557	.1988078	-4.62	0.000*	-1.309112	-.5297995
IFR	-.2123971	.0890954	-2.38	0.017**	-.3870209	-.0377733
LR	-1.090161	1.967971	-0.55	0.580***	-4.947313	2.76699
ER	-.9280152	.3526558	-2.63	0.009*	-1.619208	-.2368227
_cons	48.00081	19.10798	2.51	0.012	10.54986	85.45176

sigma_u	7.7727872
sigma_e	9.0257615
rho	.42582443 (fraction of variance due to u_i)

Source: own computations Via Stata 11

    Note: *significant at 1%, **significant at 5%, and ***insignificant

Thus, based on the above table 4.5.1, the following model was developed to examine the determinants of NPLs in this study.

$$NPL = 48.001 - 0.919GDP - 0.212IFR - 1.0902LR - 0.928ER + U_{it} + \varepsilon_{it}$$

As shown in the above table 4.5.1, coefficient of determination is 27.64% revealing that 27.64%

of variation in NPLs ratio is explained by the selected explanatory variables (gross domestic product, inflation rate, lending interest rate and exchange rate). Besides, Rho displays that 42.58% variation in NPLs is due to entity specific characteristics of the selected cross sectional entities i.e. the selected banks of Ethiopia and the rest due to idiosyncratic error. Furthermore, Since F- statistics is designed to jointly test the effect of explanatory variables on dependent variables; F-statistics of this model has a p-value of 0.0000 indicating rejecting of the null hypothesis. This implies that all selected explanatory variables can affect the level of NPLs in common.

Furthermore, the researcher examined the effect of macroeconomic determinants on the level of NPLs based on regression result of random Effect Model in the above table 4.5.1 in terms of examination of coefficients of explanatory variables and significance level.

The examination of coefficients for macroeconomic determinants; gross domestic product, inflation rate, lending interest rate and exchange rate had negative effect on NPLs having coefficients of -0.92, -0.21,-1.09 and -0.93 respectively. This indicated that a percentage change across time and between banks in gross domestic product can result a change on NPLs rate by 0.92 times in opposite direction, a percentage change across time and between banks in inflation rate can result a change on NPLs rate by 0.21 times in opposite direction, a percentage change across time and between banks in lending interest rate can result a change on NPLs rate for Ethiopian banks by 1.09 times in opposite direction but insignificant result indicates that lending interest rate is not an important determinant for Ethiopian banks that influence the level of nonperforming loan. Lastly a percentage change across time and between banks in exchange rate can result a change on NPLs rate by .93 times in opposite direction. The coefficient value may suggest that from all determinants of NPL (from the four explanatory variables mentioned in this study) the most important one is exchange rate and also NPLs rate highly influenced by exchange rate.

In terms of significance level (corresponding to p-value), all explanatory variables had p-values of less than the selected significance levels (5%) except for lending interest rate. As shown in the

above table 4.5.1, gross domestic product had strong and statistically significant (p-value = 0.000) impact on the level of NPLs even at 1%. Besides, inflation rate and exchange rate had statistically significant (p-value = 0.017and 0.009 respectively) effect on the level of NPLs at 5%. However, lending interest rate had no statistically significant effect on the level of NPLs with a p-value of 0.580 in the considered Ethiopian banks.

My findings have several implications in terms of policy and regulation. It can help identify the determinants of NPLs ratio and thus lead analysts, policymakers, investors and financial institutions to a better understanding of banking and credit market conditions as well as their effect on economic activity, and the national financial stability and soundness.

Based on previous studies and the finding of this study, this section discussed the general result obtained via random Effect regression Model as shown in the above table 4.5.1. Referring the literature, the result of each explanatory variable including their effect on the level of NPLs of the selected banks in Ethiopia was discussed. The result of the finding was discussed in relation to the previous empirical and theoretical evidences. Thus, taking into consideration that the basic aim of this study was to assess the determinants of NPLs of the selected banks in Ethiopia, the estimation results of Random Effect Model that presents the effect of explanatory variables on NPLs were discussed as follows:

Ethiopia has registered remarkable economic performance with annual growth averaging 10.9% over the past ten years. This is double the Sub Sahara Africa and triples the world average growths over this period and has led to Ethiopia being rated as one of the fastest growing economies in the world.

Huge public investments with focus on infrastructure and pro-poor sectors explain much of the economic performance from the expenditure side. Government investments have mainly been carried out from domestic resource mobilization and augmented by external resource inflows. Domestic savings has been growing significantly in the past few years from 12.8% of GDP in 2010/11 to 17.7% of GDP in 2012/13. The newly introduced savings instruments (bonds) and

expansion in financial services through the aggressive opening of banking branch networks have contributed to the surge in the domestic savings.

From the production side, looking at the Major sectoral classifications the growth remained robust and broad based as all sectors registered positive and significant growth. The growth in the industry sector was very strong in the past three years. This sector was the highest performer in 2012/13 by registering 18.5% annual growth rate, which was buoyed by the construction boom and expansion in mining and manufacturing sub-sectors. Agriculture grew by 7.1%, recovering from 4.9% growth in the previous year mainly attributed to increased crop production as a result of Increases in productivity and expansion of area under cultivation.

The main reasons for the increase in the agricultural productivity and production were favorable weather and good rainfall, strengthened agricultural extension services, better access to agricultural inputs, improved access to market and pursue of enhanced policy and advocacy.
In 2012/13 the service sector registered 9.9% annual growth and stood out in terms of its contribution to the overall output.

Structurally, the service sector has slowly taken over the lead from agriculture in terms of its contribution to the gross national product. In 2012/13 the respective shares of agriculture, industry and service sectors in the GDP stood at 43%, 12% and 45%. The share of the service sector to GDP increased from 38% to 45% in the past 10 years while the share of agricultural declined from 52%t to 43% in the same period. Meanwhile, the industry sector has maintained modest increments over the years in terms of value added (UNDP, 2014).

The results of trend analysis shown that nonperforming loan and growth rate in growth domestic product moving trend line in opposite direction indicated that as GDP increased the income of borrowers increased leading to increased debt servicing and hence reduce in NPLs ratio.

The coefficient sign of real GDP growth rate show that, economic growth has a negative effect

on the growth of NPL. Unexpectedly the current econometric analysis suggest that real GDP growth is the main driver of nonperforming loan ratio in Ethiopia banking industry. The result also suggests that GDP growth rate is the most important determinant factor for Ethiopian banks NPL. (i.e. there is negative and significant relationship between GDP and banks nonperforming loan). Parallel to the current coefficient sign of GDP, (Quagliarello, 2007) found that business cycle affects the NPL ratio for a large panel of Italian banks over the period 1985 to 2002. Furthermore, Salas and (Saurina, 2002) estimated a significant negative contemporaneous effect of GDP growth on the NPL ratio and inferred the quick transmission of macroeconomic developments on the ability of economic agents to service their loans.

Accordingly, the results of random effect model in the above table 4.5.1 indicate that there is a negative and statistically significant effect of GDP on the level of NPls. The result shows strong effect of increase in constant market prices measured in terms of GDP on NPLs with a coefficient of -0.92 and a p-value of 0.000 showing strongly significant at 1% and 5% significance level. This implies that for a percentage change in GDP across time and between banks, keeping other things constant had resulted 0. 92 times change on the level of NPLs in Ethiopian banks in opposite direction. This result confirms the finding of (Irum Saba, Rehana Kouser and Muhammad Azeem, 2012) where aggregate country data was used.

The central bank's policy on interest rate is that it sets the minimum (floor) bank deposit rate, currently at 5 %, but the banks are free to pay above the minimum and to set their own lending rates. While the minimum bank saving rate was controlled at 5 %, average saving rate was 5.4 % and lending rate at 12 % in 2012/13. Real saving rates remained negative as the inflation rate is still higher than the nominal interest rate. The relatively insensitive nature of savers to interest rate, due to the absence of alternative financial instruments, has allowed the banks to hover around the minimum deposit rate (UNDP, 2014).

The result of Random Effect Model in the above table 4.5.1 indicates statistically insignificant negative effect of lending rate on NPLs in Ethiopia banks. This negative sign indicates an inverse relationship between lending rate and NPLs. It implies that for a percentage change in the banks'

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lending rate, keeping other things constant had resulted 1.09 times change on the levels of NPLs in Ethiopian banks in opposite direction.

The finding of this study confirms the finding of (Joseph, 2011; Saba et al., 2012; Ahmad and Bashir, 2013; and Hyun and Zhang, 2012) that argues negative effect of lending rate on the NPLs of banks. Thus, according to the selected banks in Ethiopia, change in lending rate had no direct effect on NPLs since it was not significant in this model.

The main reason for this negative association between lending rate and NPLs for the selected banks in Ethiopia was: First, higher lending rate curtail ability to borrow, which decreases the amount of loan and then reduce NPLs. In case, higher lending rate enable individuals with funds to start saving with the banks to earn on their funds but investors with the profitable projects feel unwilling to borrow and invest. Rather, ability to repay debt depends on other factors like borrowers' source of income. That is due to mismatch between the time they got return from their investment and the time they repay their debts. In case, when lending rate increases at the time they got return on their investment, the borrowers' ability to repay their debt increase resulting reduction in NPLs.

The choice of interest rate as the primary determinants of NPLs may also be justified from the theoretical literature of life-cycle consumption models. (Lawrence, 1995) examines such a model and introduces explicitly the probability of default. The model implies that borrowers with low incomes have higher rates of default. This is explained by their increased risk of facing unemployment and being unable to pay. Additionally, in equilibrium, banks charge higher interest rates to riskier clients. (Rinaldi and Sanchis-Arellano, 2006) extend Lawrence's model by including the possibility that agents can also borrow in order to invest in real or financial assets. After solving the optimization problem of an agent, they derive the probability of default which depends on lending rate and other macroeconomic variable. The interest rate affects the difficulty in servicing debt, in the case of floating rate loans.

The current result indicated that lending interest rate has a negative coefficient and it is statistically insignificant at 5% significant level (0.580). The coefficient value of the variable (i.e. -1.09) indicated a percentage rise/decline in banks lending interest rate, resulted in 1.09 times decline/rise in the NPL of banks in Ethiopia. The coefficient value of lending interest rate (-1.090161) may suggest that from all determinants of NPL (from the four explanatory variables mentioned in this study), keeping the other things constant had resulted the largest 1.09 times change on the level of NPLs in Ethiopian banks in opposite direction. Therefore, even if the finding was insignificant (0.5800) the result disclosed that lending interest rate has negative relationship with nonperforming loan. So, lending interest rate was not important determinants of NPL in the selected banks of Ethiopia in the researcher's study.

Historically Ethiopia has been one of the low inflation economies with average inflation rate of less than 5 %. Since 2006 however Ethiopia has no longer been considered a low inflation country and in July 2008 an all-time high inflation rate of 64 % was recorded. The major causes were the then high fuel and food prices shocks, weaker foreign exchange earnings, and rising demand for imports that depleted international reserves of the country. The highest price increase was observed in food, housing, fuel and transport services, making the urban poor the most vulnerable to the impacts of inflation. Owing to strong policy measures and abated world price shocks inflation tumbled down to single digit in 2010 and 2011.Inflation re-emerged in 2012 and reached a peak of about 40 % in September 2012. Looking at the components, the food and nonalcoholic beverages category has been the main drivers of overall price movements. Both internal and external factors contributed to the hike again in inflation. Well-coordinated monetary and fiscal policy stance coupled with slowdown in the world commodity prices have resulted in significant decline in inflation (UNDP, 2014).

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

Though the magnitude of the coefficient of correlation between inflation and nonperforming loans is low, the sign is negative (-0.2123971); unexpected rise in inflation under cyclical downturns is likely to negatively affect the performance of the banking sector and recovery of loans to private operators and investors. In the extreme case, hyper-inflation may erode banks assets and equity and weaken banks position through the interest rate channel.

The National Bank of Ethiopia (central bank), follows a managed floating exchange rate regime where the local currency Birr is pegged to the US Dollar. Accordingly, drastic movements in the nominal exchange rate are not expected. The Birr continued to depreciate but at a very slow rate and it reached 18.19/US$ at the end of 2012/13. This gradual depreciation is in line with the goal to enhance competitiveness of Ethiopian exports and attract FDI (UNDP, 2014).

The results of random effect model in the above table 4.5.1 indicate that there is a negative and statistically significant effect of exchange rate on the level of NPls. The result shows the effect of increase exchange rate on NPLs with a coefficient of -0.93 and a p-value of 0.009 which is significant at 1% and 5% significance level. This implies that for a percentage change across time and between banks in exchange rate, keeping the other things constant had resulted 0. 93 times change on the level of NPLs in Ethiopian banks in opposite direction.

CHAPTER FIVE

CONCLUSION and RECOMMENDATION

Summary; the previous chapter presented descriptive analysis, examined the trends of NPLs and econometrics analysis executed for the selected banks in Ethiopia. Besides, the results of findings and discussion were also made as well.

This chapter discussed the conclusion and possible recommendation for the results and discussion of documentary analysis regarding the determinant factors of nonperforming loans of the selected banks in Ethiopia. In case, trends of NPLs of the selected banks, descriptive statistics, diagnosis tests for classical linear regression model assumptions and econometric results on determinants of NPLs was presented.

Regarding the trend analysis of NPLs, the selected banks in Ethiopia had downward sloping of NPLs for the period under consideration that is, from the period 2002-2013. The trend line between NPLs and each explanatory variable also have shown opposite movement. From descriptive statistics, the average levels of NPLs of the selected banks in Ethiopia are still above the threshold. i.e more than 5 %.

Besides, normality, heteroscedasticity, multicolinearity and autocorrelation problem was checked. Eventually, the result has shown that growth rate in gross domestic product, average inflation rate and annual average exchange rate were statistically significant factors that determine the NPLs of the selected banks in Ethiopia. Whereas the result revealed that annual average lending rate was statistically insignificant factor that determine the NPLs of the selected banks in Ethiopia.

The first section of this chapter is the conclusion part that presented a brief conclusive idea for the finding of the study, The second section revealed the recommendation for the finding whereas section three highlights the research limitation and direction for further studies.

5.1. Conclusion

Worldwide evidence shows that the determinants of loans that do not perform well divided into three main groups: macroeconomic factors, bank-specific factors and socio-economic factors. This paper analyses the relationship between the NPLs ratio and some selected macroeconomic variables.

The main objective of this study was to assess the macroeconomic determinants of nonperforming loans (NPLs) of some selected banks in Ethiopia based on static panel data analysis on the time period from 2002 to 2013. The data was analyzed by using random Effect Model. For the purpose of analysis, Stata version 11 was used. The finding of the trend analysis of NPLs shows a downward sloping of NPLs of the selected banks in Ethiopia over the time of study. The study found out that the macroeconomic variables; growth rate of gross domestic product, average annual inflation rate and average annual exchange rate had statistically significant effect on the level of NPLs. However, the results of random effect regression model revealed that the insignificant effect of average annual lending rate on the level of NPLs of the selected banks in Ethiopia for the period under consideration. In addition to this the dependent variable, nonperforming loan ratio were inversely related with all the dependent variables under this study.

5.2. Recommendation

Based on the findings of the descriptive and regression analysis and conclusion, the following recommendations were forwarded.

- From the finding the study recommends that there is a need for the policy makers and bank regulators to enhance economic growth in the country by exerting maximum of their effort collectively as it was found that increase in Gross domestic Product would lead to decrease in Non-performing loans among the selected banks in Ethiopia .

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

- Banks should give due attention to the macroeconomic determinants, since these have significant effect on their loan collection and thereby on their nonperforming loan.

- The study suggests that a further study can be done on the macroeconomic determinants of non-performing assets on the financial performance of other financial institutions like the micro finance institutions.

5.3. Research limitations and future research directions

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

Accordingly, the study employed only a secondary data and used static panel data model and limited to the sample of only nine banks. Even if there are so many bank specific, socio economic and macroeconomic variables the researcher only tried to see four macroeconomic variables (GDP, interest rate, exchange rate and inflation). Hence, there are other variables that might influence the NPLs and needed to be studied.

Accordingly, this study examined macroeconomic determinants of nonperforming loans of senior banks in Ethiopia using selected macroeconomic variables. However, there are so many variables that were not included in this study. Thus, future researchers may be interested in validating the consistency of the result and provide supplementary results for this study by including other variables like bank specific variables, size, ownership, unemployment rate, socio economic factors and the like on the same banks. Furthermore, the same study may be required on newly emerging banks and other financial institutions.

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

APPENDICES

Appendix 1: The trend analysis of the dependent variable against the dependent variables

Appendix 1A: the trend analysis of Nonperforming loan and growth in GDP

Graphs by bank code
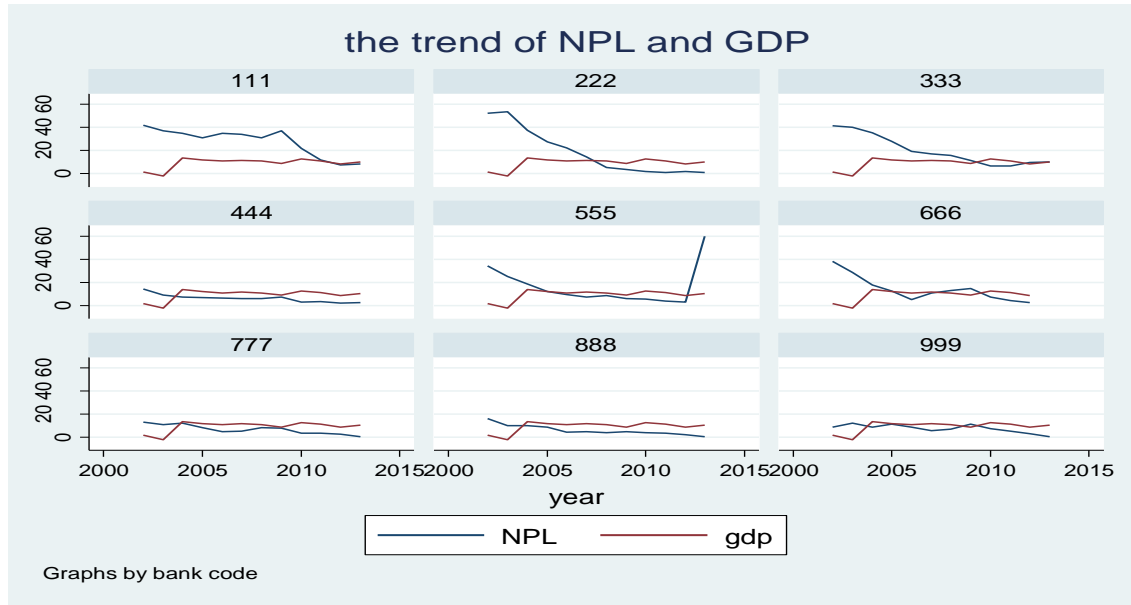
Appendix 1B: the trend analysis of Nonperforming loan and Inflation rate

Graphs by bank code
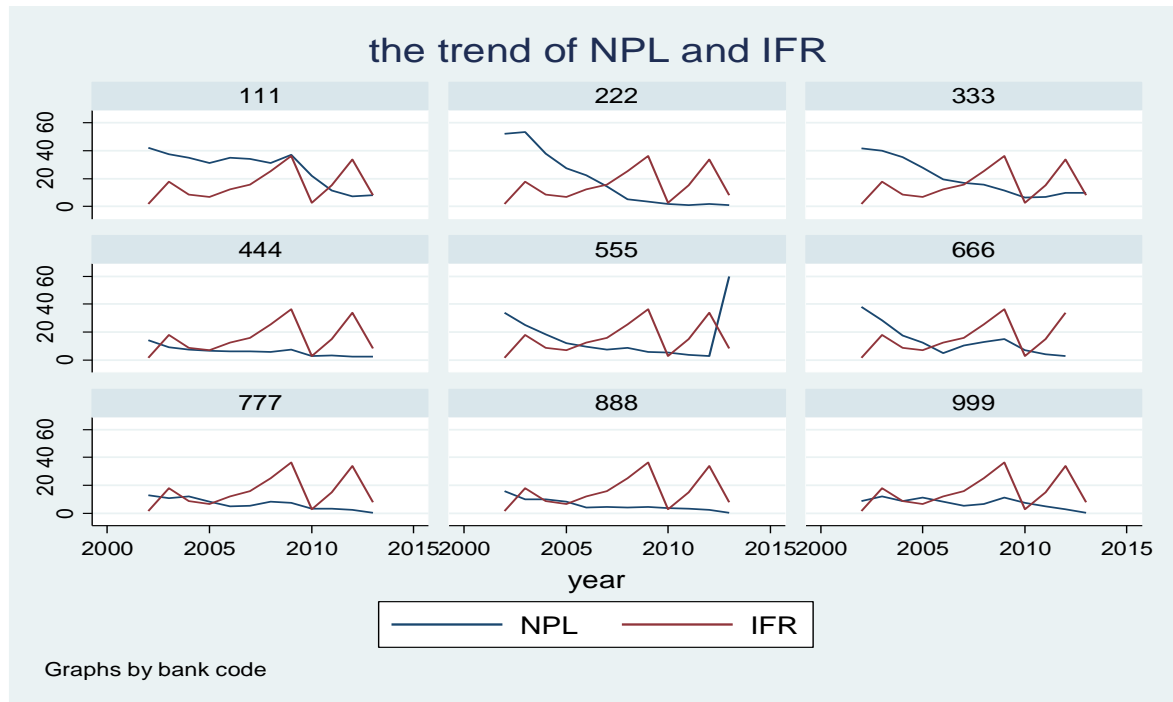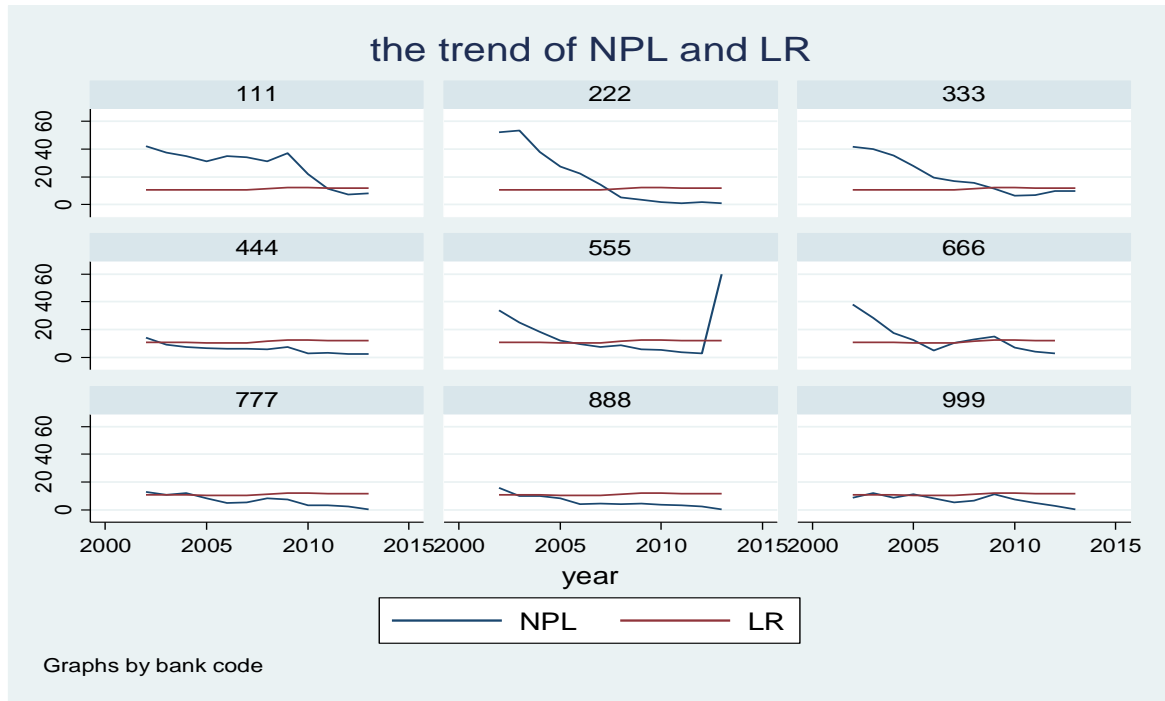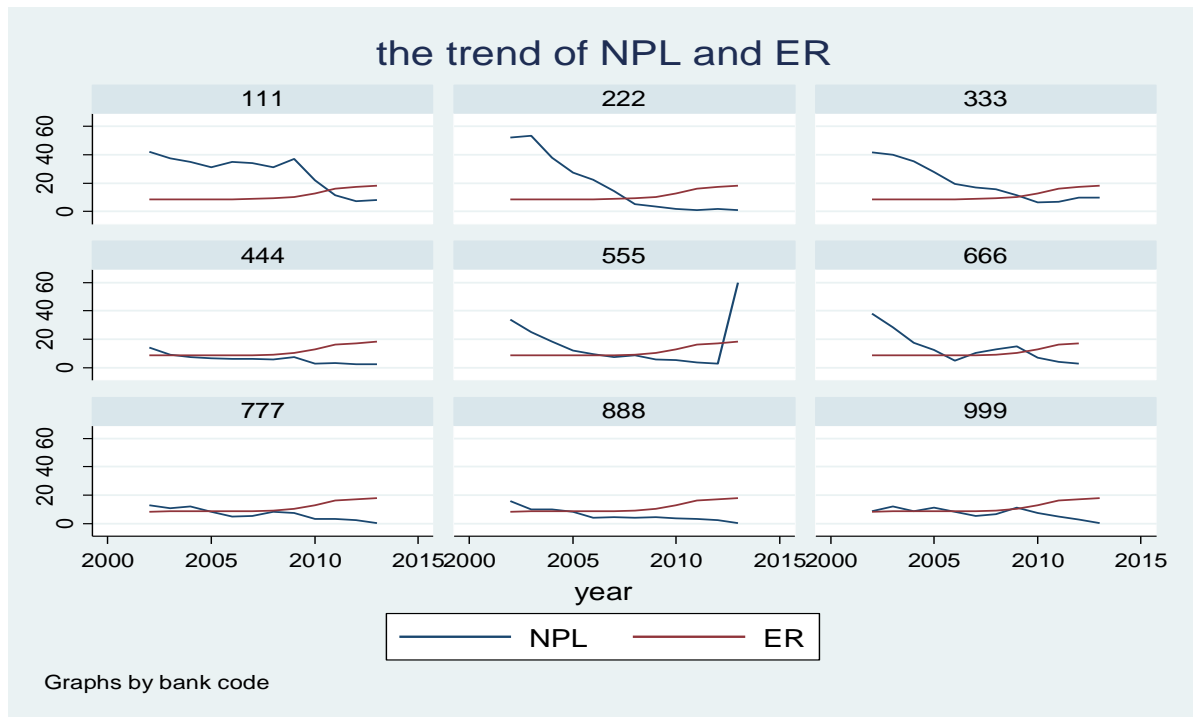
Appendix 1C: the trend analysis of Nonperforming loan and lending interest rate

Appendix 1D: the trend analysis of Nonperforming loan and lending exchange rate

Source: own computation via stata 11

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Where:

- Bank code 111 represents development bank of Ethiopia
- Bank code 222 represents commercial bank of Ethiopia
- Bank code 333 represents Construction and Business Bank
- Bank code 444 represents Dashen Bank
- Bank code 555 represents Awash International Bank
- Bank code 666 represents Bank of Abyssinia
- Bank code 777 represents Wegagen Bank
- Bank code 888 represents Nib International Bank
- Bank code 777 represents United Bank

Appendix 2: Model Selection and Basic Tests for CLRM Assumptions

Appendix.2A:- Heteroscedasticity and autocorrelations Test

. imtest, white

White's test for Ho: homoskedasticity

against Ha: unrestricted heteroskedasticity

chi2(11)   =   11.96

Prob > chi2 =   0.3668

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	P
Heteroskedasticity	11.96	11	0.3668
Skewness	7.50	4	0.1116
Kurtosis	1.23	1	0.2672
Total	20.69	16	0.1907

Source: own computation via Stata 11

Appendix.2B:- Pearson Correlation Matrix

	NPL	GDP	IFR	LR	ER
NPL	1.0000				
GDP	-0.3698	1.0000			
IFR	-0.2276	-0.0553	1.0000		
LR	-0.3704	0.2003	0.4000	1.0000	
ER	-0.3889	0.2030	0.1821	0.7116	1.0000

Source: own computation via Stata 11

Appendix.2C:- summary of VIF

Variable	VIF	1/VIF(Tolerance)
GDP	1.07	0.933712
IFR	1.24	0.804594
LR	2.45	0.408415
ER	2.10	0.475475
Mean VIF	1.72	

Source: own computation via Stata 11

Appendix 2D Hausman Specification test

```
. xtreg npl gdp ifr lr er,fe

Fixed-effects (within) regression              Number of obs      =        107
Group variable: bankcode                       Number of groups   =          9

R-sq:  within  = 0.3990                         Obs per group: min =         11
       between = 0.0002                                        avg =       11.9
       overall = 0.2764                                        max =         12

                                                F(4,94)            =      15.60
corr(u_i, Xb)  = -0.0003                         Prob > F           =     0.0000
```

npl	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
gdp	-.9194453	.1997819	-4.60	0.000	-1.316117 -.5227737
ifr	-.2123765	.0895345	-2.37	0.020	-.3901492 -.0346037
lr	-1.089994	1.977618	-0.55	0.583	-5.016601 2.836613
er	-.9281821	.3544264	-2.62	0.010	-1.631904 -.2244601
_cons	48.00234	19.02591	2.52	0.013	10.22594 85.77873

sigma_u	7.6728088	
sigma_e	9.0257615	
rho	.41950634	(fraction of variance due to u_i)

```
F test that all u_i=0:      F(8, 94) =      8.67                 Prob > F = 0.0000

. xtreg npl gdp ifr lr er, re

Random-effects GLS regression                  Number of obs      =        107
Group variable: bankcode                       Number of groups   =          9

R-sq:  within  = 0.3990                         Obs per group: min =         11
       between = 0.0002                                        avg =       11.9
       overall = 0.2764                                        max =         12

Random effects u_i ~ Gaussian                   Wald chi2(4)       =      63.03
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =     0.0000
```

npl	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
gdp	-.9194557	.1988078	-4.62	0.000	-1.309112 -.5297995
ifr	-.2123971	.0890954	-2.38	0.017	-.3870209 -.0377733
lr	-1.090161	1.967971	-0.55	0.580	-4.947313 2.76699
er	-.9280152	.3526558	-2.63	0.009	-1.619208 -.2368227
_cons	48.00081	19.10798	2.51	0.012	10.54986 85.45176

sigma_u	7.7727872	
sigma_e	9.0257615	
rho	.42582443	(fraction of variance due to u_i)

```
. quietly xtreg npl gdp ifr lr er,fe

. estimates store fixed

. quietly xtreg npl gdp ifr lr er,re

. estimates store random

. hausman fixed random
```

	—— Coefficients ——			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
gdp	-.9194453	-.9194557	.0000103	.0197045
ifr	-.2123765	-.2123971	.0000207	.0088559
lr	-1.089994	-1.090161	.0001674	.1951019
er	-.9281821	-.9280152	-.0001669	.0353837

```
                   b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

           chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =        0.00
           Prob>chi2 =      1.0000
```

Appendix 2E Breusch and Pagan Lagrangian multiplier test for random effects

Breusch and Pagan Lagrangian multiplier test for random effects

npl[bankcode,t] = Xb + u[bankcode] + e[bankcode,t]

Estimated results:

	Var	sd = sqrt(Var)
npl |	173.5295	13.17306
e |	81.46437	9.025761
u |	60.41622	7.772787

Test: Var(u) = 0

$$chi2(1) = 82.35$$

$$Prob > chi2 = 0.0000$$

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