Determinants of Non-Performing Loan in Development Bank of Ethiopia

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Abstract

This study aimed to investigate macroeconomic variables, bank specific internal factors and variables that are external to the bank, which explain Non-Performing Loans (NPLs) in Development Bank of Ethiopia. The study used time series data of NPLs and eight macroeconomic variables over the period of 1980–2016. In addition, cross sectional data for bank specific variables and borrower's related external factors were collected. 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. For the cross sectional data, OLS regression model was data. Cross sectional data were collected using stratified sampling technique. 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. In addition to macroeconomic variables bank specific factors and borrower's related external variables such poor due diligence assessment, insufficient grace period given by the Bank for the repayment, non-credit worthy project financing, financing second hand machines, lack of proactive measures taken against sign of default, willful default, rent seeking character of borrowers, poor financial record system of borrowers, misfortune of borrower, unavailability labor force in the project area, saturation of demand for the product of the project, remoteness from market, and unsuitable agro-ecological condition are explanatory variables that significantly increase the occurrence of NPLs in Development Bank of Ethiopia. In order to minimize the impact of NPL,s Development Bank of Ethiopia need to finance export-oriented projects and minimize long-term financing foreign direct investment, conduct proper due diligence, viability checks, revise policy as per the conditions and   assess internal factors and external factors for stability and soundness of the project financing of the Bank.

Keywords: Co-integration, Development Bank of Ethiopia, Error Correction Mechanism, Linear Regression Model, Macroeconomic variables, NPLs, Vector Autoregressive

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1. Introduction

Bank's role in the economy of any country is very significant. They play financial intermediation function and collect money from those who have excess and lend it to others who need it for investment. Availing credit to borrowers is one means by which Banks contribute to the growth of economies. They play intermediary roles between money depositors and those in need of fund for their investments thereby ensure that money flows are smooth (Richard, 2011). Economic development in any country is impossible without a sound Banking industry (Raman and Visishtha, 2002). On the other hand, loans are the dominant assets and account the highest percentage share of operating income and at the same time it represents Bank's greatest exposure to risk of defaults (Mac Donald and Koch, 2006). Good performance of financial institutions is the symbol of prosperity and economic growth in any country or region and poor performance of these institutions not only hamper the economic growth and structure of the particular region but also affects the whole world (Muhammad et al, 2012).

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). NPLs are one of the main reasons that cause insolvency of the financial institutions and ultimately hurt the whole economy (Mohammed et al, 2012). According to the International Monetary Fund (IMF, 2009), a non-performing loan is any loan in which principal and interest payments are more than 90 days overdue; or when more than 90 days worth of interest has been refinanced. The Basel Committee (2001) also defined

non-performing loans as loans left unpaid for a period of 90 days. Under the Ethiopian Banking business directive of the National Bank of Ethiopia (NBE), non-performing loans are defined as loans whose credit quality has deteriorated such that full collection of the principal and/or interest are not accomplished in accordance with the contractual repayment terms of the loan (NBE, 2008).

The causes of loan default vary in different countries due to differences in macro-economic situations. Both internal and external factors affect the soundness of bank financing. Theoretically, there are so many reasons as to why loans fail to perform. Some of these include depressed economic conditions, high real interest rate, inflation, lenient terms of credit, credit orientation, high credit growth and risk appetite, poor monitoring and other related factors. DBE provides development finance to creditworthy borrowers and viable investment projects based on the government priory area projects by mobilizing local funds and other development loans provided by international organizations for development purpose. Since from its establishment, non-performing loan increased from year to year in terms of amount and in the numbers of projects. In 1980 the amount of nonperforming loan was Birr 593,088.65 while in 2015/16 increased to about Birr 7,615,994,000.00 (it accounts 22.70% from the total loans). This shows that this figure increased through time and this problem affect not only the Bank performance and profitability it also affects the country economic activity largely since it finances projects that have significant impact on the country development and the sources for financing are community resources. Due to the increasing trend of the problem of nonperforming loan ratios, the countries

resource jammed by ineffective /problem projects this has an impact on reduction of the government revenue in terms of profit tax, generate foreign exchange, employment creation, create forward and back ward linkage, knowledge transfer and the countries growth and transformation plan.

Lending is one of the main activities of DBE and interest income constitutes the major portion of operational profit. Lending is one of the main activities of a Bank and interest income constitutes the major portion of profit. In DBE, lending to manufacturing, agro-processing, and commercial agricultural projects constitutes the major operation and income (DBE, 2014). Despite the fact that project financing is major source of the Bank's income and it constitutes the Bank's major assets, it is risky area in the Bank industry. Observing macroeconomic and specific issues is essential before extending loans and advances. In Ethiopian context, the Banking sectors are required to maintain their non-performing loans below 5% of the total loan portfolio (NBE, 2008). However, DBE's NPL account for about 22.7% (about Birr 7.66 Billion) for the year ended June 30, 2016 which is beyond the threshold set by the NBE.

Non-performing loan may result from macro-economic condition of the country, borrower's-related factors, bank-related problems, and some other external factors. The macro-economic factors for occurrence of non-performing loans are inflation, interest rate, GDP growth, unemployment, exchange rate fluctuation, and soon. Borrower's related factors include willful default, poor management system of the borrowers, loan diversion, poor knowledge of about the business they run and poor loan repayment culture. Poor credit risk

management, lenient credit terms and conditions, poor customer due diligence assessment, poor appraisal, lack of proper follow-up and supervision, problem of portfolio management, incapability of performers and management of the Bank to manage the borrowers and elongated decision making process are Bank specific factors are generally the factors mentioned in the literature to have impact on loan default. On the other hand, market condition, political and economic situation; environmental factors are the external factors which contribute for increment of bad loans.

Rajha (2016) examined macroeconomic and bank specific factors to identify the determinants of NPLs of Jordanian banks using panel data regression. The results showed that lagged NPLs and the ratio of loans total assets were the most important factors that affect nonperforming loans. In addition, economic growth and inflation rates were found to have a significant negative effect on non-performing loans. Arega et al (2016) used descriptive statistics (mean, median, mode, standard deviation) on the specific factors for non-performing loans in DBE. They found that poor credit assessment and credit monitoring as 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. On the other hand, poor credit culture of customers, lack of knowledge of borrower for the business they engaged in, willful default, loan diversion, and project management problems were identified as the major customer specific causes of

NPLs (Arega et al, 2016). This research, however, couldn't accommodate the macro-economic variables and also used descriptive statics method of analysis which has no power to make recommendation because the result of descriptive statistics result has less power to predict the future. Therefore, the researcher accommodates both specific and macro-economic variables and used inferential statistics to reach the result and recommendation. While bank specific, borrower's related, and external factors could lead to non-performing loans, up to the level of the researcher's findings and review there is no any study on macroeconomic determinates of nonperforming loan in DBE case. This study, therefore, aims to fill the existing knowledge gap by including more comprehensive factors that may explain NPLs in DBE.

1. Review of Literature

2.1 Review of Relevant Concepts and Empirical Finding

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). According to the International Monetary Fund (IMF, 2009), a non- performing loan is any loan in which interest and principal payments are more than 90 days overdue; or more than 90 days' worth of interest has been refinanced .On the other hand the Basel Committee1(2001) puts non-performing loans as loans left unpaid for a period of 90 days. Under the Ethiopian banking business directive, non-performing loans are defined as "Loans or Advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the

contractual repayment terms of the loan or advances in question"
National Bank of Ethiopia (NBE, 2008). For this study the researcher
used the definition of nonperforming loan given by National Bank of
Ethiopia (NBE) in 2008.

In general, the loan and advance which is categorized under sub-
standard, doubtful and loss are subjected to non-performing loans. The
Bank held provisioning of 20%, 65% and 100% for these loans
respectively. Which implies that the increase in the non-performing
loans directly deteriorate the financial and non-financial asset of the
Bank (NBE, 2008). In DBE case poor credit assessment and credit
monitoring are the major causes for the occurrence of NPL in DBE.
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the business they engaged in, willful default, loan diversion, and
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specific causes of NPLs (Arega et al, 2016).

By using mixed research approach on the determinants of
nonperforming loan in Ethiopian Commercial Banks, Geletta found
that fund diversion, compromised integrity, over/under Financing
were the most frequently mentioned factors followed by unfair
competition among Banks, willful default and macroeconomic
conditions. On the other hand charging high interest rate and rapid
loan growth were rated among the least factors causing occurrences of

nonperforming loan ratios (Geletta, 2012). Determinants of nonperforming loan ratios (NPLs) of Commercial Banks in Ethiopia based on panel data analysis between the time period 2002 and 2013 by using fixed effect model found that return on equity (ROE), return on asset (ROA), capital adequacy ratio, lending rate, and effective tax rate had statistically significant effect on the level of NPLs. However, the results of fixed effect regression model revealed insignificant effect of loan to deposit ratio and inflation rate on the level of NPLs of Commercial Banks in Ethiopia for the period under consideration (Gezu, 2014).

The determinants of non-performing loan in Nigeria found that, in the long run, economic growth is negatively related to non-performing loan. On the other hand, unemployment, credit to the private sector and exchange rate exerts positive influence on nonperforming loan ratios. Whereas in the short run, credits to the private sector, exchange rate, lending rate and stock market index are the main determinants of non-performing loans (Olayinka and Emmanuel, 2014). It is revealed that the research conducted on 25 Commercial Banks in Uganda by using panel data and multiple regression of macro-economic variables inflation rate, interest rate GDP growth rate and interest rate found that inflation rate, and GDP growth have a negative effect on nonperforming loans but statistically insignificant effect on NPLs while the effect of interest rate on NPLs is positive but insignificant (Haniifah, 2015). The study on Islamic Banks in Malaysia on the determinants of non-performing loans using an autoregressive distributed lag model (ARDL) approach based on the three explanatory variables such as interest rate, industrial production index

and producer price index found that two long run relationship among the variables and note that interest rate has significant positive long run impact on NPLs.

Industrial production index turns out with a positive but insignificant sign. This reflects the popular believe that Islamic banking system in Malaysia is not fully motivated by profit and loss mechanism, as the impact of interest rate is stronger relative to productivity. Producer price index appears to have negative and significant impact on NPLs (Adebolaa et al, 2011). There is positive relationship between the GDP growth and the NPLs ratio that is in reverse to international evidence. In fact it is expected that a GDP growth will lead to a reduction of the NPLs ratio because all subjects in one economy when getting higher incomes will be more capable to repay their debts and this will be translated into lower NPLs ratios. According to international evidence the inflation rate is negatively related with NPLs ratio even in the Albanian banking system. The result of the study shows that there is a positive relationship between the lending interest rate of fifth lag and NPLs ratio in time. The supervisory authorities should take into account this fact when determining their monetary policies to avoid the negative effects of NPLs ratio when they decide to increase the lending interest rate. An important finding of this paper consists in the positive relationship between foreign exchange rate Euro/ALL and the NPLs ratio. This is an essential fact taking into account that more than 50% of the granted loans in the Albanian banking system are in Euro currency. For this the borrowers will be almost always exposed to the foreign exchange rate of Euro/ALL and will lead to a higher NPLs ratio (Kurti, 2016). By using panel data on micro and macro

determinants of NPLs, Ahlem and Faith (2013) found that, problem loans vary negatively with the growth rate of GDP, the profitability of Banks' assets and positively with the unemployment rate, the loan loss reserves to total loans and the real interest rate. Regarding the economic factors causing non-performing loans in the Pakistani banking sector since 2006, all the hypothesis were accepted and correlation and regression data analysis described that Interest Rate, Energy Crisis, Unemployment, Inflation and Exchange Rate have a significant and positive relationship with the non-performing loans while GDP growth has significant negative relationship with the non-performing loans of Pakistani banking sector. Bad performance of energy sectors along with poor economic settings/conditions are the main factors causing non-performing loans in Pakistan (Muhammad et al, 2012).

A research was undertaken on macroeconomic and bank-specific determinants of NPLs in Greece by using dynamic panel data methods to examine the determinants of nonperforming loan ratios (NPLs) in the Greek financial sector. Based on his study found that macroeconomic variables, specifically the real GDP growth rate, the unemployment rate and the lending rates have a strong effect on the level of NPLs. Furthermore, Bank specific variables such as performance and efficiency indicators were found to possess additional explanatory power on NPLs (Dimitrios et al, 2010). Research findings indicated that non-performing loans were caused by internal and external factors. Internal factors such as poor credit policy, weak credit analysis, poor credit monitoring, inadequate risk management and insider loans have a limited influence towards non-

performing loans. The research findings highlighted that external factors namely natural disaster, government policy and the integrity of the borrower as the major factors that caused non-performing loans in Commercial Bank of Zimbabwe (Mabvure et al, 2012). The econometric analysis of the determinants of NPLs presented in the paper suggests that real GDP growth was the main driver of non-performing loan ratios during the past decade. Therefore, a drop in global economic activity remains the most important risk for Bank asset quality. At the same time, asset quality in countries with specific vulnerabilities may be negatively affected by additional factors. In particular, exchange rate depreciations might lead to an increase of nonperforming loan ratios in countries with a high degree of lending in foreign currencies to unhinged borrowers (approximated by international claims which are mainly denominated in foreign currencies). According to the analysis a drop in stock prices also negatively affects bank asset quality, in particular in countries with large stock markets relative to the economy (Roland, 2013).

Carlos (2012) investigated on macroeconomic determinants of the non-performing loan indices in Spain and Italy for the period from January 2004 to March 2012. The NPL ratio was defined as the percentage of bad loans over the total loans. The macroeconomic variables were expressed as credit growth, wage, inflation, unemployment and GDP. In both Spain and Italy, the macroeconomic variables are strong determinants of the Non-performing loans. However, of the five explanatory variables used, only unemployment, wage and GDP turned out to be statistically significant. Real Interest Rate has a positive effect on NPL increase while nominal interest rate

(NINT) has a negative impact on NPL fluctuations in addition GDP level influences negatively on bad debt level and NPL level is reduced when GDP increases, because economic growth shows the improvement of business performance. This performance improves their payment capabilities. Credit to economy is the ratio of total credit to GDP, when lending increases the probability for NPL increase is higher. When an economy has a high level of credit to economy, economic crises will make businesses suffering liquidity problems (Fiqiri et al, 2015).

The study of Beatrice (2013) in Kenya focused to investigate the link between NPLs and bank-specific and macroeconomic factors (period covered from 1995 to 2009), and establish the extent to which these factors affect the occurrence of nonperforming loan ratios in commercial banks in Kenya. The dependent variable was nonperforming loan ratios while independent variables included macroeconomic and bank specific factors. The macroeconomic factors included are; real GDP, GDP per capita, lending interest rates, inflation, government expenditure, export and imports, exchange rate between the Kenya shilling and US dollar and asset value as measured by the Nairobi Securities Exchange (NSE) 20 share Index. Bank specific factors included; credit risk management techniques, bank structures, and quality management factors. The study find evidence that bank specific factors contribute to NPLs performance at higher magnitude compared with macroeconomic factors. For effective management of NPLs, it is critical for commercial Banks to understand and focus more on the management of Bank specific

factors which they have more control over and seek practical and achievable solutions to redress NPLs problems.

From the above literature reviewed, the researcher found that some of the studies depend on the on macroeconomic variables, some others depend on Bank specific factors and some other by combining the two variables, and the others also depend on the external and internal factors. Moreover, some of the researchers use primary data, some others secondary and most of the researches use panel data and the others cross sectional data. Therefore, the researcher believes that to reach at feasible result, will try to accommodate macroeconomics and specific to Bank and borrowers related factors that determine the Non-performing Loans. Finally the researcher after assessing other researcher's methodology, technique and gapes on the above literature reviews, will try to use mixed approach. i.e the researcher for the time series data used the model developed by Fawad *Ahmad and Taqadus Bashir* in the research of Explanatory Power of Macroeconomic Variables as Determinants of Non-Performing Loans by including credit growth and average real exchange rate of macro variables. In addition, the researcher will use NPLS amount as dependent variable. And for primary data regarding Bank and borrowers specific and external factors the researcher used cross sectional data and analyzed by using OLS model.

2.2 Conceptual Framework
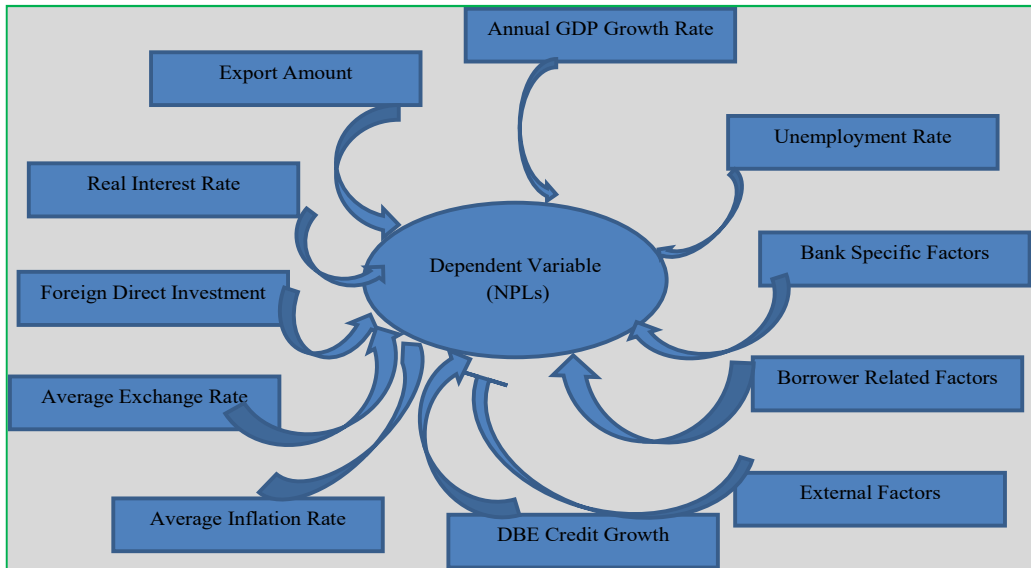
Source: Own construction based on literature review (2016)

2. Research Methods

The research approach adopted by the study was quantitative since the researcher used econometrics model to reach the conclusion. Causal research design was used to show the relationship between the dependent and explanatory variables or independent variables. The study used both primary and secondary sources of data. The primary data collected for cross-sectional data from the respondents of the sample representative of non-performing borrowers for the data related to Bank specific and borrower related as well as external variables that determine the non-performing loans amount of NPL borrowers and the secondary data collected for macroeconomic variables. The dependent variable for cross sectional data NPL ration of non-performing borrowers and independent variables are variables related to Bank related, Borrowers related and external factors collected through questionnaire. However, in the time series data, the

dependent variables NPL amount of the Bank over 37 years and independent variables are macro-economic variables listed in conceptual framework. The secondary data collected from Ministry of Finance and Economic Development, National Bank of Ethiopia, Ethiopia Revenue and Customs Authority, Central Statistics Agency, Development Bank of Ethiopia, World Bank Websites, World Bank Development Indicator and International Monetary Fund. The study period for the econometric analysis covered from 1980 to 2016.

3.1 Model Specification and Method of Data Analysis for Time Series Data

Non-performing loan function expressed as follows:

$$NPLs = f(AGGDR, UR, RIR, AIR, AEX, FDI) \dots\dots\dots\dots\dots\dots\dots. (3.1)$$

The model outlined in equation (3.1) is a function that is used in many empirical works in the literature to an extent. But in this study the researcher extended the above theoretical model by including credit growth and average real exchange rate and export as additional determinants for non-performing loan. The following model specification was used for this study:

NPLs=Amount of nonperforming loan/ Amount of total loan * 100%.

$$NPLs = f(AGGDP, UR, RIR, AIR, AEX, FDI, AREXR, CG) \dots\dots. (3.2)$$

Where, NPLs, for Non- performing loan amount over the years, AGGDP=Annual growth Rate of GDP, UR=Unemployment rate, RIR=Real interest rate, AIR=Average Inflation Rate, AEX= Annual

Export, and FDI=Foreign direct investment. The regression equation for non-performing loans in logarithmic form is specified as:

$$lNPLst = B_0 + B_i lAGDP_t + B_i lUR_t + B_i lRIR_t + B_i lAIR_t + B_i lREXR_t + B_i lAEX_t + B_i lFDI_t + B_i lCG_t + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3.3)$$

Where e is the error term at time t, B_0 *and β_i (1, 2, 3, 4,5,6,7, and 8)* are parameters (coefficients) *and* t is time period. To check the normality data the researcher used unit root test to cheek stationary and non-stationary of variable before estimating/run the model. A commonly applied formal test for the existences of a unit root in the data is the Dickey Fuller (DF) test which is a simple being the Augmented Dickey Fuller (ADF) test. The augmentation adding lagged values (p) of first different of the dependent variable as additional are required to account for possible occurrence of Dickey fuller test was applied which involves estimation testing for unit roots using equation assumes that the underlying data generating process has no intercept term and time root. After the stationary of data checked for time series data, the data analysis have been conducted by using ordinary least square model. To test long run and short run relationship between the dependent variable and macro-economic variables Co-integration (Max statistics and maximum likelihood) test and error correction model has applied to test short run significance of variables. For cross sectional data's or primary data collected on Bank and borrower specific as well as external factors analyzed by using significance t-test for the explanatory variables using OLS model. For both time series data and cross sectional data the relationship between the dependent and independent correlation and regression co-efficient analysis so that both the relationship either positive and negative and significant analyzed in this study.

3.2 Model Specification and Method of Data Analysis for Cross Sectional Data

As parts of this study the researcher included cross sectional data meaning, nonperforming loans amount of NPL borrowers selected trough sampling as dependent variable whereas Bank Specific factors, Borrower related factors and external factors. These variables were chosen from the empirical study sources that may have impact on the occurrence NPLS projects in Development Bank of Ethiopia.   Accordingly, this study examined the determinants of NPLs of specific project of Development Bank of Ethiopia selected under this study by adopting a model that is existed in most literature. The regression model which is existed in most literature has the following general form:

$$Y= \beta o + \beta X + \varepsilon$$

Where Y is the dependent variable for firm, $\beta 0$ is the constant term, β is the coefficient of the independent variables of the study, X is the independent variable for determinant of NPLs and ε is the normal error term.

To collect the cross sectional or primary data the researcher used sampling since the target population was very large to undertake census survey. There are 411 projects categorized under non-performing loans as per loan classification of National Bank of Ethiopia criteria for Development Bank of Ethiopia. The data's for NPL projects taken from the loan position T-24 system report of the Bank as at September 30, 2017. Of which 275 projects are agricultural projects and the remaining are manufacturing projects. The researcher used two stages sampling first the sample size determined from

all agricultural and manufacturing projects with 90% level of confidence. Then the projects are divided in to strata based on homogeneity and from the stratum sample taken based on the proportion of population and lastly, the respondents selected using non-probability sampling convenience sampling. The questionnaire distributed to key informants of non-performing customers and Bank contact officers who can give better response on the questionnaire. The NPL project and ratio of NPLs to the total loan amount utilized collected from DBE loan position T-24 system report as of September 30, 2017 and the variables determining such NPLs projects are collected through structured questionnaires selected by taking sampled candidates. By combining time series and cross-section observations, it gives more informative data. Accordingly, the researcher used both primary and secondary sources of data that are time series and cross sectional data. A time series data collected over 37 years starting from 1980 to 2016.

3. Results and Discussions

This study has two analysis parts the first is time series data analysis and the second is cross sectional data analysis. The time series data analysis is for macro-economic variables and amount of Development Bank of Ethiopia non-performing loan amount over the 37 years. The cross sectional data are the variables related to bank specific, borrower-related and external factors. The analysis starts with time series data and then the cross sectional data analysis.

4.1 Results of Unit Root Test

In the case of Dickey Fuller test, there may create a problem of autocorrelation problem. To tackle autocorrelation problem, dickey fuller have developed a test called augmented dickey fuller test on there are three equations. This are

a) $Delta*Yt=\beta1+dYt-1+ai+et$ ------------------------- (Equation 4.1) intercept only

b) $Delta*Yt=\beta1+\beta2t+dYt-1+ai+et$ -------------------- (Equation 4.2) Trend and intercept

c) $Delta*Yt=dYt-1+ai+et$ -------------------------------- (Equation 4.3) No Trend no intercept

The computed absolute value of the test statistics (Dickely-Fuller statistics) was checked against the maximum values of these criteria with the 95 percent absolute critical value for the Augmented Dickey-Fuller statistic. If the computed absolute test statistic value was greater than the absolute critical value, then we rejected the null of unit root, which means stationary in the time series and vice versa The variable of log of Nonperforming loan (LNPLs), Real Interest Rate, GDP (Gross Domestic Product) growth rate, Average Inflation Rate and DBE's credit growth was tested for stationary and found that stationary at a level. The computed absolute value for intercept, Trend model and Non- trended model are greater than 95 percent absolute critical value for the intercept, Trend model and Non- trended model are -2.93, -3.50 and -1.950 respectively which indicated that the Augmented Dickey-Fuller test statistic was above the absolute value of 95 percent critical value. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 1: Unit Root Test of Variables at a Level

Variable	Intercept	Trend Model	Non-Trend Model
LNPLS	-8.188	-7.769	-8.524
LFDI	-1.458	-2.78	-0.614
LRIR	-4.107	-4.158	-4.168
LAVEXCR	3.318	-0.137	6.003
LGDGR	-4.196	-5.241	-2.933
LUR	-1.285	-3.897	-0.453
LAVIFR	-4.104	-4.483	-2.909
LDBECG	-5.609	-5.614	-2.992
LEXPORT	2.270	-0.642	4.012
Critical values	**5%=-2.93**	**5%=-3.50**	**5%= -1.95**

Source: Authors' Estimation (2016)

On the other hand, the computed absolute value of the variables for intercept, Trend and non-trended model of Log FDI (Foreign Direct Investment), Average Exchange Rate, Unemployment rate and Annual Export amount were below the 95 percent absolute critical value for the Augmented Dickey Fuller statistics of -2.93, -3.50 and -1.950 respectively. This implies that these variables has unit root at a level. So that should go to first differencing since the data should be stationary to run the regression model (Table 1 and 2).

Table 2: Unit Root Tests of Variables at First Difference

Variable	Intercept	Trend Model	Non-Trend Model
LNPLS	-8.188	-7.769	-8.524
ΔLFDI	-4.909	-4.297	-4.820
LRIR	-4.107	-4.158	-4.168
ΔLAVEXCR	-4.909	-4.929	-4.820
LGDGR	-4.196	-5.241	-2.933
ΔLUR	-3.686	-4.882	-3.639
LAVIFR	-4.104	-4.483	-2.909
LDBECG	-5.609	-5.614	-2.992
ΔLEXPORT	-3.089	-3.954	-2.624
Critical values	**5%=-2.93**	**5%=-3.50**	**5%= -1.95**

Source: Authors' estimation (2016)

Note: Δ refers to first differenced

4.2 Co-integration and Error Correction Model

Once the researcher tested the unit roots for the given data series, the next step was to estimate the co-integrating regression between the variables to check the long run relation between them. Two conditions must be fulfilled for the variables to be co-integrated. First, all the individual variables should be integrated of the same order and secondly the linear combination of these variables should be integrated to an order lower than the order of integration of the individual variables.

Table 3: Lag Order Selections

Selection order criteria

Sample: 1982 – 2016   Number of obs = 35

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-521.74				8.8e+11	30.33	30.47	30.73
1	-479.47	84.54[*]	1	0.00	8.4e+10[*]	27.97[*]	28.12[*]	28.41[*]
2	-479.38	0.18	1	0.67	8.8e+10	28.02	28.19	28.51

[*]Denotes the selected lag order of VAR

Source: Authors' estimation (2016)

In the first stage of this analysis, order of VAR was identified using Schwarz basic information criterion (SBIC), Hanna-Quinn information criterion (HQIC), Akaike information criterion (AIC), and final prediction error (FPE) criteria with a maximum of their lags. As table 3 indicates all of the four criteria's FPE, AIC, HQIC and SBIC recommend using one lag in the system equation model that is in the Johansen test of co-integration and vector error correction. The second step in Johansson's procedures is to test the presence and the number of co-integrating vectors among the series in the model. The rank of the co- integrating that is the number of the co- integrating vectors selected using the maximal Eigen values and the Trace value test statistics.

Table 4: Number of Co-integration Vector Based On Trace Statistics

Maximum Rank	Parms	LL	Eigen value	Trace statistic	Critical value
0	90	-1242.48	.	278.43	192.89
1	107	-1206.10	0.88	205.68	156
2	122	-1175.78	0.83	145.03	124.24
3	135	-1154.59	0.71	102.66	94.15
4	146	-1136.56	0.65	66.66[*]	68.52
5	155	-1121.42	0.59	36.32	47.21
6	162	-1113.64	0.37	20.75	29.68
7	167	-1107.14	0.32	7.75	15.41
8	170	-1104.18	0.16	1.83	3.76
9	171	-1103.26	0.05		

Note: [*] Denotes rejection of the hypothesis at 0.05 level.

Sources: Authors' estimation (2016)

On the basis of the results of trace statistic value of test statistic Table 4 the hypothesis of no co-integration was rejected and the study accepted the alternative hypothesis of existence of co-integration among the series. This suggests that there exist precisely four co-integrating vector in the estimated model. Hence, we can conclude that there is long run relationship between the variables which is explained by a linear combination of I (4) variables. Results of the trace test confirmed that, the result obtained through maximal Eigen value test and gave us three co- integrating vector because test showed that, the value were significant at 5% level .For test statistics of the fourth statistic value for the tests was greater than the 95 percent critical value.

Table 5: Number Co-integration Vector Based Max Statistics

Maximum Rank	Parms	LL	Eigen value	Max statistic	5% Critical value
0	90	-1242.48		72.75	57.12
1	107	-1206.11	0.88	60.66	51.42
2	122	-1175.78	0.83	42.37	45.28
3	135	-1154.59	0.71	36.07	39.37
4	146	-1136.56	0.65	30.28	33.46
5	155	-1121.42	0.59	15.57	27.07
6	162	-1113.64	0.37	13.00	20.97
7	167	-1107.14	0.32	5.92	14.07
8	170	-1104.18	0.16	1.83	3.76
9	171	-1103.26	0.052		

Source: Authors' estimation (2016)

4.3 Estimation Results of Long Run and Error Correction Model

Co-integration analysis offers an improved method to estimate the long run dynamic relationship among time series economic variables. The Johansen method is a form of an Error correction model (ECM) and in the presences or existence of one co-integrating vector, its parameters can be interpreted as estimates of the long run co-integrating relationship among the series (Hallam and Zonoli, 1993). The concepts of co-integration and error correction modeling are closely correlated as the method brings together short run and long run information in modeling time series data through an error correction model (ECM) (Ericsson, 1992). The co-integrating, once established among the variables include in the present study, the dynamic ECM structure was then considered for analysis as it saved from the estimation of counterfeit regression among the variables and also provided information about the adjustment speed to long run equilibrium (Engle and Granger, 1987). In the estimation of an ECM for nonperforming loan, we included the same number

of lags as were taken in the tests of co-integration that is one lag. The parameters from the Johansen co-integration regression were the estimates of the long run elasticity's whereas, the coefficients of the differences terms in the error correction model were the estimates of the short run elasticity's.

Table 6: Estimation of Long-run Elasticity

Variables	Coefficient	T	P>t
LOGRIR	-41885.9	-2.22	0.035
LOGGDPGR	50842.36	2.08	0.047
LOGINFR	-7430.75	-0.39	0.7
LOGDBECG	-2789422	-2.96	0.006
DLOGFDI	287133.3	2.44	0.022
DLOGAVER	1144331	3.68	0.001
DLOGUR	-60262.4	-0.93	0.36
DLOGEXPORT	-82.8406	-2.29	0.03

Source: Authors' estimation (2016)

The variable of foreign direct investment was significant in the long run and in the short run since the t-critical value (2.064) were less than t-statics value for the long run 2.44 and short run -6.34 respectively. The direction of these variables in the long run is positive and negative in the short run as it showed positive and negative sign with the non-performing loans, its effects to the non-performing loans was elastic both in the long run and in the short run. The elasticity coefficient for this variable in the long run explained that one percent increase in the amount of foreign direct investment brought 287,133.3 increases in the non-performing loan amount in Development Bank of Ethiopia .Whereas this elasticity coefficient decreased to 682,212.9 in the short-run which indicated that one percent increase in the amount of foreign direct investment introduced 682,212.9 decrease in nonperforming loan amount however , keeping all other factors constant (See table 6 and table 7).

This shows that in the long run the foreign direct investment increase the non-performing loan amount in credit management of the Development Bank of Ethiopia. This is therefore, the Development Bank of Ethiopia subject to risky in the long run in foreign direct investment.

Table 7: Estimation of Error Correction Model

Variables	Coef. Std. Err.	z	P>Z
LOGRIR	-62247.28	-4.18	0.00
LOGGDPGR	-24324.16	-1.67	0.094
LOGINFR	-162352.2	-11.22	0.00
LOGDBECG	2649247	4.68	0.00
DLOGFDI	-682212.9	-6.34	0.00
DLOGAVER	660117.5	3.14	0.002
DLOGUR	-271693.4	-4.98	0.00
DLOGEXPORT	20.3394	0.78	0.435
Constant	-108684.1 .	.	.

Source: Authors' estimation (2016)

The variable of real interest rate was significant in the short run and long run since the t-critical value were less than the t-statics for the long run and short run were -2.22 and -4.18 respectively. The direction of this variable in the short run as well as in the long run was not consistent as it showed negative sign with the non-performing loans, and its effect is inelastic in the long run and elastic in the short run (See table 6 and 7).

The average exchange rate was significant in the long run and in the short run since the t-critical value (2.064) were less than t-statics value for the long run 3.68 and short run 3.14 respectively. The direction of these variables in the long run and in the short run was consistent as it showed positive sign with the non-performing loans, but its effects to the nonperforming loan ratios was

elastic in the long run and as well as in the short run. The elasticity coefficient for this variable in the long run explained that one percent increase in the average exchange rate leads to 1,144, 331 increases in the amount of Nonperforming loan in Development Bank of Ethiopia. Whereas this elasticity coefficient slightly decreased to 660,117.5 in the short run which indicated that one percent increase in the average real exchange rate leads to 660,117.5 increases in amount of nonperforming loan keeping all other factors constant (See table 6 and 7).

In the case of annual growth rate of gross domestic product, it has positive impact on the amount of nonperforming loan both in the short run and log run case. However, it is significant in the long run only since the t-critical value (2.064) was less than t -statistics values for the long run 2.08 and less than critical value for the short run -1.68 respectively. From this result we can understand that even though growth of gross domestic product is not significant in the short run it has the power to reduce the amount non-performing loan by insignificant amount.   On the study conducted the determinants of non-performing loan in Nigeria proved that that, in the long run, economic growth is negatively related to non-performing loan (Olayinka and Emmanuel, 2014). Moreover, it is revealed that the research conducted on 25 Commercial Banks in Uganda by using panel data and multiple regression of macro-economic variables inflation rate, interest rate GDP growth rate found that have a negative effect on nonperforming loans but statistically insignificant effect on NPLs (Haniifah, 2015). Similar to this study the study on Islamic Banks in Malaysia on the determinants of non-performing loans using an autoregressive distributed lag model (ARDL) approach based on the three explanatory variables such as interest rate, industrial production index

and producer price index found that two long run relationship among the variables and note that interest rate has significant positive long run impact on NPLs. Industrial production index turns out with a positive but insignificant sign. This reflects the popular believe that Islamic banking system in Malaysia is not fully motivated by profit and loss mechanism, as the impact of interest rate is stronger relative to productivity.

The other variable unemployment rate was significant in short run since the t-critical value (2.064) were less than t -statistics values for the short run is -4.86 and insignificant in the long run since the t-critical value (2.064) were greater than t-statistics values of -0.93. Moreover, the direction of this variable in the long run as well as in the short run shows negative impact of unemployment rate on the nonperforming loan ratios on DBE. This shows against the available literature. A study undertaken on macro-economic and bank specific determinants of NPLs in Greece by using dynamic panel data methods to examine the determinants of nonperforming loan ratios (NPLs) in the Greek financial sector found that macroeconomic variables, specifically the unemployment rate have a strong effect on the level of NPLs (Dimitrios et al, 2010).

Similarly, average inflation rate was significant in short run since the t-critical value (2.064) were less than t -statistics values for the short run is -11.2 and insignificant in the long run since the t-critical value (2.064) were greater than t -statistics values of -0.93. Moreover, the direction of this variable in the long run as well as in the short run was not consistent with the hypothesis of the study as it shows negative impact of average inflation rate on the nonperforming loan of DBE. The variable export amount was significant in the long run and insignificant the short run since the t-critical value (2.064) were less than t-statistics value for the long run -2.29 and short run 0.93

respectively. The direction of these variables in the long was consistent with the expectation as it showed negative relationship with the non-performing loans meaning increase in the export can decrease non-performing loan in the long run and increase in the short run even though it is insignificant. Therefore, the DBE have to finance long term loans engaged in export oriented projects.

4.4 Granger Causality Test

Causality means the direction of cause from one variable to other variable which is regressed individually on each other. In this regard three cases can be identified. The first type of causality is unidirectional causality from the first variable to second variable. The second type is bilateral causality and last one is the independence of variables from each other (Gujarati, 1995). Regression was run separately for each of the explanatory variable which is I (1) with the dependent variable of nonperforming loan ratio (NPLs) and checks the Granger-Causality. And fount that Log of DBE credit growth and Log of Annual Export Amount Granger cause Log of Non-performing Loan. Similarly, Log of Real Interest Rate, DBE credit growth and Average Exchange Rate can Granger cause Log of Average Inflation Rate. Log GDP growth rate Granger Cause and the direction was unidirectional. The other macro-economic variables does not Granger cause each other.

4.5 Results from Analysis of Cross-sectional Data

4.5.1 Test for Linear Regression Model (LRM) Assumptions

In the descriptive statistics part, the study shows the mean, standard deviation, minimum and maximum values of the dependent and explanatory variables including the number of observation for each variable. However, this section provide test for the linear regression model (LRM) assumptions such as normality, Heteroscedasticity and multicolinearity tests. The linearity of the

parameter is assumed since the model applies linear ordinary least square (OLS). The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Thus, in order to maintain the validity and robustness of the regression result of the research in Linear Regression Model, it is better to satisfy basic assumption Linear Regression Model.

As noted by Brooks (2008), when these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there will be data that left out of the model. Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, normality, multicolinearity and heterosckedasticity tests are made for identifying misspecification of data if any so as to fulfill research quality.

1) Normality Test
One assumption of classical linear regression model (CLRM) is the normal distribution of the residual part of the model. As noted by Gujarati (2004), OLS estimators are BLUE regardless of whether the ui are normally distributed or not. If the disturbances (ui) are independently and identically distributed with zero mean and constant variance and if the explanatory variables are constant in repeated samples, the OLS coefficient estimators are asymptotically normally distributed with means equal to the corresponding β's. However, as per the central limit theorem, if the disturbances are not normally distributed, the OLS estimators are still normally distributed approximately if there are large-sample data. Thus, since the sample size for this study is large enough, it is approximately considered as normally distributed. This implies that residuals are asymptotically normal in this study.

2) Heteroscedasticity Test

In the classical linear regression model, one of the basic assumptions is Homoskedasticity assumption that states as the probability distribution of the disturbance term remains same for all observations. However, if the disturbance terms do not have the same variance, this condition of non-constant variance or non-homogeneity of variance is known as heteroscedasticity (Bedru and Seid, 2005). Accordingly, in order to detect the heteroscedasticity problems, Breusch-Pagan or Cook- Weisberg test was utilized in this study. This test states that if the p-value is significant at 95% confidence interval, the data has heteroscedasticity problem, whereas if the value is insignificant (greater than 0.05), the data has no heteroscedasticity problem. Thus, as shown in annex 3, there is no heteroscedasticity problem for this study hence the p value is 32.23% showing insignificant value.

3) Multicolinearity Test

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

The multicolinearity problem is solved by dropping highly correlated variables (Ahmad and Bashir, 2013).Then, the result provide more significant variables than before. To overcome this problem, VIF test was conducted. That means, the larger the value of VIF indicates the more collinearity of the

variables with each other. According to the rule of thumb, if VIF of a variable exceeds 10, the variable is said to be highly collinear (Bedru and Seid, 2005). Accordingly, the variance inflation factor tested. Based on the result there is no multicolinearity problem in this study. This is due to the fact that the mean of VIF of variable is 4.42 which is much lower than the threshold of 10.The VIF for each variable also very low. This indicates that the explanatory variables included in the model were not correlated with each other.

Based on the result of OLS regression model depicted in table 8, the variables poor due diligence assessment, insufficient grace period given by the Bank for the repayment, non-credit worthy project financing, financing second hand machines, lack of proactive measurement for the sign of default, willful default, rent seeking character of borrowers, poor financial record system of borrowers, misfortune of borrower, change of policy in the economic system, unavailability labor force in the project area, saturation of demand for the product of the project, remoteness from market, and unsuitable agro-ecological condition are explanatory variables that increase or significantly impact the occurrence of NPLs projects in Development Bank of Ethiopia. The p-value of other variables is greater than 5 percent critical value so that we fail to reject null hypothesis since the probability of doing error is greater than 5 percent critical while accept the alternative hypothesis.

Table 8: Result of Regression Analysis

Variables	Coef.	Std. Err.	t	P > t
Poor credit risk management	-0.03	0.23	-0.13	0.90
Elongated loan processing time	-075	0.38	-1.97	0.03
Poor due diligence assessment	1.47	0.64	2.30	0.03
Insufficient grace period	0.83	0.32	2.60	0.01
Overestimation of Cash Flow	-0.41	0.39	-1.07	0.29
Poor follow-up	0.23	0.23	0.99	0.33
Unable to provide timely decision	0.13	0.30	0.42	0.68
Rigid credit policy	-0.52	0.37	-1.41	0.17
Non-credit worthy financing	1.26	0.43	2.93	0.01
Financing with Relocated Machine	-0.42	0.42	-0.99	0.33
Financing second hand machine	1.76	0.76	2.31	0.03
Lack of proactive sign of default	1.054	0.48	2.21	0.03
Low capacity of credit performers	0.003	0.24	0.01	0.99
Lack of commitment by borrowers	-0.31	0.34	-0.90	0.37
Loan diversion	-1.52	0.85	-1.80	0.08
Poor management system of borrower	1.18	0.80	1.49	0.14
Poor repayment character of borrower	-0.62	0.47	-1.30	0.20
Willful default	1.060	0.50	2.12	0.04
Rent seeking character	3.97	1.54	2.57	0.01
Poor Financial Record	1.94	0.82	2.36	0.02
Misfortune of borrower	1.46	0.48	3.01	0.004
Change in economic policy	1.74	0.60	2.89	0.01
Unavailability skilled & unskilled labor	0.91	0.37	2.43	0.02
Riots	0.81	0.42	1.94	0.06
Lack of co-ordination of stakeholders	0.98	0.80	1.24	0.23
Economic cries	1.77	0.82	2.17	0.03
Electric power interruption	-0.07	0.25	-0.27	0.79
Demand fluctuation	1.23	0.51	2.42	0.02
Competition from imported goods	0.55	0.35	1.59	0.11
Competition from local suppliers	1.64	1.07	1.54	0.13
Deterioration of demand	0.24	0.48	0.57	0.62
Saturation of demand	1.78	0.69	2.57	0.01
Remoteness from market	2.51	0.96	-2.62	0.01
Unsuitable agro-ecological condition	3.05	1.19	2.56	0.01
Cons	14.58	5.25	2.78	0.01

Source: Authors' estimation (2016)

Among the significant variables such as variables poor due diligence assessment, insufficient grace period given by the Bank for the repayment, non-credit worthy project financing, financing second hand machines, and lack of proactive measurement for the sign of default are Bank related factors

significantly causing non-performing loans. Willful default, rent seeking character of borrowers, poor financial record system of borrowers and misfortune of borrowers are borrower related factors significantly causing no-performing loans. Change of policy in the economic system, unavailability labor force in the project area, saturation of demand for the product of the project, remoteness from market, and unsuitable agro-ecological condition are variables significant variables subject external factors causing non-performing loan projects in the Development Bank of Ethiopia.

On the other hand, on the above table, test of significance of the variables such as   Poor Credit risk Management, overestimation of cash flow, poor follow-up, unable to provide timely decision, rigid credit policy, financing with relocated machine, low capacity of credit performers, lack of Commitment by borrowers, loan diversion, poor management system of borrower, poor repayment character of borrower, riots, natural disaster, lack of co-ordination of stakeholders, economic crisis, electric power interruption, competition from imported goods, completion from local Supplier's, deterioration of demand, and saturation of demand are insignificant factors for increment of non-performing loan projects in Development Bank of Ethiopia.

5. Conclusion and Recommendation

5.1 Conclusion

The positive association between the foreign Direct Investment and NPL proved that the positive association is that with the increase in FDI, economic activities and credit in the country increases, with the passage of time when foreign investors' confidence in the economy declines or they anticipate depreciation of currency, lowering of interest rate after large inflow of money or expect financial crisis in repay the loan increases consequently NPLs

increases. The country, they suddenly withdraw their investments leaving Banks illiquid. This also results in the slowing down the pace of economic activities in the country, which results in the inability of the borrowers to repay that with the increase in interest rate the difference loans. Due to the increase in FDI, domestic lending increases more than the income of the households and firms results in growth of NPLs on the withdrawal funds of foreign investments. And it will expect that to have a positive impact of FDI on NPL$_S$. This study proved there is positive significant association between the NPL and GDP growth against to available literature, it is assumed if annual growth rate of GDP increased, the amount of nonperforming loan in the Banks will reduced. Different literatures suggested there is a significant negative association between growth in GDP and NPLs. The explanation for negative relation is that increase in growth of GDP leads to the ability to repay the loans increases, as a result NPLs decreases.

Conversely, with the decrease in GDP, to repay loan decreases resulting in the growth of NPLs. On the other hand this study found out that there is significant positive association of NPL and average exchange rate growth. The gradual devaluation of the value of Birr has made domestic product more and cheaper for importers from aboard and enhances export and increased the demand for domestically produced exportable goods. And conversely real appreciation would make export less competitive in the world market and hence decreased total export. The positive association of real effective exchange rate with NPLs and concluded that the inflationary pressure and increase in real average Exchange rate contributes to the growth in NPLs.

The study proved that there is negative association of export amount and the amount of non-performing loan in the long run. This implies that the Bank can reduce the risk of default by engaging financing of export oriented projects.

Among the significant variables such as variables poor due diligence assessment, insufficient grace period given by the Bank for the repayment, non-credit worthy project financing, financing second hand machines, and lack of proactive measurement for the sign of default are Bank related factors significantly causing non-performing loans. Willful default, rent seeking character of borrowers, poor financial record system of borrowers and misfortune of borrowers are borrower related factors significantly causing no-performing loans. Change of policy in the economic system, unavailability labor force in the project area saturation of demand for the product of the project, remoteness from market, and unsuitable agro-ecological condition are variables significant variables subject external factors causing non-performing loan projects in the Development Bank of Ethiopia.

5.2 Recommendation

The findings of the macroeconomic variables have policy related implications for the Development Bank of Ethiopia (DBE). DBE can use the findings to predict changes in the NPLs to take precautionary measures to prevent any financial crisis. The government can also play important role in improving the level of NPLs in the economy by influencing the macroeconomic variables. For instance, government should create conducive policy for thus projects that create forward and back ward linkage (producing input to other factors and receiving other factories output), low level of unemployment, economic activities in the economy and high exports. In order to increase the exports of tile country government can provide incentives to the manufacturer by developing basic infrastructure, reducing taxes, providing low cost loans and can help exporters in strengthen the existing relations and exploring new international markets(those markets which are not addressed by the country before). The government can increase the economic activities, employment rate, production level and exports by doing special agreements with the

neighboring countries (countries around and near to Ethiopian territories) for free trade.

 The finding of current study and future studies by using above mentioned variables can be helpful in predicting and controlling Banking crisis in the Development Bank of Ethiopia in particular and Ethiopian Banks in general. From the result of internal and external factors regression the researcher recommended the Development Bank of Ethiopia should develop effective and efficient due diligence assessment procedure complying complexity and dynamic characteristics of project and/or the borrowers. Sufficient grace period should be given for borrowers considering the implementation and turnover of the business. The other significant variables that cause NPLs is financing with second hand machineries so that the Bank policy makers should either avoid or minimize/scrutinize second hand machinery financing. The Bank should develop the system that helps to detect the proactively the sign of default. The Bank should change the policy in financing second hand machineries, proactively understand sign of default, the Bank should develop controlling mechanism for borrowers factors, and external factors in project financing so as to minimize the amount of non-performing loans in the Bank.

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