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Determinants of Non-Performing Loans: In The Case of Development Bank of Ethiopia.

**Addis Ababa University
College of Business and Economics
Department of Management**

A Research submitted in Partial Fulfillment of the Requirements for the Award of
the Degree of Masters in Business Administration

By

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September, 2020

Addis Ababa, Ethiopia

DECLARATION

I hereby declare that this work entitled “Determinants of non-performing loans in the case of Development Bank of Ethiopia.” is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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This Research project has been submitted for examination with my approval as a University advisor.

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This is to certify that the research project prepared by Daniel Muluneh titled: “**Determinants of Non-Performing loans in the case of Development Bank of Ethiopia**” and submitted in partial fulfillment of the requirements for the degree of Master of Business Administration in Management complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Approval of Board of Examiners

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Abstract

Banks are very important institutions in the financial system of any country and play a fundamental role in the global economy. This study intends to investigate determinants of nonperforming loans in Development Bank of Ethiopia. The study was used secondary data. To analyze the determinants of NPL the study was used Auto-regressive distributed lags (ARDL) and Error correction model (ECM) were applied. Return on asset, bank size, interest rate, GDP growth, inflation rate, Credit to private sector and loan to deposit ratio were the independent variables. According to the result from the total of seven macroeconomic and bank specific independent variables lagged value of NPL, return on asset, GDP, bank size and interest rate were found to negative and statistically significant effect on NPLs of Development Bank of Ethiopia while loan to deposit ratio, inflation rate and credit to private sector were found to be statistically insignificant effect on NPLs of DBE. In the short run from all independent variables bank size, GDP and return on asset were found statistically significant effect. The ECM coefficient reveals that short run deviation from equilibrium is adjusted towards long run equilibrium by the speed of 24.71 percent. Development Bank of Ethiopia management organs should increase return on asset to improve the loan performance in the organization.

Key words: Non-Performing loans, Development Bank of Ethiopia, ARDL

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List of Acronyms

CSA	Central Statistics Agency
DBE	Development Bank of Ethiopia
GDP	Gross Domestic Product
IMF	International Monetary Fund
NBE	National Bank of Ethiopia
NPL	Non-Performing Loan
ARDL	Auto regressive distrusted lag model
SMEs	Small and Medium Scale Enterprises
WB	World Bank

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Banks are very important institutions in the financial system of any country and play a fundamental role in the global economy (Richard, 2011). It generally functions as financial intermediaries between those who want to save money and those who need funds. Lending is the primary activity of banks in generating profits which are derived from the difference between lending interest rate and deposit interest rate. The financial strength of any bank depends upon the performance of its own assets. The degradation in the assets quality results in accretion of nonperforming assets (Biswajit and Puja, 2016). The intermediation role of banks is vital for the development of any countries (Adeola, 2016).

Banks pool funds together and make them available for investment with issuing loans, thereby providing liquidity. Small business borrowers find bank lending important due to their small sizes and capacities. Enhanced bank customer relationship helps small business to access funding because the bank has got special knowledge about the firm. In difficult time, for example, economic recession, firms with strong relationship with a bank stand a better chance to obtain financing to endure the recession. Banks administer payment systems which are core to an economy. Through payment system, banks execute customer's payment instruction by transferring fund between their accounts. Banks are the transmission belt for monetary police (Richard, 2011).

The concept of development financing has evolved to become industrial expansion in countries more than a hundred years ago in the long time. It was mainly source of capital formation as a long term financing institution, investment in productive sector the precondition for achieving the economic growth from a country perspective (Chandra and Abdul, 2005). They promote national development agenda in general in the form of long term loans (between 10 and 25 years). Development Banks would simply follow the policy of the government and extend their credit to projects in areas prioritized by the government (Asrat, 2013).

In Ethiopian case, the Development Bank of Ethiopia (DBE) is distinguished feature as its viable “project” based lending tradition, one of the financial institutions engaged in providing short, medium and long-term development credits. The Bank not only active on project lending in also development of institution(entrepreneurs) are carefully selected and prepared through appraised, closely supervised and systematically evaluated.

However, the greatest risk of banks also comes from the lending itself,banks are faced with default by loan borrowers that result in non-performing loans (NPLs hereafter) a hindrance to the efficiency of bank activities. It is widely accepted that the quantity or percentage of non-performing loans (NPLs) is often associated with bank failures and financial crises in both developing and developed countries. In the recent year the non-performing loan (NPL) becomes a major concerning issue in banking industry of Ethiopia specifically in Development bank of Ethiopia. Therefore, this study was tried to analyze the bank specific and macroeconomic variable determinants of non-performing loan in DBE.

The issue related to the relationship between the non-performing loans (NPLs) and bank-specific and macroeconomic conditions has drawn great deal of attention in the recent decades, because of results that the NPLs have on both banking system and the economy

1.1.1 Establishment and Background of the Organization

In Ethiopia there are 16 private banks and 3 government banks providing loan to investors as per National Bank of Ethiopia as of December 2019. The development bank of Ethiopia (DBE) is one of the financial institutions in Ethiopia engaged in providing short, medium and long term developmental credits. The Development Bank of Ethiopia is a state owned development finance institution, established in 1909 and currently the key mandate of the Bank is the provision of development credit to viable priority area projects along with technical support and advice by mobilizing resources from domestic and foreign sources. DBE continued to extensively provide financial and technical support to government priority economic sectors which are commercial agriculture, agro-processing, manufacturing and extractive industries.

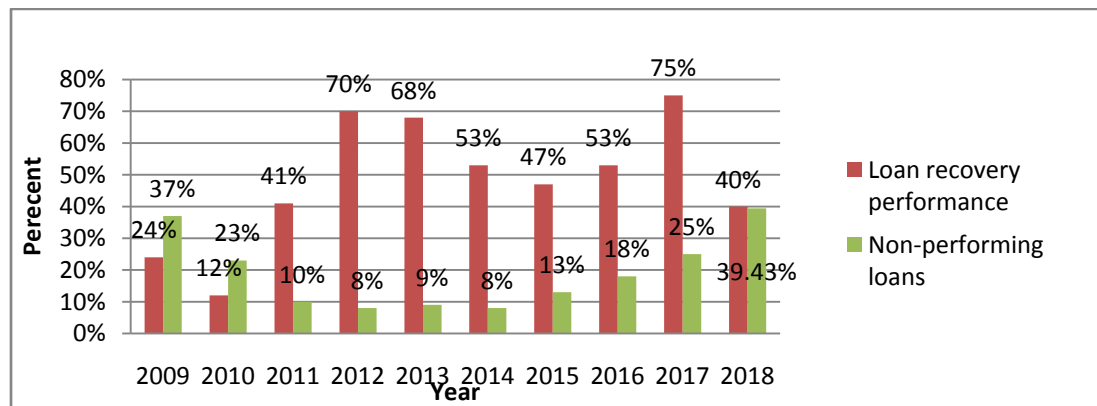
Since its establishment in 1909, the bank has been playing a significant role in promoting overall economic development of the country and its history is going back to 1909 when the first attempts of its kind known as The Society National d' Ethiopia Pour le Development de l'

agriculture et de Commerce (The Society for the promotion of Agriculture and Trade) was established in the Menelik II era. Since its establishment, in the long years of existence, DBE has played a significant role in the development process of the country providing loans for small medium and large scale projects in various sectors of the country's (ZenaLemat Bank 2010).

As it has been doing for over hundred years, DBE has remained dedicated to assisting the development endeavors of the country through availing financial and technical assistance to viable projects in accordance with government policies. However, availing loan to borrower is not an easy task, this is because of the high financial risk of the bank as a result of failure to collect the disburse loan from the customers. According to NBE directive 2008, Loans or Advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment terms of the loan or advances in question is called non-performing loan (NPL).

Development Bank of Ethiopia(DBE) is established in the country economic growth through financial and technical support for selected government priority area projects Agriculture, Agro-processing, Industry and Mining's. Besides this, now the bank is facing a serious challenge of accumulated NPL (i.e. loan which couldn't meet their debt obligation as per the agreed terms and condition) due to the riskiest sectors, mainly comes from the Agricultural area loans, which shows a higher ratio of NPL compare to others sectors, remedies must be in action from Development Bank of Ethiopia.

Figure 1.1: Loan Status of DBE



Source: Own computation using DBE dataset

As per the figure above, the loan recovery performance report trend for the last ten years, this indicates that yearly collection performance of the bank are not performed well remains unpaid past their due (expired Maturity date). Similarly the bank non-performing loans against the total outstanding loan ratio of the last ten years presented in the above figure, In addition, the last year planned target of the bank as per Bank's BSC 2018/19 fiscal year performance report in the areas of NPL planned to come with 15.76%; but the actual NPL ratio was 33.91%, this indicates that the bank resulted lower performance, this is beyond a bank's NPL ratio limits, and also generally the average yearly growth rate of the total NPLs and the loan recovery performance from period of 2008/09 to 2017/18 is 31% and 18% respectively. But during 2017/18 fiscal report shows the total loan portfolio of the bank level reached 39.15 Billion. Compared to the preceding year 2016/17, the total loan portfolio of the bank has increased by Birr 5.33 Billion (16%). Now the bank of Ethiopia sets its strategies for NPL ratios, by known as NPL's resolution strategy to keep its level of required.

1.2 Statement of problem

The deterioration in the quality of the loan portfolio of banks was the main cause of problems in the banking system and in financial crises in developed and developing countries. The theme of "non-performing loans" (NPL) has attracted more attention in recent decades. Several studies examined bank failures and find that asset quality is an indicator of insolvency.

As stated in figure 1 above, the non-performing loan in DBE is sharply increasing in the recent time. The increasing level of Non-performing loans may lead to very serious implications. For instance, it discourages the financial institution to refinance the defaulting client, which put the defaulters once again into vicious circle of low productivity. Therefore, a rough investigation of the various aspects of loan defaults, source of credit, purpose of the loan, form of the loan, and condition of loan provision are of utmost importance both for policy makers and the lending institutions. Even if default is random and influenced by unpredictable behaviors or it is influenced by certain factors in a specific situation needs an empirical investigation so that the findings can be used by any financial institutions to manipulate their credit program for the better. Most of the default arose from poor management procedures, loan diversion and unwillingness to repay loans, etc. Because of this, the lenders must give various institutional methods that aimed to reduce the risk of loan default (Ahmmed et al., 2012).

Nowadays, factors that affecting non-performing loans in banking industry is a hot topic worldwide. Numerous empirical works have been carried out on the determinants of non-performing loan and on the factors that affecting non-performing loans in developed and developing countries. However, these studies were conducted in different dimensions in terms of sample coverage, data type and objectives. For instance, a study by Selma and Jouini (2013), Vasilikiet.al (2014), Mazrek et al. (2018), Abdelaziz and Abdelhameed (2015), Ogieva and Atewe (2019) and Skarica (2013) conducted the study on cross-country level and they were only identified the macroeconomic variable determinants of non-performing loan on the study area. Another study conducted by Kumar and Kishore (2019), Isik and Bolat (2016) and Kumar (2019) conducted a study on cross-bank level and basically they were analyzed the bank specific determinant factors of non-performing loan in their study area. In addition to above two cases the study by Haniifah (2015), and Wairimu and Gitundu (2017) conducted a study on the macroeconomic determinants of non-performing loan in the study area basically by using time series data but the former two cases were used panel data. More specifically in Ethiopia, there are some empirical works have been conducted for instance, the study by Million et al. (2019), Arega et al. (2016), Dagn and Maru (2016), Negalign (2019), Umer (2015) and Gudeta(2018) from these studies some of them were conducted in commercial bank of Ethiopia and there are very few studies were conducted in development bank of Ethiopia by considering macroeconomic determinants of non-performing loan eg. (Study by Arega et al. (2016) and Dagn and Maru (2016)).

The motivations of this study come from the following reasons. Firstly, the ongoing empirical works did not consider the bank-specific and macro-economic variable determinants of non-performing loan jointly specific to a single bank in general and particularly in Development Bank of Ethiopia. Secondly, analysis of factors that affecting non-performing loan has been continues and current subject matter since DBE has also undergone changes in its lending procedures, lending limit, credit policies and organizational structure. Third, timing of the study is significant given the level of non-performing loan of DBE sharply increasing from time to time.

Generally, to the best of my knowledge, none of the researchers has been conducted a study on macroeconomic and bank specific determinants of non-performing loan jointly in Development Bank of Ethiopia by using secondary data. Therefore, this study tries to narrow the research gap.

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of the study is to analyze the determinants of non-performing loans in the case of Development Bank of Ethiopia.

1.3.2 Specific Objective

- To examine the trend of nonperforming loans in Development Bank of Ethiopia
- To analyze bank specific determinants of non-performing loans in DBE
- To investigate macro-economic variable determinants of non-performing loans in DBE

1.4 Research Questions

This study is guided by the following basic research questions:

1. What looks like the trend of nonperforming loans in Development Bank of Ethiopia?
2. What are the bank specific variables that determine NPL in DBE
3. Which macroeconomic sectors have more contribution for NPL to DBE?

1.5 Significance of the Study

In this regard, the outcome of this research study yields a significance value for such as in generally the existing banking sectors (Development and Commercial Banks), and researchers for further researches and validation. The finding of such investigation for National Bank of Ethiopia, useful as an input for directives and to examine policy implication related with banking supervision lending activities, and for Banking also takes the outcome of the study will initiate them to manage those variables, for their reputation in the sectors and also to improve loan qualities in the balance sheet.

1.6 Scope and limitation of the Study

The research was concentrated its study only on the Development Bank of Ethiopia from 1980 - 2018. The limitation of this study may also have challenge to find contact person of a project manager or availability of defaulter borrower data in the bank. In addition, also those Variables are not the only final determinant factors of non-performing loans in DBE.

1.7 Limitations of the study

Data availability and weaknesses remain a major setback in carrying out empirical research in most developing countries, particularly in Ethiopia. The number of time span used in this study is the basic limitations of the study. This is mainly due to lack of data on important variables (NPL) and lack of adequate long time data series on important variable.

1.8 Organization of the study

The rest of the paper is organized as follows. Chapter **II** reviews the related theoretical and empirical literature. Chapter **III** includes the description of the study area, data source, methodology of the study and model specification. Chapter **IV** provides empirical analysis and discusses the findings. Lastly, chapter **VI** concludes the study with the main findings and forward some policy implications based on the findings.

CHAPTER TWO

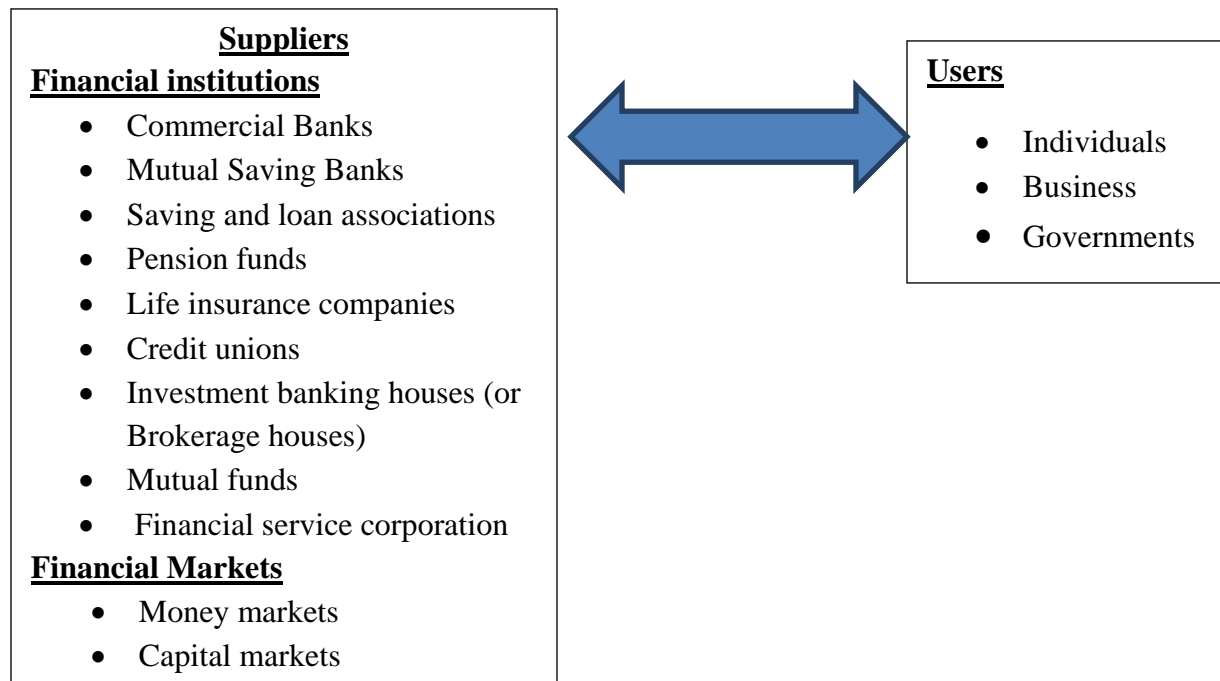
LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 The Role of Financial Institutions

A healthy economy depends heavily on efficient transfer of funds from savers to individuals, businesses, and governments who need capital. Most transfers occur through specialized financial institutions, which serve as intermediaries between suppliers and users of funds. The financial system has diverse and important roles to play. Perhaps the most important is to transfer funds from surplus to deficit economic units in the most efficient way possible (Pilbeam, 2005). People who have the money but who do not have business skill need to save it in a bank rather than putting it at home under their mattresses so as to be safe and not to make their resource sterile as it will generate interest when it is deposited at banks. Inversely, those who have developed entrepreneurial skill but running with a short of finance are ready to take loan. Since it is very difficult for the surplus and deficit units to meet each other due to asymmetric information (more severe in developing countries), there is a need to have an intermediary institution or Bank (Pilbeam, 2005). Therefore, the existence of a development finance institution like Development Bank of Ethiopia (DBE) in the economy is undeniably important.

Figure 2.1: Flow of funds in the economy (Suppliers and Users of Funds)



Source: Literature and own formulation

Development finance institution means an institution which is engaged mainly in medium and long term project finance business, with the purpose of promoting development in the industrial, agriculture, construction, services, commercial or other economic sectors (NBE Directive, 2016). Development Banks are state backed financial institutions that are engaged in the provision of long term loans to not only profitable projects but also to socially beneficial ones. The rapid industrialization in many countries in the 19th century was achieved by state provision of long term loans to risky projects via Development Banks, (Diamond, 1957; Boskey, 1961).

2.1.2 Credit Management Policies

In the past decades there have been major advances in theoretical understanding of the workings of credit markets. These advances have evolved from a paradigm that emphasis the problems of imperfect information and imperfect enforcement. Borrowers and lenders may have differential access to information concerning a projects risk, they may form different appraisal of the risk. What is clearly observed in credit market is asymmetric information where the borrower knows the expected return and risk of his project, whereas the lender knows only the expected return and risk of the average project in the economy. In the course of undertaking credit activity

lending institutions are confronted with four major problems: First, to determine what kind of risk the potential borrower is (adverse selection). Second, to make sure the borrower will utilize the loan properly once made, so that s/he will be able to repay it (moral hazard). Third, to determine or know how the project really did in case the borrower declares his inability to repay, and. Fourth, to find methods to force the borrower to repay the loan if the borrower is reluctant to do so (enforcement). These problems of imperfect information and enforcement lead to inefficiency of credit market which in turn leads to default. Deep credit assessment that consider the borrowers` character, collateral, capacity, capital and condition (what is normally referred to in the banking circles as the 5C`s) should be undertaken if they are to minimize credit risk (Kapoor et al., 2007).

2.1.3 The Concept of Development and Commercial Bank

Development Banks are among the most widely used instruments of funding and assistance for projects that require long-term maturity (Mazzucato, 2011). These organizations offer funding and advice to projects that may not have access to commercial banks, as they do not necessarily provide adequate return rates in the short-term or because of local capital market imperfections. Infrastructures are a major focus of contemporary funding, since they typically involve higher capital costs and also because they are essential for providing adequate framework conditions for innovation. Direct support for innovation activities, however, has often with notably exceptions received less substantial financial support. Hence, Development Bank is essentially a multi-purpose financial institution with a broad development outlook to undertake infrastructure projects with long gestation period and huge investment, but Commercial Bank lends to business related with business opportunities (AlokSud,2017).Development Banks can also promote “catch-up such as endeavors to generate not only new technological trajectories but also an instrument of economic development for the country.

As the Bank`s mandate is to support the development program via development finance and close technical support to viable projects from the priority areas of the government by mobilizing fund from domestic and foreign sources while ensuring its sustainability, the bank has provided loans to the economic sectors: Agriculture (Commercial agriculture and agro processing), Manufacturing, and Other sector services (Such as: Service, Mining & energy, Financial Service, Small and Medium scale Enterprises (SMEs) lease financing and Consumer). But the total loan

portfolio at the bank level reached during the reporting fiscal year 2017/18, the total loan portfolio at the bank level is 39.15 Billion. Compared to the preceding year 2016/17, the total loan portfolio of the bank has increased by Birr 5.33 Billion (16%).

While in a number of economies, these financial institutions have proven to be vital for providing long-term capital to nascent industries, as well as to screen promising private projects and to increase their propensity on succeeding through well-defined performance targets and monitoring. By contrast, in some cases national development banks have been criticized for investing too much in traditional sectors, such as agriculture, leaving aside potentially innovative projects in nascent and higher value-added sectors. In Ethiopia, the growing demand of investment in commercial agriculture, manufacturing industry, mining and extractive industry, agro processing requires huge amount of funds to be invested. Report shows that a demand for those sectors in the country (DBE Annual report,2016).

2.1.4 Concepts and Definition of NPL

Non-performing loans are any loan in which, principal and interest unpaid more than 90days overdue, or delayed on contractual agreement .A non-Performing loans are a loan which is either in default, or with a reasonable expectation that the loan will enter default even though it has not technically defaulted yet(Smith,2010).Therefore, there is no common definition of NPL across a country since it is recognized. Accordingly, the IMF's Compilation Guide on Financial Soundness Indicators, NPLs is defined as: "A loan is nonperforming when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons such as a debtor filing for bankruptcy to doubt that payments will be made in full" (IMF, 2005).

According to Basel Committee on Banking Supervision (2001) as cited in Kargi (2011), loan is considered default when bank declares that a borrower (that is, debtor) cannot meet his/her obligation and repay the loan, or similarly to the first definition, the borrower past due more than 90 days on any payment of the bank credit. Also the International Monetary Fund's (IMF) suggested (2015) the following definition as follows:

“A loan is non-performing when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons—such as a debtor filing for bankruptcy—to doubt that payments will be made in full.”

Fofack (2005), Caprio and Klingebiel (1996), who define non-performing loans as those loans which for a relatively long period of time do not generate income that is, the principal and or interest on these loans have been left unpaid for at least ninety days. The authors further supported that non-performing loans are the loans which are not generating income. Non-performing Loans (NPLs), as an indicator of poor performance of banks, have gained the attention of scholars in the field in the last three to four decades as increasing NPLs are causing crisis in the banking industry (Barr and Siems, 1994). The main reasons that cause insolvency of the financial institutions and ultimately hurt the whole economy (Mohammed et al, 2012). Impaired loans with due payment (World Bank, 2009), loans with deteriorated quality (NBE, 2008). loans that failed to be paid in principal/interest within agreed time (NBE, 2008), failure to meet to consecutive repayments (DBE, 2008).

Non-performing loans are also commonly described as loans in arrears for at least ninety days and non-performing loans have been widely used as a measure of asset quality among lending institutions and often associated with failures and financial crises in both developed and developing world (Guy, 2011). But Basu (1998), described NPL by the term called “bad loans” interchangeably with impaired loans. Non-performing loans are still a major concern for both international and local regulators (Boudriga et al, 2009). Greenidge and Grosvenor (2010), again argue that the magnitude of non-performing loans is a key element in the initiation and progression of financial and banking crises. In consistence with the above authors, Reinhart and Rogoff (2010) as cited in Louzis et al (2011) pointed out that, non-performing loans can be used to mark the onset of a banking crisis. According to Berger and De Young (1997) sited in Joseph, et al., (2012), non-performing loans could be harmful to the financial performance of banking institutions.

2.1.5 The Effects of NPL

The issue of Non-performing loans (NPLs) has gained increasing attentions in the last few decades. The immediate consequence of large amount of NPLs in the banking system is bank failure. Many researches on the cause of bank failures find that asset quality is a statistically significant predictor of insolvency (e.g. Dermirgüç-Kunt, 1989; Barr and Siems, 1994), and that failing banking institutions always have high level of non-performing loans prior to failure. Historically, Deterioration in banks' loan quality is one of the major causes of financial fragility. Past experience shows that a rapid buildup of bad loans plays a crucial role in banking crises (Demirgüç et al, 1998; González Hermsillo, 1999). The regression results clearly indicate. That higher non-performing loan reduces cost efficiency. (Abdkarim, et al, 2010). As the NPLs amount is becoming larger and larger, it deteriorates Banks' asset quality, reduces banks' efficiency and when it cannot be recovered in that period time , the income is not earning, full payment of principal and interest (due to increasing provision expenses held on increasing non-performing loans)these all adversely affects banks': image reputation, resource mobilization capacity, soundness, financial intermediation role; these in turn result in reduction in: investment and related economic growth of countries.

2.1.6 NPLs by Loan Classification

Loans can be classified as performing and non-performing. But now in this category, non-performing of DBE classified into three as substandard, doubtful and loss loans; substandard loans are medium and long term loans past due 180 (one-hundred-eighty) days or more, but less than 360 (three-hundred-sixty) days; doubtful loans are medium and long term loans past due 360 (three-hundred-sixty) days, but less than 3 (three) years; and loss loans are medium and long term loans past due 3 (three) years or more.

To show the loans which are only non- performing loans calculation of provisions according to NBE directive number SBB/48/2010 NPLs are classified as follows

- 1. Substandard:** Past due for more than 180 days but less than 360 days. Substandard signify Loans whose interest or principal payments are longer than three months in arrears of lending conditions are eased.
- 2. Doubtful:** Past due for more than 360 days but less than 540 days. Doubtful indicate that

full liquidation of outstanding debts appears doubtful and the accounts suggest that there will be a loss.

3. **Loss:** Past due 3 (three) years or more or over 1,080 days, in other word loss imply that outstanding debts are regarded as not collectable.

As per the directive no, SBB/48/2010 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 2.1: Classifications of non-performing loan

Classification	Range(CBES) (SBB/43/2008)	Range DFIS (SBB/48/2010)	Provision(n	
			2008	2010
Pass	x > 1 month	1 month < x < 3 months	1%	1%
S. Mention	1 month < x < 3 months	3 months < x < 6 months	3%	3%
Substandard	3 months < x < 6 months	3 months < x < 6 months/ 6 months < x < 12 months	20%	20%
Doubtful	6 months < x < 12 months	6 months < x < 12 months/ 12 months < x < 26 months	50%	65%
Loss	x > 12 months	12 months < x < 36 months	100%	100%

Source: DBE Library, Training Document, Holistic Project Rehabilitation, Loan Recovery and Disposal Feb 2016.

By and large, NPLs are loans that are outstanding both in its principal and interest for a long period of time disagreeing to the terms and conditions under the loan contract as noted by (Gesu, 2014). Any loan facility that is not current in terms of repayment both on principal and interest conflicting to the terms of the loan agreement is NPLs. Thus, the amount of nonperforming loan measures the quality of bank assets (Tseganesh, 2012).

Banks in many developing countries hold a truly an alarming volume in non-performing loan. The differences between promised and actual repayments on loans are the result of uncertainty concerning the borrower's ability or willingness to make the repayments when they are due which creates the risk of borrower's default (Pischke, 1991; Vigano, 1993; Kitchen, 1989). The inapplicability of the standard demand and supply model for credit market give rise to credit rationing phenomena. Credit rationing as defined by Jaffee (1971) is the difference between the

quantity of loans demanded and loans supplied at the ruling interest rate. In this case lending institutions make use of their own screening criteria to identify credit worthy borrowers so as to decrease the probability of default.

2.1.7 Five Cs of Non-performing/Bad Loans

According noted by to MacDonald (2006), there are five Cs of bad credits that represent the issues used to guard against/prevent bad loans. These are:

Complacency: refers the tendency to assume that because of the things were good in the past, they will be good in the future. For instance, assuming the past loan repayment success since things have always worked out in the past.

Carelessness: indicates the poor underwriting typically evidenced by inadequate loan Documentation, lack of current financial information or other pertinent information in the credit files, and lack of protective covenants in the loan agreement, these makes difficult to monitor a borrower`s progress and identify problems before they are unmanageable.

Communication ineffectiveness: inability to clearly communicate the bank`s objectives and policies. This is when loan problem can arise. Therefore, the bank management must clearly and effectively communicate and enforce the loan policies and loan officers should make the management aware of specific problems with existing loans as soon as they appear.

Contingencies: refers the lenders` tendency to play down/ignore circumstances in which a loan might in default. It focuses on trying to make a deal work rather than identifying down side risk.

Competition: involves following the competitors` action rather than monitoring the bank`s own credit standards. Banks, however, still have required expertise, experiences, and customer focus to make them the preferred lender for many types of loan. Lending is not just a matter of making loan and waiting for repayment. Loan must be monitored and closely supervised to prevent loan losses (MacDonald, 2006).

The term “bad loans” as described by Basu (1998) are used interchangeably with non-performing and impaired loans. Despite ongoing efforts to control bank lending activities, non-performing loans are still a major concern for both international and local regulators (Boudriga et al, 2009). Greenidge and Grosvenor (2010), again argue that the magnitude of non-performing loans is a key element in the initiation and progression of financial and banking crises. In consistence with the above authors, Reinhart and Rogoff (2010) as cited in Louzis et al. (2011)

pointed out that, non- performing loans can be used to mark the onset of a banking crisis. According to Berger and Young (1997) cited in Joseph, et al., (2012), non-performing loans could be harmful to the financial performance of banking institutions

2.2 Empirical Literature Review

This section presents evidence which identify the major factors of nonperforming loans. There are a large number of empirical literatures on the study of determinants of nonperforming loan with macro level and bank specific analysis. Accordingly, the first subsection, presents factors affecting nonperforming loans in cross countries. The second subsection discusses review of prior studies on factors of non-performing loans in Africa and the last empirical evidence in Ethiopia.

2.2.1 Empirical evidence from cross countries

Nkusu (2011) analyzed the linkage between nonperforming loans and macroeconomic performance of 26 advanced economies from 1998 to 2009. In his study, only macroeconomic variables were introduced, specifically, GDP growth, unemployment, change in the house price index, change in the equity price index, inflation, nominal effective exchange rate, policy rate of interest and credit to the private sector were included in his empirical specification. His findings revealed that a poor macroeconomic performance (Slower GDP growth, higher unemployment or decreasing asset prices) could be associated with increasing non-performing loans in advanced economies. Selma and Jouini (2013) also investigated a research on the determinants of non-performing loans for a sample of 85 banks in three countries (Italy, Greece and Spain) for the period of 2004-2008. The variables that used in the study were included the rate of growth of GDP, unemployment rate and real interest rate with respect to specific variables opted for the return on assets, the change in loans and the loan loss reserves to total loans ratio (LLR/TL). They found that the problem loans vary negatively with the growth rate of GDP, the profitability of banks' assets and positively with the unemployment rate, the loan loss reserves to total loans and the real interest rate.

Skarica (2013) also conducted a study on the determinants of NPLs in Central and Eastern European countries. In the study, Fixed Effect Model and seven Central and Eastern European countries for 2007-2012 periods was used. The study utilized loan growth, real GDP growth rate,

market interest rate, Unemployment and inflation rate as determinants of NPLs. The finding reveals as GDP growth rate and unemployment rate has statistically significant negative association with NPLs with justification of rising recession and falling during expansions and growth has an impact on the levels of NPLs. This shows as economic developments have a strong impact on the financial stability. The finding also reveals as inflation has positive impact with justification as inflation might affect borrowers' debt servicing capacities. Similarly, in the same region Vasiliki et al. (2014) analyzed the Determinants of Non-Performing Loans the Case of Eurozone, their findings largely agree with bank-specific variables, the rate of non-performing loans of the previous year, the capital ratio and ROE appear to exert a powerful influence on the non-performing loans rate. At the same time, from macroeconomic perspective, public debt, GDP and unemployment seem to be three additional factors that affect the NPL index, unveiling that the state of the economy of Eurozone countries is clearly linked to loan portfolio quality.

Abdelaziz and Abdelhameed (2015), investigated a research on to identify macroeconomic determinants of non-performing loans in some Arab countries through the period 2000-2012 using the dynamic panel data approach. The study found that inflation rate has a negative impact on NPLs, whereas improvement in macroeconomic and financial conditions seems to have a negative impact on the level of NPLs. In the recent time Mazrek et al. (2018), in their study conducted between 2006 and 2016 in transition economy. They used secondary data which obtained from World Bank and International Monetary Fund and analyzed using panel data model. The study found that GDP growth and inflation are both negatively and significantly correlated with the level of NPLs, while unemployment is positively-related to NPLs. Similarly Peyavali (2015) investigated a study on the macroeconomic determinants of non-performing loans in Namibia. The study was based on quarterly data covering the period 2001:Q1 to 2014:Q2, utilizing the technique of unit root, co-integration, Granger causality, impulse response functions and forecast error variance decomposition. He found that a long run relationship between non-performing loan and log of gross domestic product, interest rate and inflation rate.

In Africa Ogieva and Atewe (2019), investigated a research on the determinants of NPLs in eight African countries where data on NPLs are available for the period 2000 to 2016 using a dynamic panel methodology. The study suggested that significant and positive relationship between NPLs

and financial deepening ratio while the relationship between NPLs, Inflation and GDP growth rate were significant but negative.

2.2.2 Empirical evidence from cross banks

Kumar and Kishore (2019) conducted a study on macroeconomic and Bank specific determinants of Non-performing Loans in UAE conventional bank. The study was used panel data methodology including Random Effects model to identify the bank-specific determinants and macroeconomic determinants of non-performing loans in the United Arab Emirates (UAE) conventional banks for the period 2008-2015. Among the bank-specific determinants, non-performing loans (NPL, t-1) indicate a significant positive relationship with NPL and liquidity ratio indicate a significant negative relationship with NPL, whereas capital adequacy ratio and return on assets was found to have an insignificant relationship due to the robust banking regulations in UAE. All the macroeconomic determinants, namely, gross domestic product, growth, inflation, domestic credit to private sector, unemployment and government debt appeared to be insignificant in determining the level of NPLs.

Isik and Bolat (2016) studied a research on empirically analyzes the factors that determine the non-performing loans (so-called bad loans) of 20 deposit banks in Turkey for 2006-2012 period using panel data analysis method. The analysis results reveal that solvency, profitability, credit quality, diversification, economic growth and the recent financial crisis are essential indicators of non-performing loans rate in Turkish banking sector.

Kumar (2019) analyzed the comparative position of all the fours banking categories on non-performing loans in Bangladesh and also investigate what are the different causes of nonperforming loans in banking sectors of Bangladesh. The study was based on secondary data which has been collected from the annual reports of the Bangladesh Bank during the 2006-2017 for 12 years and total NPL, NPL to Total Loans ratio and Trends of net NPL to total loans ratio are taken as variables of the study. The data was analyzed by using descriptive Statistics, ANOVA Test and the Test of Homogeneity of Variances. He found that there is significant difference at the performances of four categories of banks on the Non-performing loans and there is no Homogeneity of Variances of total NPL, NPL to Total Loans ratio and Trends of net NPL to total loans ratio among all the banking categories.

2.2.3 Empirical evidence from Africa

Haniifah (2015) conducted a research on economic determinants of non-performing loans (NPLs) in Ugandan commercial Banks. A multiple linear regression model was applied to examine the effect of four economic factors: inflation rate, exchange rate, and interest rate and GDP growth. He found that inflation rate, interest rate and GDP growth have a negative but statistically insignificant effect on NPLs while the effect of interest rate on NPLs is positive but insignificant.

Wairimu and Gitundu (2017) examined the macroeconomic determinants of non-performing loans in Kenya. They analyzed time series data for the period 1998-2015 using a linear regression model. The dependent variable was the ratio of non-performing loans to total loans while the independent variables were GDP growth rate, inflation rate, interest rate, exchange rate, remittances, unemployment rate and public debt. The empirical results revealed that inflation rate, interest rate, GDP growth rate, public debt, and exchange rate were not statistically significant while unemployment rate and remittances were statistically significant at the 5 percent level of confidence. The study concludes that the significant macroeconomic determinants of non-performing loans in Kenya for the period under review were remittances and the rate of unemployment.

2.2.4 Empirical evidence from Ethiopia

Daniel (2010), focusing on management of non-performing loan on private commercial banks in Ethiopia employing the mixed type of research. The result showed that credit policy and supervision by the management has less contribution to the NPLs and most of the NPLs are caused by factors after the loan released like ineffective monitoring and operational loss of the borrower has created high NPLs in private commercial banks in Ethiopia. Similarly, in the same institution but in different time, Arega et al. (2016) investigated a research on the identifying the major factors affecting Non-performing loans of Development Bank of Ethiopia, Central Region. To achieve the objective descriptive research design was used and data has been collected mainly through primary source using questionnaire from both borrowers and region's staffs. The result of the study shows that poor credit assessment and credit monitoring are the major causes for the occurrence of NPL in DBE. Credit size (includes aggressive lending, compromised integrity in

approval, rapid credit growth and bank's great risk appetite); high interest rate, poorly negotiated credit terms and lenient/lax credit terms, and elongated process of loan approval were bank specific causes for the occurrence of nonperforming loans.

Umer(2015) conducted on the Determinants of Nonperforming Loan in Ethiopian Commercial Banks, Their study period covered from 2004 to 2013. Seven factors (four bank specific and three macroeconomic factors) affecting banks nonperforming loan were selected and analyzed. Their results of balanced fixed effect panel data regression analysis showed that deposit rate, loan to deposit ratio and lending interest rate had positive and significant impact on banks nonperforming loan. According to the regression result lending interest rate is a very important determinant of nonperforming loan in Ethiopia banking industry. Cost efficiency had negative and significant impact on banks nonperforming loan. Bank solvency ratio and gross national product (GDP) growth rate and inflation rate had negative and statistically insignificant impact on banks nonperforming loan. Similarly, in the same institution but in recent time Million et al. (2019) conducted a study concerned with identifying the determinants of credit risk in Ethiopian commercial Banks. They were collected secondary data from the audited financial statement of eight senior commercial banks for the period of 14 years. To analyze the data a fixed effect ordinary list square model was applied. They found that loan to deposit ration and bank asset have positive impact on non-performing loan whilst negative and significance effect GDP growth and loan growth on the level of assets quality in Ethiopian baking industry.

Dagn and Maru (2016) investigated the determinants of non-performing loan in Development Bank of Ethiopia. The study used time series data of NPLs and eight macroeconomic variables over the period of 1980–2016. Multivariate time series model of vector auto regressive and vector error correction model were used and Johansen approach was applied to test the explanatory power of macroeconomic variables. The study proved significant negative association of real interest rate, DBE credit growth, and export with the size of non-performing loan in Development Bank of Ethiopia in the long run. Whereas, the variables such as GDP growth, foreign direct investment, and average exchange rate have significant positive association with the amount of non-performing loan and SimeonGudeta(2018) also conducted a study on determinants of NPL on Development Bank of Ethiopia which focused on policy induced aspect, project follow up, loan provision criteria, source of equity contribution and nature of commodity

aspects. The study revealed that project follow up, policy induced aspect, and loan provision criteria had a significant and positive impact on loan default but source of equity contribution and nature of commodity had no significant contribution on loan default.

In the recent time, Negalign (2019) conducted in his study to identify factors affecting non-performing loans in commercial banking sector; in public and private banks of Ethiopia. To achieve the specified objectives the study was consider institutional and customer specific factors affecting NPLs and the remedial practices can be implemented to reduce the level of NPLs. This study was used descriptive research design and quantitative research approach were used and the primary source of data were collected from 52 credit staff members from CBE and Dashen banks District in Southern Region. The study found that Bank specific factors include Bank size and performance, credit size, poor credit assessment, poor credit terms, lack of aggressive credit collection system, inadequate nature of collateral were identified as bank specific factors affecting NPLs. On the other hand unwillingness of borrower to pay back loan, customers funds diversion for unexpected purpose were identified as customer specific factors affecting NPLs.

2.3 Summary of Literature and Research gap

As per theoretical and empirical literature review above there are a number of empirical works have been carried out on the determinants of non-performing loan and on the factors that affecting non-performing loans in developed and developing countries. However, these studies were conducted in different dimensions in terms of sample coverage, data type and objectives. For instance, a study by Selma and Jouini (2013), Vasilikiet.al (2014), Mazrek et al. (2018), Abdelaziz and Abdelhameed (2015), Ogieva and Atewe (2019) and Skarica (2013) conducted the study on cross-country level and they were only identified the macroeconomic variable determinants of non-performing loan on the study area. Another study conducted by Kumar and Kishore (2019), Isik and Bolat (2016) and Kumar (2019) conducted a study on cross-bank level and basically they were analyzed the bank specific determinant factors of non-performing loan in their study area. In addition to above two cases the study by Haniifah (2015), and Wairimu and Gitundu (2017) conducted a study on the macroeconomic determinants of non-performing loan in the study area basically by using time series data but the former two cases were used panel data. More specifically in Ethiopia, there are some empirical works have been conducted for instance, the study by Million et al. (2019), Arega et al. (2016), Dagn and Maru (2016),

Negalign(2019), Umer (2015) and Gudeta(2018) from these studies some of them were conducted in Commercial Bank of Ethiopia and there are very few studies were conducted in Development Bank of Ethiopia by considering macroeconomic determinants of non-performing loan eg. (Study by Arega et al. (2016) and Dagn and Maru (2016)).

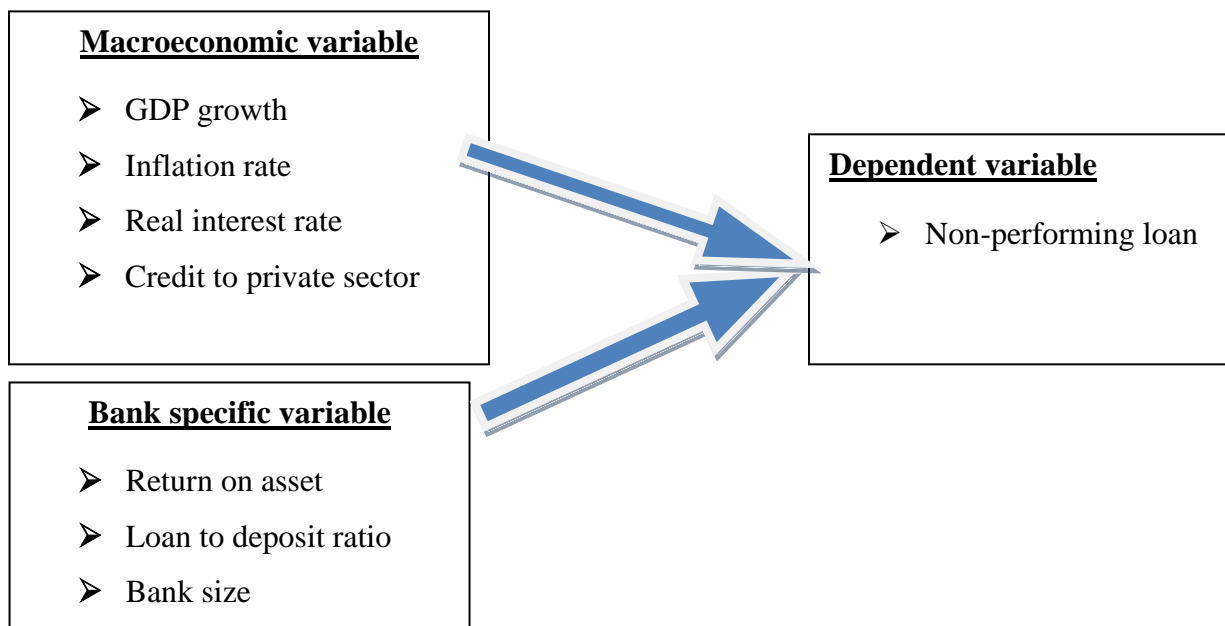
After review of various researches on determinants of non-Performing loans in Commercial and Development Banks , none of the researchers has been conducted a study on macroeconomic and bank specific determinants of non-performing loan jointly in Development Bank of Ethiopia by using secondary data. Therefore, this study tries to narrow the research gap. In addition this research was assessed the borrower related factors that affect NPL in Development Bank of Ethiopia using secondary data.

2.4 Conceptual framework

As presented in the above discussion non-performing loan is determined by different factors. The framework is based on the concept that the macroeconomic variable and bank specific determinants of non-performing loan. The macroeconomic variable and bank specific determinants of non-performing loan is based on the investment theory and the related empirical works

Figure 2.2: Conceptual framework

Independent variable



Source: Literature and Own formulation

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1 Research Design and approach

The general objective of the study is to analyze the basic determinants of non-performing loan in Development Bank of Ethiopia. Therefore, to achieve this objective properly explanatory research design with quantitative data approaches was used through this study. The reason for using explanatory research is that according to the Kothari (2004, p.19) explanatory research method is very important to explain the cause and effect relationships phenomena.

A research design is a master plan that specifies the methods and procedures for collecting and analyzing needed information (Zikmund et al, 2009 pp.66). The conceptual structure which a research is conducted; it is the blueprint for the collection, measurement and analysis of data. The study was employed both descriptive and explanatory research design with quantitative and qualitative data approaches to ascertain the data the secondary of non-Performing loans in DBE.

3.2 Source for Secondary data

The objective of this study is to identify the determinant factors of non-performing loan in Development Bank Ethiopia. To achieve the objective of this study was used secondary data which was obtained from National Bank of Ethiopia (NBE), Central Statistics Agency (CSA) and Development Bank of Ethiopia (DBE).

3.3 Method of Data Management and Analysis

The research of raw data was cleaned, organized, exported and finally analyzed through STATA 14.2 statistical packages. The study was conducted on descriptive statistics analysis, in addition to the dependent and independent variables correlation analysis was employed and deals on the main finding of this research.

Finally, all qualitative data and result was presented using narrative regression models and depth interview, notes to comply with quantitative finding of the study.

3.2 Model Specification and Description of Study Variables

3.2.1 Model specification

As shown in the previous section, there are a number of academic literatures which covered the issue of NPL's determinants in different countries context like Selma and Jouini (2013), Vasiliki et.al (2014), Mazrek et al. (2018), Abdelaziz, Abdelhameed (2015), Ogieva, Atewe (2019), Skarica (2013), Kumar and Kishore (2019), Isik and Bolat (2016), Kumar (2019), Million et al. (2019), Arega et al. (2016), Dagn and Maru (2016), Negalign (2019), Umer (2015) and Gudeta (2018), Haniifah (2015), and Wairimu and Gitundu (2017). Unlike most research, the present study considers the issue from the single country perspective and single bank perspective i.e Development Bank of Ethiopia. Moreover, the study includes systematic variables which are not customary in most research in case of Ethiopia. The following variables are accounted for the model of this research. This study was followed the model specified by Kumar and Kishore (2019) and Wairimu and Gitundu (2017) because Wairimu and Gitundu (2017) study model based on the macroeconomic determinates of NPL and Kumar and Kishore (2019) study model based on bank specific determinants of NPL. The main objective of this study is to analyze the bank specific and macroeconomic determinants of non-performing loan in Development Bank of Ethiopia.

Bank Specific Variables

Return on Assets (ROA): Good management has the ability of changing its efficiency to reduce the risk of default. Most empirical evidence identified an inverse relationship between profitability and credit quality. There is negative relationship between return on assets and NPLs as stated by Kumar (2019), Selma and Jouini (2013).

Loan to Deposit Ratio (LTD): To measure banks liquidity this research paper employed Loan to Deposit Ratio. Increasing loans to deposits ratio reveals a risk preference and is expected to lead to higher NPLs. So it is expected a positive relationship between NPL and LTD ratio. When the banks are more liquid, they can reduce risk of insolvency. Loan to deposit ratio have positive impact on non-performing loan as stated by Kumar (2019) and Selma and Jouini (2013).

Bank Size (SIZE): We use the natural logarithm to capture the size of commercial banks in Ethiopia which is similar with Vithessonthi (2016). With the liberal credit policy with the assumption of "TO BIG TO FALL", big banks might involve in loose credit monitoring activity.

On contrary, their experience, management capability and diversification, big banks have the ability to reduce their credit default rate. This shows that the relationship between these two variables depends on the trait of the management of the banking industry. Bank size negatively affected the NPLs as stated by Skarica (2013), Wairimu and Gitundu (2017).

Macro-Economic Variables:

Economic growth (EG): It is an increase in the production of goods and services over a specific period. Economic growth creates more profit for businesses. As a result, stock prices rise. That gives company's capital to invest and hire more employees. As more jobs are created, incomes rise. Consumers have more money to buy additional products and services. Purchases drive higher economic growth. For this reason, all countries want positive economic growth. This makes economic growth the most-watched economic indicator. Economic growth have negative impact on non-performing loan as stated by Isik and Bolat (2016), Selma and Jouini (2013), Skarica (2013), Peyavali (2015), Ogieva and Atewe (2019), Wairimu and Gitundu (2017)

Inflation rate (IR): it is refers to an overall increase in the Consumer Price Index (CPI), which is a weighted average of prices for different goods. The set of goods that make up the index depends on which are considered representative of a common consumption basket. The negative effects of inflation include an increase in the opportunity cost of holding money, uncertainty over future inflation which may discourage investment and savings, and if inflation were rapid enough, shortages of goods as consumers begin hoarding out of concern that prices will increase in the future. Inflation rate have positive effect on non-performing loan as stated by Nkusu (2011), Selma and Jouini (2013), Skarica (2013), Abdelaziz and Abdelhameed (2015), Peyavali (2015), Ogieva and Atewe (2019), and Wairimu and Gitundu (2017)

Real interest rate (RIR): it is an interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of funds to the borrower and the real yield to the lender or to an investor. The real interest rate reflects the rate of time-preference for current goods over future goods. The real interest rate of an investment is calculated as the difference between the nominal interest rate and the inflation rate: $\text{Real Interest Rate} = \text{Nominal Interest Rate} - \text{Inflation (Expected or Actual)}$. Real interest and non-forming loan have negatively related rate as stated by Nkusu (2011), Selma and Jouini (2013), Peyavali (2015), Wairimu and Gitundu (2017).

Credit to Private Sector (CPS): Domestic credit to private sector by banks refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. Credit to private sector have positively related with non-forming as stated by Nkusu (2011).

Table 3.1: Summary of Variables, Expected Signs of their Coefficients and Data Sources

Variable	Definition	Expected sign	source
NPL	Non-performing loans to total loans $NPLs = \frac{NPL}{Total\ loans} * 100$		DBE
GDP growth	The annual growth in real GDP at time t computed as follows: $GDP\ growth = (GDP_t - GDP_{t-1}/GDP_t) * 100$	Negative	NBE
RIR	Real interest rate (measured as the difference between the weighted average lending rate and the annual inflation rate) of bank i at time t. $RIR_t = NIR_t - IFL_t$	Negative	NBE
Inflation rate	The annual inflation rate at time t $INF_t = (CPI_t - CPI_{t-1}/CPI_{t-1}) * 100$	Positive	NBE, CSA
Bank size	Logarithms of total bank asset	Negative	DBE
Return on Assets	Net income/Total assets	Negative	DBE
Loan to deposit ratio	Total loan/total deposit	Positive	DBE
Credit to private sector	Total available domestic credit	Negative	NBE

3.3 Theoretical model specifications

Autoregressive distributed lag (ARDL) model is one of the most general dynamic unrestricted model in econometric literature. In ARDL model, the dependent variable is expressed as the lag and current values of independent variable and its own lag value. ARDL model normally starts from reasonably general and large dynamic model and progressively reducing its mass and altering variable by imposing linear and non-linear restrictions (Charemza and Deadman, 1997). ARDL methodology follows general to specific approach that is why it could be possible to

tackle many econometric problems like, misspecification, autocorrelation, and come up with a most appropriate interpretable model. Therefore, this study was adopted Autoregressive Distributed Lag (ARDL) to estimate the long run and the short run determinants of NPL in Development Bank of Ethiopia within the study period.

According to Johansen and Juselius (1990), Pesaran and Shin (1995), and Pesaran et al. (1996b) the general ARDL model is specified as follows.

The ARDL (p, q1, q2, q3.....qk) model specification is given as follows.

$$\Phi(L, p)y_t = \sum_i^k B_i(L, q_i)x_{it} + \delta w_t + u_t \quad 1$$

Where, $\Phi(L, p) = 1 - \Phi_1L - \Phi_2L^2 - \dots - \Phi_pL^p$

$B(L, q) = 1 - \beta_1L - \beta_2L^2 - \dots - \beta_qL^q$, for $i = 1, 2, 3, \dots, k$, $u_t \sim iid(0, \delta^2)$ and L is the lag operator.

Based on the above equation 1 The ARDL model specifications:

$$\Phi(L)y_t = \varphi + \theta(L)x_t + u_t \quad 2$$

With $\Phi(L) = 1 - \Phi_1L - \dots - \Phi_pL^p$,

$$\theta(L) = \beta_0 - \beta_1L - \dots - \beta_qL^q$$

Hence, the general ARDL(p, q1, q2, q3.....qk) model; where p, q1, q2, q3.....qk is optimal lages.

$$\Phi(L)y_t = \varphi + \theta_1(L)x_{1t} + \theta_2(L)x_{2t} + \theta_k(L)x_{kt} + u_t \quad 3$$

Using the lag operators L applied to each component of vector, $L^k y = y_{t-k}$, is convenient to define the lag polynomial $\Phi(L, p)$ and the vector polynomial $B(L, q)$. As long as the error term U_t assumed to be, white noise process, or more generally, independent with x_t, x_{t-1}, \dots and y_t, y_{t-1}, \dots , the ARDL model consistently estimated using ordinary least squares.

3.4 Empirical model specification

To determine the determinants of NPL in Development Bank of Ethiopia the following general model specification.

$$NPL_t = f(ROA, LTD, LGR, EG, IR, RIR, CPS) \quad 4$$

Where: ROA =Return on Assets

LTD= Loan to Deposit Ratio

LGR = Loan growth rate

EG = Economic growth

IR =Inflation rate

RIR = Real interest rate

CPS = Credit to private sector

Equation 4 is the general formulation of NPL then transformed into ARDL model in order to analyze the determinants of NPL. The empirical ARDL model specification is shown in the following equation.

$$\begin{aligned} NPL_t = C_0 &+ \sum_{i=1}^Q \alpha_i NPL_{t-1} + \sum_{i=1}^Q \alpha_i ROA_{t-1} + \sum_{j=0}^J \beta_j GDP_{t-j} + \sum_{l=0}^L \gamma_l INF_{t-l} + \sum_{n=0}^N \zeta_n IR_{t-n} \\ &+ \sum_{r=0}^R \gamma_r CPS_{t-r} + \sum_{y=0}^Y \theta_y LTDR_{t-y} + \sum_{p=0}^P \eta_p SIZE_{t-r} \\ &+ \varepsilon_t \end{aligned} \quad 5$$

Where, NPL, GDP, INF, ROA, IR, CPS and LTDR and SIZE are previously defined. C_0 is the drift parameter, Q, J, L, N, R, Y and P denotes the lag lengths. $\alpha, \beta, \gamma, \eta, \theta, \zeta$ and γ_r are the coefficients to be estimated, i, j, l, n, s, p, n, r, and y denotes the time trend, and ε_t is the error term.

Since it is necessary to understand the long run and short run dynamics of the determinants of NPL, specification of the long run and short run ARDL models is done after testing for co integration of variables. Therefore, the short run model is specified as the error correction model as shown in the following Equation.

$$\begin{aligned}
\Delta NPL_t = & C_0 + \sum_{i=1}^Q \alpha_i \Delta ROA_{t-1} + \sum_{j=0}^J \beta_j \Delta GDP_{t-j} + \sum_{l=0}^L \gamma_l \Delta INF_{t-l} + \sum_{n=0}^N \zeta_n \Delta IR_{t-n} \\
& + \sum_{r=0}^R \gamma_r \Delta CPS_{t-r} + \sum_{y=0}^Y \theta_y \Delta LTDR2_{t-y} + \sum_{p=0}^P \eta_p \Delta SIZE_{t-p} + \theta ECM_{t-1} \\
& + \varepsilon_t
\end{aligned}$$

5

Where, all the variables previously defined and ECM denotes the error correction term.

3.5 Econometrics Analysis

In addition to the descriptive analysis, in order to capture the degree of influence of some of the determinants of non-performing loan econometrics analysis was applied. This study was employed the ARDL model. This model can be used for to determine the long run and the short run determinants of NPL. The time series data taken to run the regression covers the year between 1980 and 2018. This study was undertakes some diagnostic tests to ensure that the estimated model does not suffer any biases within ARDL regression analysis. Pre-estimation test like unit-root test and lag length determination and post-estimation tests like normality, Multicollinearity, Heterosedasticity, autocorrelation, co-integration test, omitted variable test, model stability test and model misspecification test using different methods.

CHAPTER FOUR

RESULT AND DISCUSSION

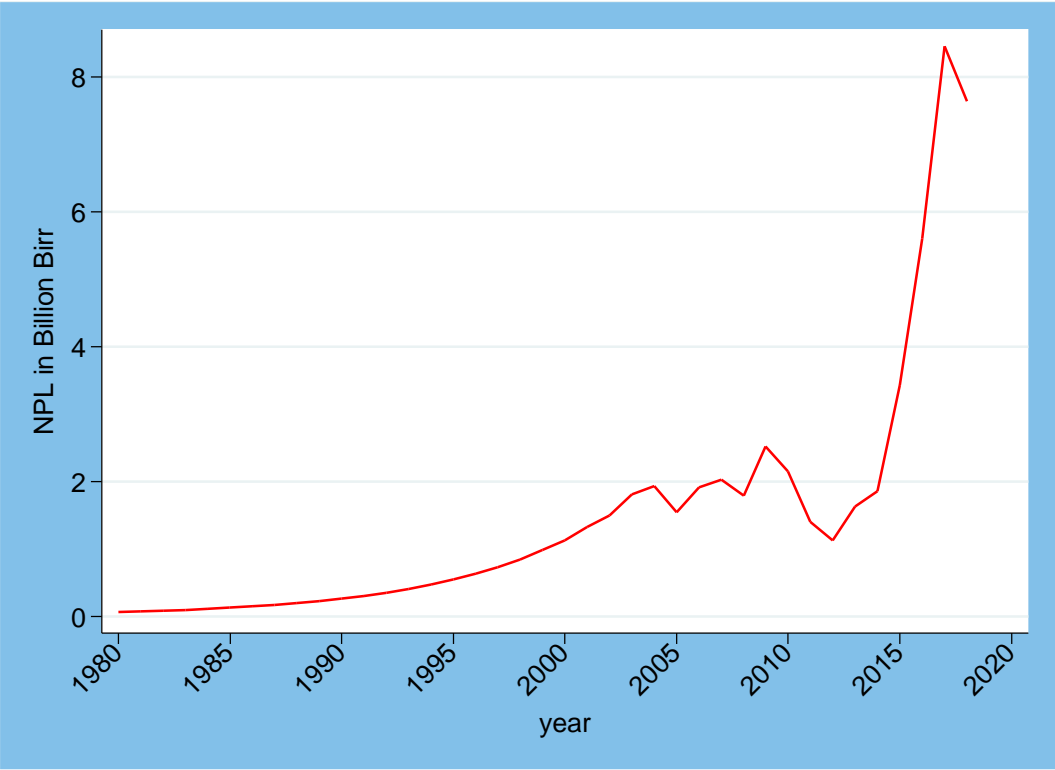
4.1 Introduction

This chapter presents analysis, results and discussion of the study depends on the secondary data. As discussed in the preceding chapter this study is aimed at to analyze the determinant of non-performing loans in the case of Development Bank of Ethiopia and also it tried to present the results of the different sources of data. This chapter is organized into two sections. The first section, section 4.2 trend analysis based on secondary data, besides under section 4.7 regression analysis based on secondary data.

4.2 Trend analysis

4.2.1 Trend of Non-performing Loan in DBE

NPL is the major indicator of commercial banks credit performance. In this case, the bank was exposed to risk when NPL is increase. Poor management can imply weak monitoring for both operating cost and credit quality of customers, which will include high levels of capital losses. This may be expressed in the form of follow-up problem, poor ratio analysis, collateral estimation and registration problem etc. As per the graph below the level of NPL in DBE almost constant in the year between 1980 and 2008 around 1.8 billion birr but in 2009 increased and reached to 2.52 billion birr. From 2009 to 2012 the level of NPL decreased from 2.52 billion birr to 1.12 billion birr. Since 2013 NPL consistently increasing and reached to 8.45 billion birr in 2017 but in 2018 slightly decrement to 7.64 billion birr from 2017.

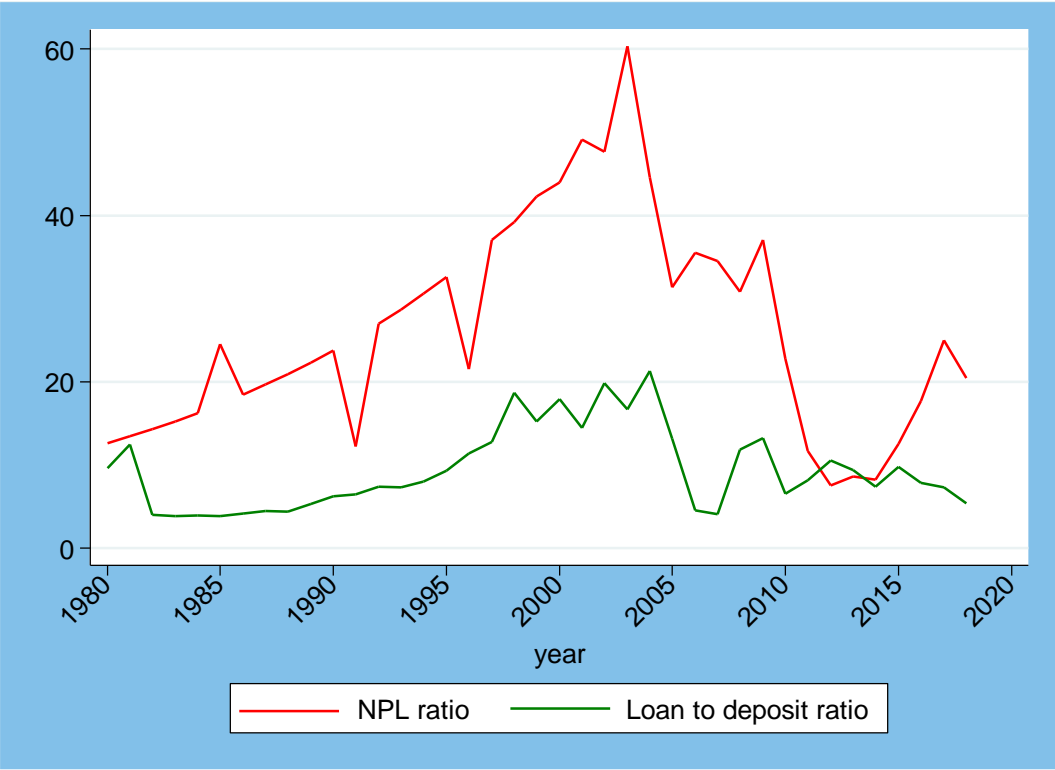


Source: Own computation using the data from 1980 to 2018

Figure 4.1: Trend of Non-performing Loan

4.2.2 NPL ratio and Loan to Deposit ratio

NPL rate is the major indicator of Commercial Banks credit performance. It is the ratio of non-performing loan to total loan and advance which measures the extent of credit risk of banks. As per the graph below, from 2001 to 2012 NPL ratio was continuously decreasing and reached to minimum from 58.67 % to 7.54 % respectively. Since 2013 the ratio was consistently increasing and reached to 39.43 % in 2018. Loan deposit to ratio was reached to maximum in the year 2007 which is 24.22 %. From the year 2010 to 2018 ratio of loan to deposit increased from 15.34 % to 18.53 %. Generally, as per the graph below the relationship between NPL ratio and loan to deposit ratio it seems positively related.

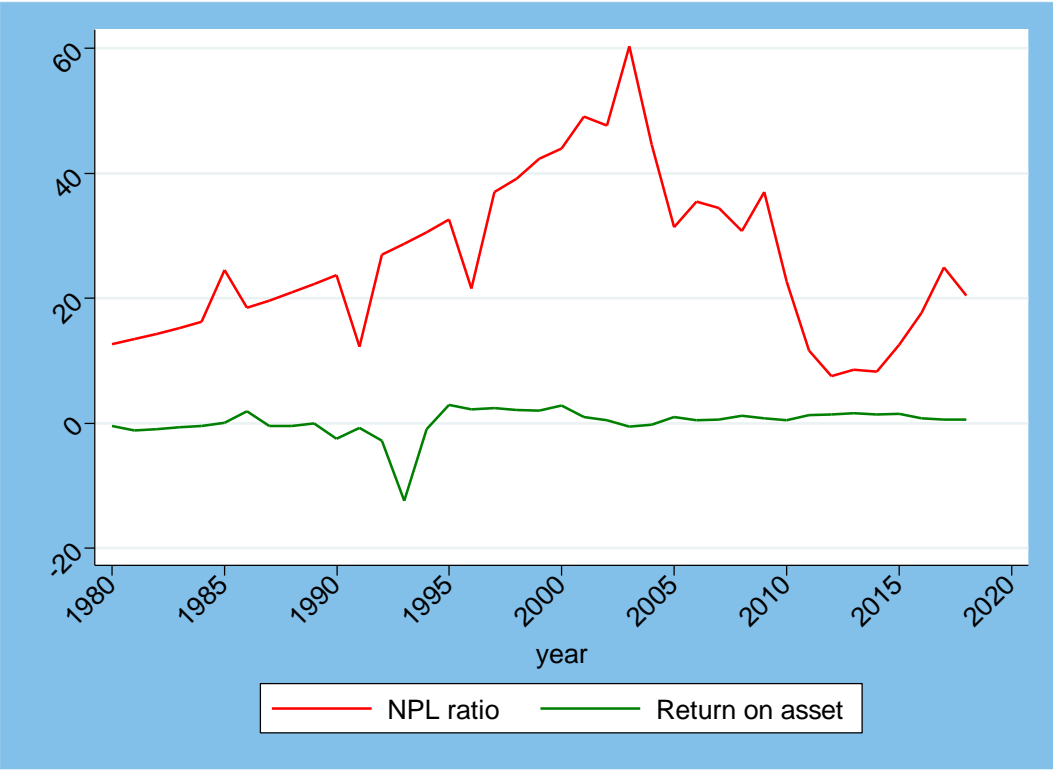


Source: Own computation using the data from 1980 to 2018

Figure 4.2: Trend of NPL ratio and Loan to deposit ratio

4.2.3 NPL ratio and Return on Asset

Return on Assets (ROA) is an indicator of how profitable a bank is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a bank's management is at using its assets to generate earnings. Return on assets is displayed as a percentage. As per the graph below, level of Return on asset in DBE reached to negative in 2004 which is -0.46%. The ROA graph generally depicts that a constant trend and reached to 0.61 % in 2018.

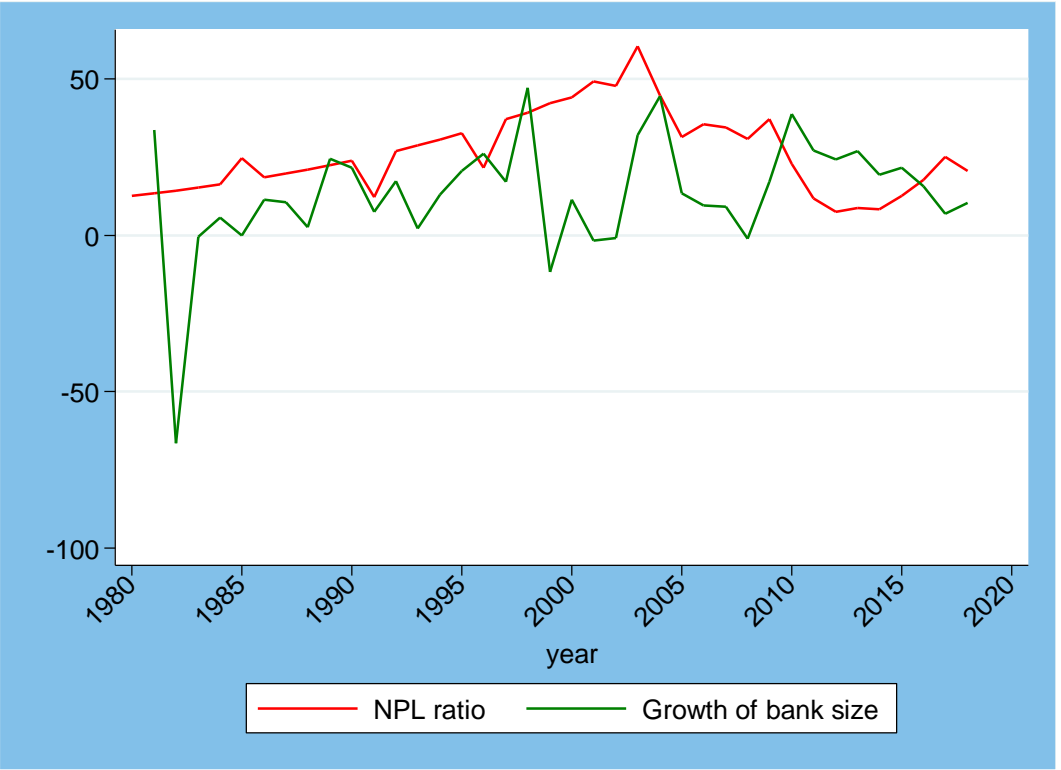


Source: Own computation using the data from 1980 to 2018

Figure 4.3: Trend of NPL ratio and Return on asset

4.2.4 NPL ratio and Loan Growth Rate

The graph below showed that the relationship between NPL ratio and Loan growth rate. Over the study period loan growth rate was highly fluctuated. From the year 2001 to 2004 loan growth rate increased from 3.26 % to 44.54 % due to aggressive lending but in 2008 the rate decreased to negative 1.04 %. From the year 2008 to 2010 again the rate was increased and reached to 38.64 %. Since 2011 loan growth rate was consistently decreased and reached to 10.35 % in 2018.



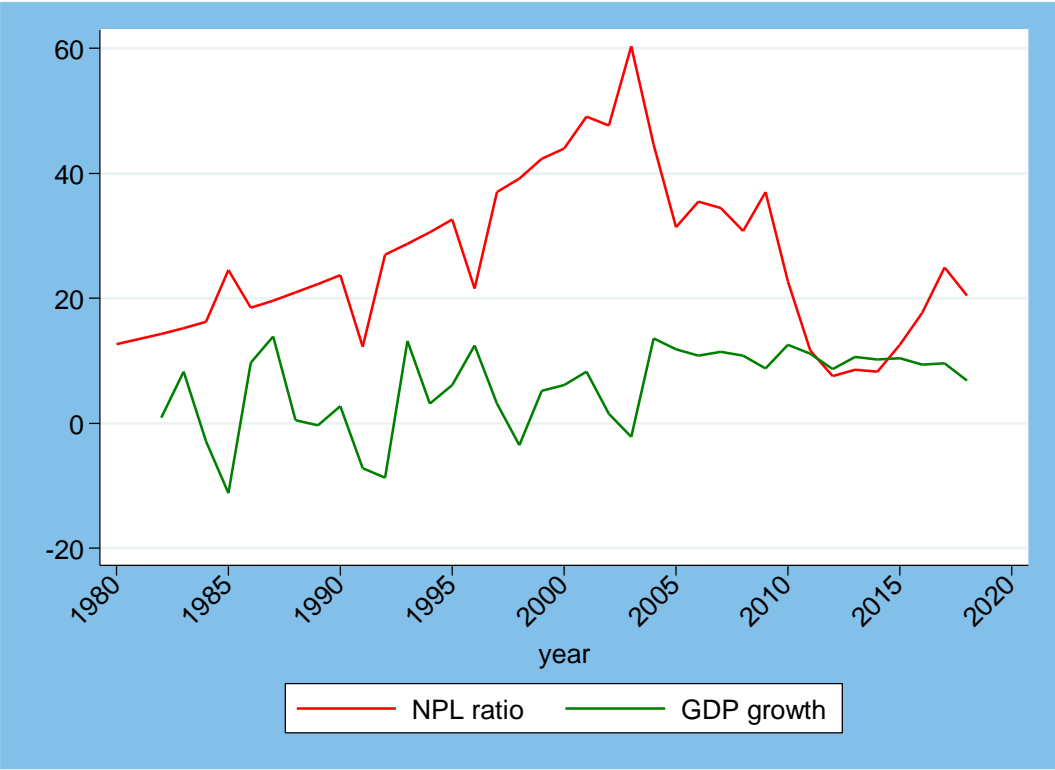
Source: Own computation using the data from 1980 to 2018

Figure 4.4: Trend of NPL ratio and Growth bank size

4.2.5 NPL and Real GDP

Real gross domestic product is a macroeconomic measure of the value of output produced within a country’s territory in a given year adjusted for price changes. RGDP is the main measurement of economic growth since it transforms the money value measured in nominal GDP into total quantity produced by the country. From figure below we can understand that RGDP growth showed that high ups and downs in the years between 1990 and 2003 which implies that there was no sustainable economic growth between such years. But the years after 2003 have showed that there was high and sustainable economic growth in the country.

From figure below it seems that it is possible to comprehend that, even though the country’s RGDP growth is high and stable since the last two decades, the share of output of exportable goods and services and that of import substitute goods and services from the total output is low which leads to a decreasing movement.

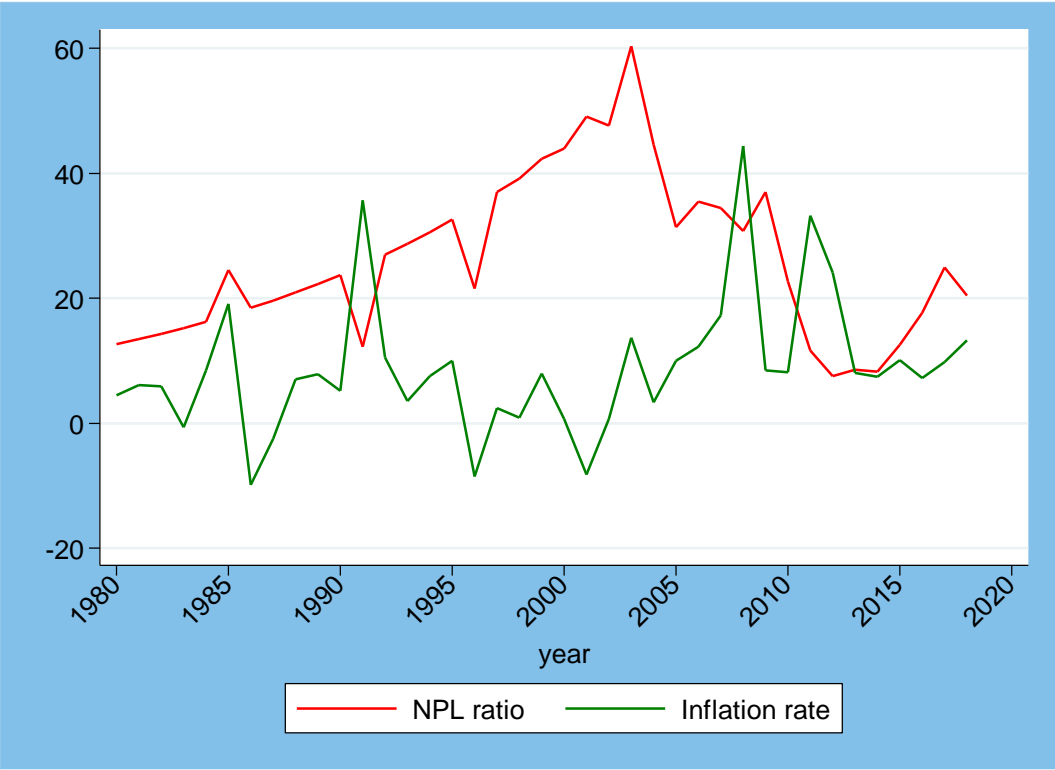


Source: Own computation using the data from 1980 to 2018

Figure 4.6: Trend of NPL ratio and GDP growth rate

4.2.6 NPL ratio and Inflation rate

Inflation in its general term refers to a phenomenon in which the country’s overall price level is rising continuously over a given periods of time. Among the various objectives of the government one is achieving stable macroeconomic condition manifested by price stability so that maximizing its social welfare through its National Bank in Ethiopian case. From the figure below one can understand that the inflation level was below 10% from 1992 to 2005. Unstable price level until 2013 on the other hand it showed stability after 2013 around 10%. The maximum inflation level was scored in 2008 being 44% which seems associated with the expenditures made to MDG activities. It seems that there was a deterministic relationship between NPL and inflation rate over the study period which showed that when the graph of inflation rate moves upward the graph of NPL shows a downward movement.

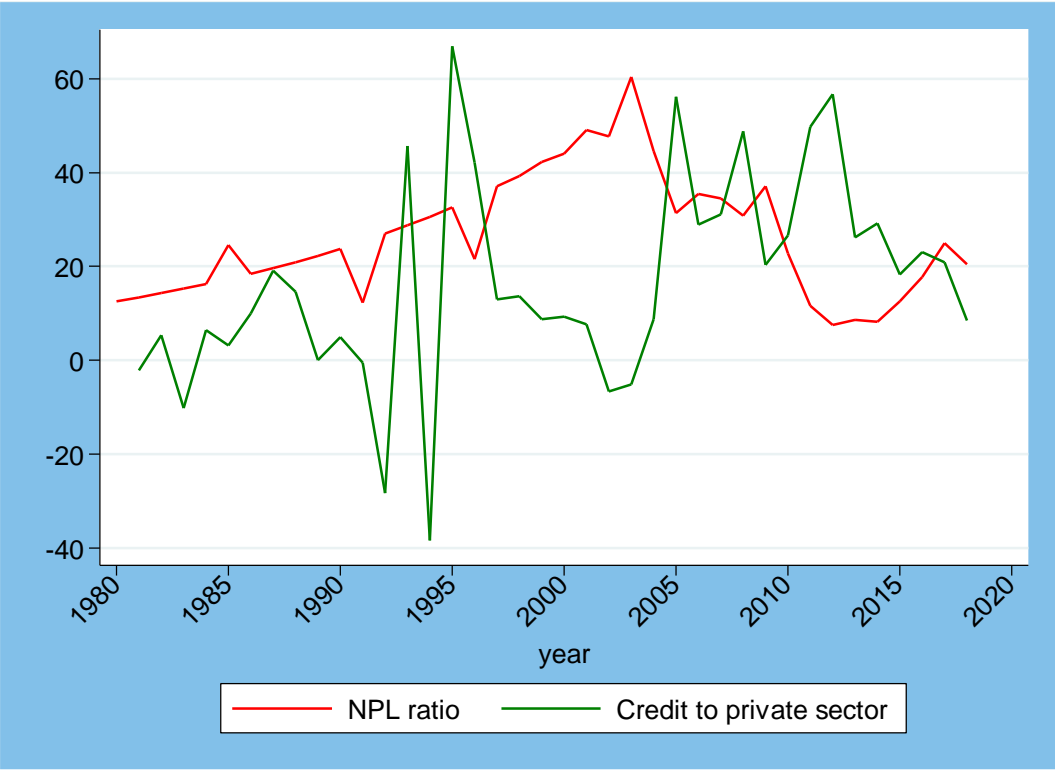


Source: Own computation using the data from 1980 to 2018

Figure 4.7: Trend of NPL ratio and Inflation rate

4.2.7 NPL and Credit to Private

Researchers who studied private investment in developing countries opted to move away from the standard theory and emphasize the role of financial sector development. This is because, financial markets in the least developing countries (LDCs) are not developed and firms are credit constrained to adjust capital to the desired level. We can see from the graph above, the level of credit to private sector was limited and constant through the Duerg regime because, in this regime there was a limited number of private financial institutions and their capitals was not more than 500,000 but, the current government came to power private financial institutions rising in number and their capitals. Since, 2004 the level of credit to private sector has shown increasing trend because banks and other financial institutions expand their branch in different parts of the country.

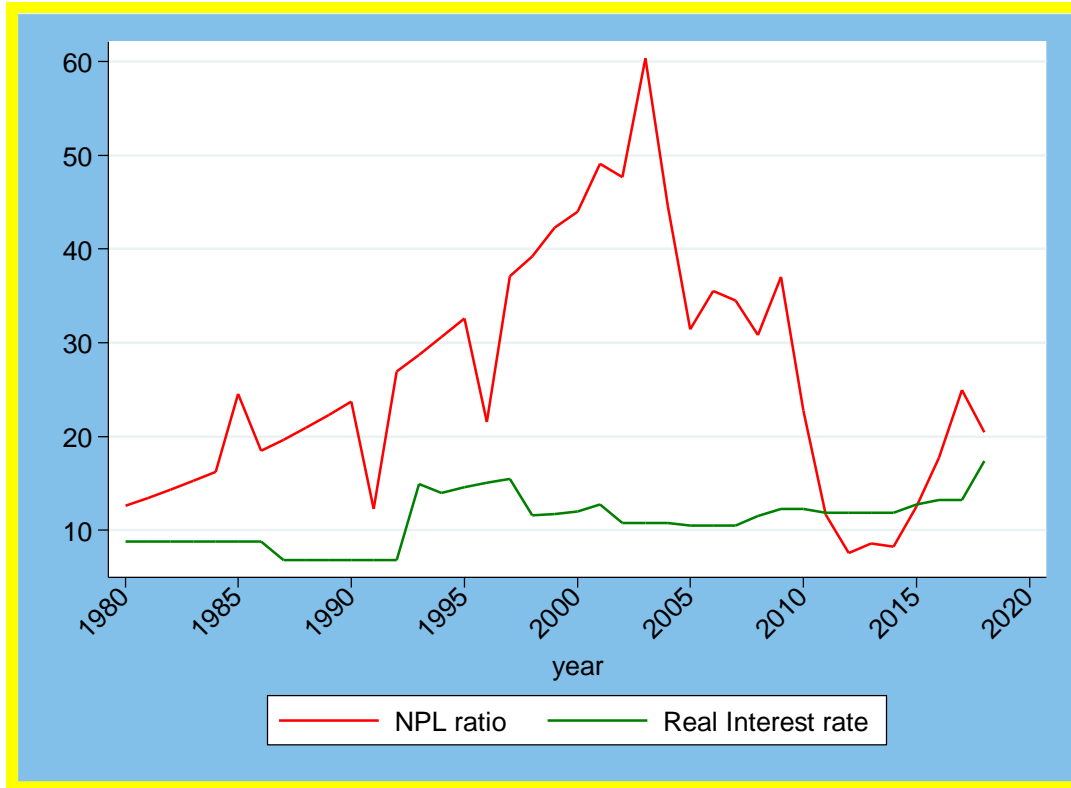


Source: Own computation using the data from 1980 to 2018

Figure 4.8: Trend of NPL ratio and credit to private sector

4.2.8 NPL ratio and Real interest rate

The level of real interest rate over the study period was highly fluctuated. As per the graph below the level of real interest rate was reached to minimum in the year 2008 which is negative 38 %. Since 2011 the level of real interest rate sharply increased and reached to negative 5%. Generally as the graph below the relationship between real interest rate and NPL is positively related.



Source: Own computation using the data from 1980 to 2018

Figure 4.9: Trend of NPL ratio and Real interest rate

4.3 Descriptive statistics

The descriptive statistics considered the mean, standard deviation, maximum and minimum values of the dependent and independent variables. The statistics are based on 39 year data due to the unavailability of data for some relevant variables. The mean represents the average value of the variables whilst standard deviation indicates how variables are distributed around their mean values. Table 4.1 shows the descriptive statistics of the variables.

As per table 4.1, the level of NPL ratio is 26.20percent per annum for the 1930 to 2018. This indicates that, from the total loans that DBE disbursed, an average of 26.20 % were being default or uncollected over the sample period. In the same period, the minimum value and the maximum value range from 7.54percent to positive 60.31 percent with standard deviations 12.88percent. Return on asset measures profitability of bank, return on asset used in the empirical analysis averaged 0.1802percent between 1980 and 2018 ranging from negative12.4percent to 2.96

percent with a standard deviation statistics of 2.45 percent. The mean value indicate that on the study period the profitability of DBE is 0.1802 percent.

Table 4.1: Summary Descriptive Statistics

Variables	Observation	Mean	Std. Dev.	Min	Max
NPL	39	26.20	12.885	7.543	60.312
Size	39	-15.028	24.306	-76.92	67.743
ROA	39	0.1802	2.451	-12.40	2.966
LTD	39	9.450	4.905	3.848	21.27
GDP growth	39	5.834	6.609	-11.14	13.85
Inflation	39	8.851	10.962	-9.80	44.35
IR	39	10.985	2.712	6.8	17.36
GCPS	39	16.66	22.49	-38.32	66.85

Source: Own computation using Stata 14.2 output

According to the summary statistics Table 4.1, the mean value of the loan to deposit in the bank is 9.45 percent for the period 1980 to 2018. This indicates that over the study period total deposit to total deposit on the average is 9.45 percent. The minimum and the maximum value of this variable is 3.84 percent and 21.27 percent respectively. The variation from the mean for loan to deposit rate is 4.9 percent. The mean value of bank size in the study period is negative 15.028 percent. The minimum and the maximum of this variable is negative 76.92 percent and 67.74 percent respectively with standard dilation of 24.30 percent.

The real GDP growth rate used in the empirical analysis averaged 5.83 percent between 1980 and 2018 ranging from negative 11.14 percent to positive 13.85 percent with a standard deviation statistics of 5.99 percent.

According to the summary statistics Table 4.1, the mean value of the inflation rate in the country is 10.96 percent for the period 1980 to 2018. The minimum and the maximum value of this variable is negative 9.8 percent and positive 44.35 percent respectively. The variation from the mean for inflation rate is 11.64 percent. This highest variation from the mean is an indication of macro-economic instability in the region through overall price skyrocketing. The mean value of interest rate in the study period is 10.98 percent. The minimum and the maximum of this variable is 6.8 percent and 17.38 percent respectively with standard deviation of 2.71 percent. The average value of growth of credit to private sector in study period 1980 to 2018 is 16.66 percent. The

minimum and the maximum value of this variable is negative 38.32 percent and 66.85 percent respectively with higher variations of 22.49 percent as compared to its mean value.

4.4 Unit Root Test

Unit root test is generally considered as time series phenomenon, testing stationary for time series dataset have greater power and advantage for time series regression. Testing stationary for time series data may help prevent unrelated regressions. There are different types of time series unit root tests in the recent strand of literature like, Dickey and Fuller (1979) and Phillips–Perron (1988). Therefore, this study used stationary test developed by Dickey and Fuller (1979) since mostly used in the recent literature.

Table 4.2: Stationary test

Variables	Test Statistic	P-value	Decision
NPL	-4.279	0.0005***	Stationary at first deference
ROA	-3.899	0.0020***	Stationary at level
LTD	-6.969	0.0000***	Stationary at first deference
Inflation	-4.729	0.0001***	Stationary at level
GDP growth	-22.70	0.0000***	Stationary at first deference
Real Interest rate	-6.140	0.0000***	Stationary at first deference
GCPS	-7.781	0.0000***	Stationary at first deference
SIZE	-5.259	0.0000***	Stationary at first deference

Note: The null hypothesis of non-stationary and the alternative hypothesis are stationary. ** and*** indicate statistical significance at 5% and 1% levels, respectively.

As per table 4.2 above, the result of Dickey and Fuller test statistics showed that the six variables; NPL, Loan to deposit ratio, GDP growth, real interest rate, growth of credit to private sector and bank size where stationary at first difference whilst the two variables; return on asset and inflation were stationary at level.

4.5 ARDL optimal lag selection

In order to estimate the determinants NPL in Development Bank of Ethiopia determining the optimal lag length is necessary. Therefore, this study Akaike information criterion (AIC) is used as optimal lag selection. NPL, return on asset, loan to deposit rate, interest rate has optimal lag

length of one. GDP and inflation rate has optimal lag length of two. The remaining bank size and credit to private sector has optimal lag length of three. Test statistics result is summarized below table 4.4 and Stata 14.2 output of each variable lag selection is reported on Appendix .

Table 4.3: Optimal lag selection of variables

Optimal Lag selection using AIC					
Variables	0	1	2	3	4
NPL	-0.34157	-0.3682*	-0.313128	-0.260038	-0.27082
Size	3.30209	0.291578	0.33894	0.396068*	0.436707
ROA	-4.45925	-4.57479*	-4.52944	-4.49208	-4.47999
LTDR	6.067	5.28108*	5.33788	5.39387	5.38406
IR	4.89406	4.02531*	4.0815	4.1319	4.18049
Inflation	7.73569	7.74035	7.79323*	7.7329	7.78858
GDP	3.7114	-1.41099	-1.35714*	-1.34101	-1.30935
CPS	4.06292	0.013201	-0.10075	-0.05298*	-0.050561

4.6 Post-Estimation Diagnostic Test

To accept this model as a good, it should satisfy the Gauss Markov assumptions or the required criteria of the post estimation test such as normality, serial correlation, and heteroscedasticity and stability tests.

4.6.1 Heteroskedasticity

An important assumption of the classical linear regression model is that the disturbance term u_i appearing in the population regression function is homoscedastic i.e. all cross sectional error terms have the same variance. But when there exist an outlier observation in relation to the observation in the sample, the assumption of constant variance is violated and this violation is referred to as heteroskedasticity. Breusch-Pagan or Weisberg test for heteroskedasticity is used which the null hypothesis of constant variance and it is possible to reject this hypothesis when p value is greater than 5% significance level. If the problem of heteroskedasticity persists the remedies suggested to correct the problems of heteroskedasticity are transforming the data to the log and deflating the variable by some measures of size (Maddala, 1992). The result presented in the following table.

```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lnnp1

chi2(1)      =      0.27
Prob > chi2  =      0.6016

```

4.6.2 Multicollinearity

In the presence of multicollinearity, the explanatory variables correlated with each other and the regression coefficients possess large standard errors (in relation to the coefficient themselves). Because of the presence of multicollinearity in a given model, the coefficients cannot be estimated with great precision or accuracy (Gujarati, 2004). To check the presence of multicollinearity or not this study used Pearson pairwise correlation and variance inflation factor. Thus, as can be seen from the result below, since the no correlation matrix value of greater than 0.8, there is no multicollinearity problem.

```

. corr roa lnsize lncps lngdp IR LTDR INF
(obs=39)

```

	roa	lnsize	lncps	lngdp	IR	LTDR	INF
roa	1.0000						
lnsize	0.3196	1.0000					
lncps	0.3069	0.9550	1.0000				
lngdp	0.2685	0.9289	0.9571	1.0000			
IR	0.1407	0.3944	0.5876	0.5731	1.0000		
LTDR	0.2423	-0.0418	0.1095	0.0664	0.2845	1.0000	
INF	0.0247	0.3018	0.2832	0.2918	-0.0640	-0.1466	1.0000

4.6.3 Testing for Normality

Normality test is used to determine if the data is well-modeled by a normal distribution and to compute how likely it is random variable is underling the data is set to be normally distributed. In descriptive statistics terms, one measure of goodness of fit a normal model of the data. The normality of data is tested by Jarque- Bera test. The null-hypothesis that the residuals are normal is rejected in this particular study. However, econometric theory states that the existence of non-normality does not affect and distort the estimator’s BLUE and consistency property (Enders 1995). The non-normality of vector in our model doesn’t affect the coefficients and t-values. The result presented in the figure below. Thus, in order to test the normality of the data Shapiro-Wilk W test for normal data is used. According to Shapiro-Wilk W test for normal data, the data is

normal if the p value is greater than 0.05 and not if p value is less than 0.05. In test Shapiro-Wilk W test the null hypothesis states that the error term of the model is normally distributed and if the P value is greater than 0.05 then the null hypothesis will be accepted.

Based on Shapiro-Wilk W test for normal data and residual plot below the error term is normally distributed since p value is 0.86 which is above 0.05. In this case, we have enough evidence to say error term of the model is normally distributed.

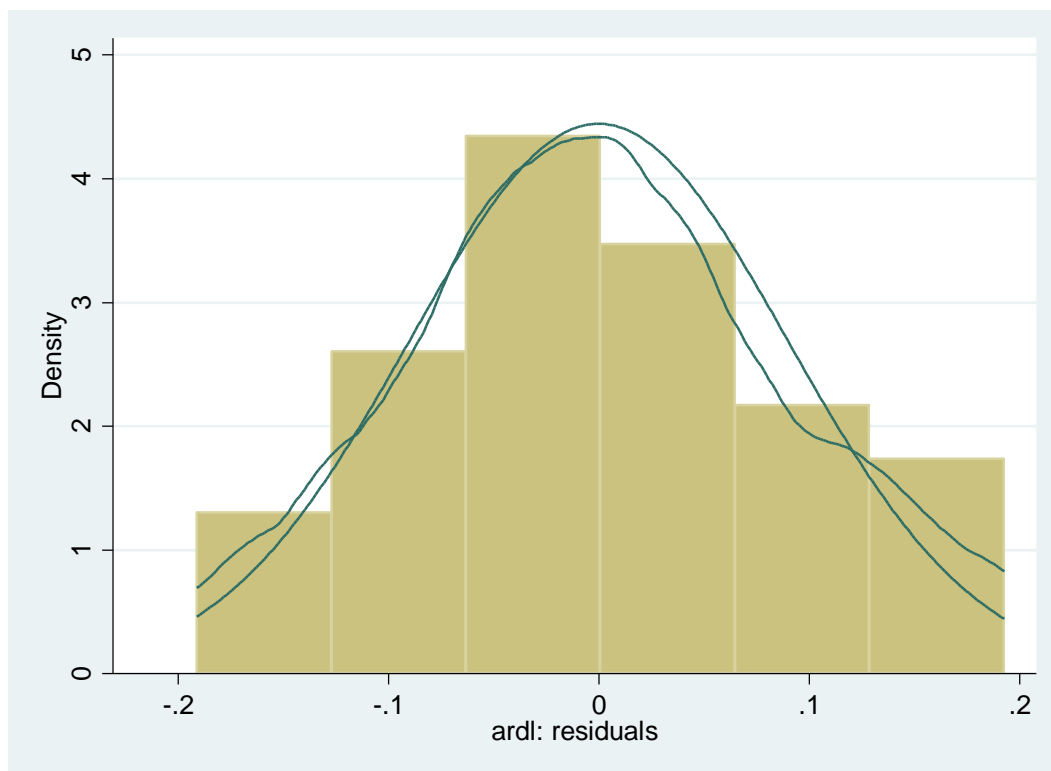


Figure 4.9: Test of normality

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. swilk r
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Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
r	36	0.98392	0.586	-1.116	0.86784

4.6.4 Autocorrelation

The correlation between residuals is called autocorrelation which is induced by the transformation of the original data and manipulation of the data through interpretation and

extrapolation. The simplest and most widely used model is one where the error term u and u_{t-1} have a correlation ρ . For this model one can think of testing hypothesis about ρ on the base of estimated correlation coefficient between the residuals. A commonly used statistic for this purpose is the Durban-Watson (DW) statistic which is denoted by d . when DW statistic is zero

($d=0$) the estimated correlation coefficient is 1 and $d=4$ when the correlation coefficient which is estimated is -1. If d is closer to 0 or 4, then the residual are highly correlated. The standard d statistic that serves as a rule of thumb is $d = 2$ which indicates that the estimated correlation coefficient is 0 and hence the residual are not correlated. As explained earlier DW test is the most often used test for existence of autocorrelation, and if there exist autocorrelation, it is customary to transform the data on the base of estimated first order autocorrelation and use ordinary least square with the transformed data. If it pure autocorrelation one can use appropriate transformation of the original model so that there we do not have problem of autocorrelation in the transformed model. In this regard we will have to use the generalized least square (GLS) method (Madala, 1992). The Lagrange Multiplier Test (LM test) was applied to prove whether there is autocorrelation between error terms or not. The estimation result of Stata 14.2 is reported the following table.

```
. estat dwatson
```

```
Durbin-Watson d-statistic( 22, 36) = 2.25074
```

4.6.5 Model Specification Test

To see whether the regression model is correctly specified or no specification bias or error, the researcher used link test. Link test is based on a null hypothesis that the predictive value (\hat{y}) is statistically significant at 5 % level of significant and square prediction (\hat{y}^2) is insignificant at 5 % level of significant of the regression model. Therefore, to test this in STATA we generated two variables, predictive value (\hat{y}) and square prediction (\hat{y}^2), from the original regression model. After regressing these two variables with the model, if a predictive value (\hat{y}) is statistically significant at 5 % level of significant and square prediction (\hat{y}^2) is insignificant at 5 % level of significant we do have a good model, unless, the model is wrong (Murteira, 2014).The link test (see Appendices) clearly shows predictive value (\hat{y}) is significant with a p value of While, square prediction (\hat{y}^2) is insignificant at 5 % level of

significant with a p value of Therefore, the Link test confirmed that there is no model specification error. See the following table.

. linktest

Source	SS	df	MS	Number of obs	=	36
Model	49.9504637	2	24.9752318	F(2, 33)	=	2984.79
Residual	.276127211	33	.008367491	Prob > F	=	0.0000
				R-squared	=	0.9945
				Adj R-squared	=	0.9942
Total	50.2265909	35	1.43504545	Root MSE	=	.09147

lnnpl	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
_hat	1.340886	.4051248	3.31	0.002	.5166537 2.165119
_hatsq	-.0083162	.0098783	-0.84	0.406	-.0284137 .0117813
_cons	-3.481719	4.144306	-0.84	0.407	-11.91337 4.949935

4.6.6 Omitted Variable test

To see whether in the regression model there is excluded of relevant variable from the model, in this paper a Ramsey RESET Test was used. The result in the following table is show that the P-value is more than 5 percent. Hence, we failed to reject the null hypothesis of Ramsey RESET test. Result proves that the model did not have omitted variable bias and the models are well constructed. Again, with this value, the test result of F statistics reveals that fail to reject the null hypothesis. These stated that the error terms are normally and independently distributed with zero mean and constant variance and the researcher concluded that the model is stable.

. ovtest

```
Ramsey RESET test using powers of the fitted values of lnnpl
Ho: model has no omitted variables
      F(3, 11) =      0.53
      Prob > F =      0.6725
```

4.6.7 Stability Test for NPL model

To test a structural stability of the model, there are also different tests based on recursive residual. The most important is the cumulative sum of squares recursive residuals (CUMSUMSQ) which are recommended by (Pesaran and Shin, 1999, 2001). The CUMSUM squares test based on a plot of the sum of the recursive residual. If this sum square goes outside the critical bound, one concludes that there was a structural break at the point at which the sum square began its movement towards the bound. Hence, for the stability test the graph plots both the cumulative sum square of residual with 5% critical lines. And, if the cumulative sum square remains inside between the two critical lines or bounds back after it is out of the boundary lines, the null hypothesis of correct specification of the model cannot be rejected. But, if the cumulative sum square goes outside between the two critical bounds there exists series parameter instability problem. (See Appendix). The straight lines represent critical bounds at 5% level of significance. As depicted in the figure above, the plot of cumulative sum square of recursive residuals graphical test of stability revealed by oscillation of the calculated statistics between the critical bounds at 5% level of significance and it is the indication of stable parameters under study. This is re-enforced by the same pattern of the plot of cumulative sum square of the squares of recursive residuals shown in the figure below.

Thus, the plot of CUMSUMSQ stay within the lines, and, consequently, this confirms the equation is correctly specified and the model is stable. Furthermore, the result shows that there is no structural instability in the model during the sample period. Henceforth, the study can precisely conclude that long and short run estimates are quite stable and as well there is no any structural break showing the Results of the estimated model are efficient and reliable. See Appendix. The respective null and alternative hypothesis is summarized below for each test.

4.6.8 Bounds Tests for the Existence of Co-integration

To identify the presence of co-integration in the long run bound test is conducted. The value of F- statistics is used as identifying the existence of long run relationship between dependent and independent variables. ARDL bound test is based on Null hypothesis (H_0): no long run relationship and alternative hypothesis (H_1): there exists long run relationship. The decision is accept if $F < \text{critical value for } I(0)$ independent variables or reject if $F > \text{critical value for } I(1)$. As shown Table 4, 4, below show the critical value of $I(1)$ at 10%, 5% and 1% are 3.13, 3.50 and

3.74, which are lower than F-statistics 3.75. Thus at 1% level of precision the Null hypothesis is rejected i.e. there is long run co-integration between dependent and independent variables.

Table 4.4: Bound Co-integration test

		Critical value 10%		Critical value 5%		Critical value 1%	
K	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
7	2.03	3.13	2.32	3.50	2.60	3.74	
F statistics = 3.753							

4.7 Empirical analysis

4.7.1 Auto-regressive distributed lag (ARDL) estimations of NPL

To identify the determinants of NPL return on asset, bank size, interest rate, GDP growth, inflation rate, Credit to private sector, bank size and loan to deposit ratio. All of the variables used except interest rate and inflation rate in the estimation result are in natural logarithm form. The estimation result of Stata 14.2 is reported in Table 4.5 and Appendix.

Table 4.5: Long run estimation of ARDL model

ARDL(1,2,3,3,2,1,1,1)		Dependent variable: NPL		
Independent variables	Coeff.	Std. Err.	t-rato	P-value
NPL(-1)	0.7528	0.0798	9.43	0.000***
ROA(-2)	-0.0095	0.00451	-2.13	0.052*
SIZE(-3)	0.5956	0.16728	3.56	0.003***
CPS(-3)	-0.1387	0.16347	-0.85	0.410
GDP(-2)	-2.053	0.7753	-2.65	0.019**
IR(-1)	0.1042	0.0475	2.19	0.046**
LTDR(-1)	0.0213	0.0129	1.65	0.122
INF(-1)	0.0246	0.0275	0.90	0.385
Cons	1.992	3.9485	0.50	0.622

4.7.2 Estimation result of short run dynamic model (Error Correction Model)

From economic intuition, the error correction term (ECM_{t-1}) in the ECM measures the speed at which an endogenous variable adjusts to shocks in an explanatory variable in order to converge to its long run equilibrium. After estimating long run co-integrating model, estimating the short run dynamic relationship between variables with in ARDL model is the next 1 step. Thus, the lagged value of all level variables (a linear combination is denoted by the error-correction term, ECM_{t-1}) is retained in the ARDL model. The Table 4.7 below presents the results of the estimated error-correction model of NPL for development bank of Ethiopia using the ARDL technique. The model is selected based on the AIC. The full model estimation result is reported on appendix.

Table 4.6: Estimation result of Short run dynamic model (Error Correction Model)

ARDL(2,3,3,3,2,1,1,1)		Dependent variable: NPL		
Independent variables	Coeff.	Std. Err.	t-rato	P-value
ROA (-2)	0.00959	0.00451	2.13	0.052*
SIZE(-3)	-0.59562	0.16728	-3.56	0.003***
CPS(-3)	0.1387	0.16347	0.85	0.410
GDP(-2)	2.053	0.7753	2.65	0.019**
IR(-1)	-0.0374	0.0331	-1.13	0.277
LTDR(-1)	-0.00546	0.0114	-0.48	0.641
INF (-1)	-0.0254	0.0296	-0.86	0.404
ECM(-1)	-0.2471	0.0798	-3.09	0.008***
Cons	1.9924	3.948	0.50	0.622

As we see from long run and short run dynamics in the long run dependent variable is highly sensitive or responsive to change in independent variables. From the above table the coefficient of the error correction model ECM (-1) of the selected ARDL(2,3,3,3,2,1,1,1) is negative and significant at 1 percent level. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The result shows a high speed of adjustment of convergence to the long run equilibrium every year after a short run shock. The coefficient of the ECM is negative 0.2471 and this implies that a deviation from the long-run equilibrium subsequent to a short-run shock is corrected by about 24.71 % at the end of each year.

4.1.1 Interpretation of Long and short run ARDL model estimation result

Among the independent variables included in the regression model including lagged value of the dependent variable, return on asset, bank size, GDP and interest rate are statistically significant variables affecting NPL at 1 percent, 5 percent and 10 percent level of significance. While in the short run only return on asset, bank size and GDP have statistically significant effect on NPL.

Lagged value of NPL: - lagged value of the dependent variable is statistically significant at 1 percent level of significance and the coefficient is positive, which indicates last year NPL positively affect the present NPL. If last year NPL grows by 1 percent current NPL will grow by 0.752 percent.

Return on asset

As per table above, the coefficient of Return on asset is -0.0095 . The coefficient is negative and has statistically significant effect on NPL in the long run at 10 percent level of significance. On the average holding other independent variables constant, when return on asset increased or decreased by 1 % then NPL of bank in the study sample was decreased or increased by 0.0095% . Therefore, the study failed to accept the alternative hypothesis that return on asset has a positive effect on NPL in development bank of Ethiopia. This means, there is no sufficient evidence to support the positive relationship between NPL and return on asset. But return on asset in the short run positive and statistically significant effect on NPL. The result is in line with our prior expectations and economic theory since higher returns on assets imply high profitability of the banks which makes bank managers less pressured in creating revenue from credit activities and thus, leading to less exposure to credit risk. In addition, this negative significant impact of ROA on the levels of NPLs indicates the existence of better management of funds invested by shareholders via good agency relationships in development banks in Ethiopia.

The finding of this study is in line with the findings of Selma and Jouini (2013), Vasiliki et al. (2014), Kumar and Kishore (2019) and Million et al. (2019).

Bank size

As presented in the above table the coefficient of bank size measured by common logarithms of total bank asset is 0.5956 . The coefficient is positive and has statistically significant effect on

NPL at 1 percent significance level. On the average holding other independent variables constant when, bank size increased by 1 % then in the long run NPL of bank in the study sample was increase by 0.5956 %. Therefore, the study failed to accept the null hypothesis that bank size has a negative effect on NPL of Development Bank of Ethiopia. This means, there is no enough evidence to support the negative relationship between NPL and bank size. But in the short run significant and negative relationship between NPL and bank size. The long run relationship is positive as expected and this positive relationship between bank size and NPL could be attributed to the fact that a bank which large size high level of NPL. Large banks have better risk management strategies that usually translate into more superior loan portfolios vis-à-vis their smaller counterparts. Larger banks are more able to solve problems of information asymmetry in comparisonto their smaller counterparts.The finding of this study is in line with the findings ofIsik and Bolat (2016).

The regression result of the paper indicates both macro and micro variables pose a significantinfluence on the NPLs of the development bank of Ethiopia. The R-square of the model is 0.877, which means around 87.7 percent of the variation in the dependent variable which is NPLs are explained by the employed explanatory variables included in the model. The remaining 12.3 percent of the variation is unexplained by this model. Overall the model is statistically significance since the F-statistic value is 21.52 with the probability value 0.000.

As per the result, there are variables (micro and macro) which significantly affect the NPL of Development Bank ofEthiopia at different level of significance.

GDP

As presented in table above, the coefficient GDP is-2.053. The coefficient is long run negative and has statistically significant effect on bank NPL under the study period. The coefficient interpreted as on the average holding other explanatory variables constant when loan growth rate increased by one percent then NPL decreased by -2.053%. Therefore, the study failed to accept the null hypothesis that GDP has a positive effect on NPL in Ethiopia Development bank. But in the short run negative and statistically insignificant effect. This means, there is no enoughevidence to support the positive relationship between NPL and GDP. The finding of this

study is consistent with the findings of Isik and Bolat (2016), Selma and Jouini (2013), Skarica (2013), Peyavali (2015), Ogieva and Atewe (2019), Wairimu and Gitundu (2017).

Interest rate

As per what table above presented, the coefficient of interest rate is 0.1042. The coefficient is positive and has statistically significant effect in the long run on NPL at 5 percent level of significance. The coefficient of interest rate interpreted as holding constant other explanatory variables when interest rate increased by one percent, the level of bank NPL increased by 0.1042%. Therefore, the study failed to accept the null hypothesis that interest rate has a negative effect on NPL in Ethiopia Development Bank. This means, there is no enough evidence to support the negative relationship between interest rate and NPL. But in the short run negative and statistically insignificant effect on NPL. The relationship is positive as expected and this positive relationship between interest rate and NPL because of a bank which has high interest rate related to total high total NPLs. The main reason for this positive association between lending rate and NPLs for development bank in Ethiopia is: First, higher lending rate leads to increase the cost of borrowing then increase 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.

The finding of this study is in line with the findings of Mazrek et al. (2018), Peyavali (2015), Haniifah (2015), Wairimu and Gitundu (2017) and Dagn and Maru (2016). But the result of this study is inconsistent with the findings of Selma and Jouini (2013), Peyavali (2015) and Umer (2015).

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

This chapter presents the summary of findings, conclusion and policy recommendation based on the findings from the study. Summary of the findings and conclusions from the estimated results is presented in the next section 5.1 and 5.2 whilst section 5.3 presents policy recommendation on the basis of the findings of this study.

5.1 Summary

The objective of the study was to the main objective of the study is to analyze the determinant of non-performing loans in the case of Development Bank of Ethiopia. Based on the literature review discussed in chapter 2, seven variables have been established to investigate their effect on NPLs. These variables are return on asset, interest rate, GDP growth, inflation rate, Credit to private sector, bank size and loan to deposit ratio.

The main findings of the ARDL regression analysis of both the short run and the long run model can be summarized as follows; The findings show that R^2 of the model describes that 99.44% of the variation in the dependent variable that means; NPLs is explained by the employed variables but, 0.66% of the variation unexplained by this model. According to the result in the long run from the total of seven macroeconomic and bank specific independent variables four variables were statistically significant effects on NPLs in Development bank of Ethiopia. More specifically, lagged value of NPL, return on asset, GDP, bank size and interest rate were found to have negative and statistically significant effect on NPLs of Development bank of Ethiopia while loan to deposit ratio, inflation rate and credit to private sector were found to have statistically insignificant effect on NPLs of DBE. In the short run from all independent variables bank size, GDP and return on asset were found to have statistically significant effect.

Under the study period describes that 78.87 % of the short run variation in the dependent variable that means NPL is explained by the employed variables but, the 11.3 % of the variation unexplained by short run model. Finally, the negative sign of error correction term shows that the short run NPL dynamics is above the long run equilibrium level. The coefficient of ECM shows

that short run deviations of NPL is corrected/adjusted to the long run equilibrium at a rate of 24.71 % each year.

5.2 Conclusions

The general objective of the study is to analyze the basic determinants of non-performing loan in Development Bank of Ethiopia. Therefore, to achieve this objective properly explanatory research design with quantitative data approaches was used through this study.

To identify the determinant factors of NPL auto-regressive distributed lag (ARDL) estimation technique using annual data from 1980 – 2018 is applied. To use ARDL model variables should be I (0), I (1) or combination of the two orders. The analyses were made in line with the stated hypotheses and specific research questions formulated in the study.

Accordingly, in this study, three bank specific variables (i.e., Return on asset, Loan to deposit ratio and bank size) and four macroeconomic variables (i.e GDP growth, Inflation rate, Real interest rate, credit to private sector) were included. Consequently, the empirical findings of this particular study suggested the following conclusions:

ARDL bound test of the model show that there exists long run co-integration between dependent and independent variables. The long run estimation results presented in this study imply that return on asset and GDP were negatively and statistically significant effect on NPL while lagged value of NPL, interest rate and bank size were positively and statistically significant effect on NPL. In the short run return on asset and GDP were positively and statistically significant effects on NPL while bank size significantly and negatively related with NPL.

5.3 Recommendation

Based on the findings of the study the following possible recommendations were forwarded: Loan growth, return on asset and interest rate and credit to private sector were the significant drivers of NPLs in Development Bank of Ethiopia. Hence, focusing and reorganizing the institutions alongside these indicators could reduce the probability of nonperforming loans Development Bank of Ethiopia.

- Development Bank of Ethiopia management organs seriously consider all factors that causing non-performing loans and impacts of NPL on bank's overall performance in order to reduce the level of default loans.
- Development Bank of Ethiopia management organs should consider when the bank size is increase since bank size significant effect on NPL.
- Bank management have to be active in their lending decision rate so as to reduce loss loans and accumulation of non-performing loans.

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Appendices

Appendix 1: Long run regression output

```
. ardl lnnpl roa lnsizelncps lngdp IR LTDR INF, lags (1,2,3,3,2,1,1,1)
```

```
ARDL(1,2,3,3,2,1,1,1) regression
```

```
Sample:      1983 -      2018      Number of obs   =      36
              F( 21, 14) =      118.05
              Prob > F   =      0.0000
              R-squared   =      0.9944
              Adj R-squared =      0.9860
Log likelihood = 36.203139      Root MSE      =      0.1419
```

	lnnpl	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnnpl						
L1.		.7528909	.0798583	9.43	0.000	.5816119 .9241698
roa						
--.		-.005391	.0036843	-1.46	0.165	-.0132931 .0025111
L1.		-.0057621	.0048699	-1.18	0.256	-.0162069 .0046827
L2.		-.009598	.0045105	-2.13	0.052	-.0192722 .0000762
lnsizel						
--.		-.1600515	.3088004	-0.52	0.612	-.8223625 .5022594
L1.		.5375335	.2754973	1.95	0.071	-.0533495 1.128417
L2.		-.359118	.2729062	-1.32	0.209	-.9444435 .2262076
L3.		.5956288	.1672882	3.56	0.003	.2368312 .9544264
lncps						
--.		-.2670128	.3186717	-0.84	0.416	-.9504956 .41647
L1.		.3670436	.3633551	1.01	0.330	-.4122755 1.146363
L2.		.2825711	.3336037	0.85	0.411	-.4329378 .99808
L3.		-.1387029	.1634791	-0.85	0.410	-.4893306 .2119249
lngdp						
--.		1.353541	.7153858	1.89	0.079	-.180809 2.887891
L1.		.0227828	.7805545	0.03	0.977	-1.65134 1.696906
L2.		-2.053155	.7753114	-2.65	0.019	-3.716033 -.3902776
IR						
--.		-.0374291	.0331224	-1.13	0.277	-.1084696 .0336114
L1.		.1042348	.0475242	2.19	0.046	.0023055 .2061641
LTDR						
--.		-.0054615	.0114607	-0.48	0.641	-.0300422 .0191193
L1.		.021317	.0129423	1.65	0.122	-.0064416 .0490755
INF						
--.		-.0254913	.0296343	-0.86	0.404	-.0890506 .038068
L1.		.0246451	.0275049	0.90	0.385	-.034347 .0836372
_cons		1.992421	3.948536	0.50	0.622	-6.476347 10.46119

Appendix 2: Short run estimation result or ECM model

ARDL(1,2,3,3,2,1,1,1) regression

Sample: 1983 - 2018 Number of obs = 36
 R-squared = 0.7887
 Adj R-squared = 0.4717
 Log likelihood = 36.203139 Root MSE = 0.1419

D.lnnpl	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ADJ						
lnnpl						
L1.	-.2471091	.0798583	-3.09	0.008	-.4183881	-.0758302
LR						
roa						
L1.	-.0839754	.0385921	-2.18	0.047	-.1667472	-.0012037
lnsize						
L1.	2.484703	1.193807	2.08	0.056	-.0757576	5.045164
lncps						
L1.	.9870096	2.29621	0.43	0.674	-3.937872	5.911891
lngdp						
L1.	-2.738998	3.167746	-0.86	0.402	-9.533138	4.055142
IR						
L1.	.270349	.1786218	1.51	0.152	-.1127568	.6534547
LTDR						
L1.	.0641639	.0440879	1.46	0.168	-.0303952	.1587229
INF						
L1.	-.0034245	.1696472	-0.02	0.984	-.3672817	.3604326
SR						
roa						
D1.	-.005391	.0036843	-1.46	0.165	-.0132931	.0025111
LD.	.009598	.0045105	2.13	0.052	-.0000762	.0192722
lnsize						
D1.	-.1600515	.3088004	-0.52	0.612	-.8223625	.5022594
LD.	-.2365108	.2324118	-1.02	0.326	-.7349845	.2619628
L2D.	-.5956288	.1672882	-3.56	0.003	-.9544264	-.2368312
lncps						
D1.	-.2670128	.3186717	-0.84	0.416	-.9504956	.41647
LD.	-.1438682	.3723349	-0.39	0.705	-.9424472	.6547107
L2D.	.1387029	.1634791	0.85	0.410	-.2119249	.4893306
lngdp						
D1.	1.353541	.7153858	1.89	0.079	-.180809	2.887891
LD.	2.053155	.7753114	2.65	0.019	.3902776	3.716033
IR						
D1.	-.0374291	.0331224	-1.13	0.277	-.1084696	.0336114
LTDR						
D1.	-.0054615	.0114607	-0.48	0.641	-.0300422	.0191193
INF						
D1.	-.0254913	.0296343	-0.86	0.404	-.0890506	.038068
_cons	1.992421	3.948536	0.50	0.622	-6.476347	10.46119

Appendix 4: stability test

