MACRO AND MICRO ECONOMIC DETERMINANTS OF NONPERFORMING LOAN: EVIDENCE FROM COMMERCIAL BANKS IN ETHIOPIA.

THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES JIMMA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIRENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF SCIENCE (MSC) OF

BANKING AND FINANCE

By: Abinet Abera

MAIN ADVISOR: DEMIS   HAILEGEBREAL (PhD)

CO-ADVISOR: MUHAMMEDNUR QADIRE

JIMMA UNIVERSITY

BUSINESS AND ECONOMICS COLLEGE

DEPARTMENT OF BANKING AND FINANCE

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CERTIFICATE

This is to certify that the thesis entitles "Determinant of non- performing loan: Evidence from commercial banks in Ethiopia." submitted to Jimma University for the award of the Degree of Master of Science Banking and Finance (MSc) and is record 0f bonafide research work carried out by Ms. Abinet Abera Amamo under our guidance and supervision.

Therefore, we hereby declare that no part of thesis has been submitted to any other

University or institutions for the award of any Degree or Diploma.

Main Adviser's Name   *Date*   *Signature*

Dr. Demis Hailegebreal   :_____   _____

Co-Advisor's Name   *Date*   *Signature*

Muhammednur Qadire   _____   _____

Declaration

I, hereby declare that this thesis entitled "Determinants of Nonperforming Loan::*evidence from commercial banks in Ethiopia* has been carried out by me under the guidance   and supervision of Dr. Demis Hailegebreal   and Ato *Muhammednur Qadire.*

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

Researcher's Name   Date   Signature

ABINET ABERA AMAMO   _____   ----------------------

Abstract

Loan or advances means any financial asset of the bank arising from the direct or indirect advances by a bank to people that were conditioned on the obligation of the person to repay the fund, either on a specified date or dates usually within interest.

The study was examined the bank-specific and macro-economic determinants of Non-performing loans (NPLs) of commercial banks in Ethiopia. In this study eight commercial banks were considered by using sampled data form 2010 to 2019. The bank's financial statement, National Bank of Ethiopia, central statistics agency and Ministry of finance and Economic Cooperation has been the main source for the study. The study employs quantitative research approach and panel regression random effect model was used. The study revealed that loan growth and bank size had a positive and significant influence on NPLs in Ethiopian commercial banks whereas; liquidity and gross domestic product had a negative and significant impact on NPLs in Ethiopian commercial banks. That commercial banks in Ethiopia should consider the macro economic factors before extending Micro economic variables.

Key words*: Non-performing loans; Macroeconomic determinants; Bank specific determinants, Panel regression model.*

Acknowledgement

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Acronyms & Abbreviations

AIB: - Awash International Bank

ALR: Average lending rate

ARDL: - Autoregressive Distributed Lag

ATM: - Automated Teller machine

BOA: - Bank of Abyssinia

CAR: - Capital Adequacy Ratio

CBB: - Construction and Business Bank

CBE: - Commercial Bank of Ethiopia

CBE- Commercial Bank of Ethiopia

 CEMAC: - Central African Economic and Monetary Community

CEEC: - Central Eastern European Countries

CESEE: - Central, Eastern and south eastern European

CIT: - Corporate Income Tax

CPI: - Consumer Price Index

 CSA: - Center of Statistical Agency

DB: - Dashen Bank

ETR: - Effective Tax Rate

GDP: - Gross Domestic Product

GMM: - Generalized Methods of Moments

IMF: - International Monetary Fund

INFR: - Inflation Rate

LTD: Loan to deposit

MENA: - Middle East and North Africa

NBE: - National Bank of Ethiopia

NIB: - Nib International Bank

NPL: -Nonperforming Loan

OLS: - Ordinary Least square

ROA: -Returns on Asset

ROE: -Return on Equity

SPSS: -Statistical Package for Social Sciences

UB: - United Bank

US: - United States

VIF: - Variance Inflation Factors

WB: - Wegagen Bank

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Lending rates were one of the essential financial determinant of nonperforming loans/bad credits in Ethiopia. The loan portfolio was typically the largest asset and the predominant sources of revenue for commercial banks. As such, it was one of the greatest sources of risk to a bank's safety and soundness (Richard, 2009).

According to business directives of National bank of Ethiopia "loan" or advances" means any financial asset of the bank arising from the direct or indirect advances by a bank to a person that were conditioned on the obligation of the person to repay the fund, either on a specified date or dates usually within interest (Tsinghua, 2008) .While performing one of its main functions granting loan, the bank was exposed to credit risk. Nonperforming loans was a loan whose credit quality has deteriorated and the full collection of principal and/or interest as per the contractual repayment terms of the loan/advances was in question and delayed for more than 90 days(NBE, 2008). The issue of non-performing loans has gained increasing attentions because the immediate consequence of large amount of NPL in the banking system was bank failure (Holger, 2008). The Study reveals there were a lot of variety that could be tackle loan management system of the banks in Ethiopia such as, due to lax credit standard, poor portfolio risk management, or weakness in the economy; loan portfolio problems had historically been the major cause of bank loss and failures (Wondimu, 2007). Effective management of loan portfolio and the credit function was fundamental to bank's safety and soundness. Loan portfolio management (LPM) was the process by which risks that were inherent in the credit process are managed and controlled. Healthy loan portfolios were vital assets for banks in view of their positive impact on the performance of banks. Unfortunately, some of these loans usually do not perform and eventually result in nonperforming which affect banks' earnings on such loans (Fofack, 2005).

These non-performing loans become cost to banks in terms of their implications on the quality of their assets portfolio and profitability.

The rise of non-performing loan portfolios in banks significantly contributed to financial distress in the banking sector. Non-performing loans were the main contributor to liquidity risk, which exposes

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banks to insufficient funds for operations. As loans & advances were the major portion of bank's asset, when they become non-performing, it will affect both profitability and liquidity of the bank.

Any loan facility that was not up to date in terms of payment of principal and interest contrary to the terms of the loan agreement was NPLs. Thus, the amount of nonperforming loan represents the quality of bank assets (Tseganesh, 2012).The minimization of NPL was a necessary condition for improving economic growth. When NPL retained permanently, these would had an impact on the resources that were enclosed in unprofitable areas. Thus, NPL were likely to hamper economic growth and reduce the economic efficiency (Hou, 2007). The shocks to the financial system can arised from factors specific to the company (idiosyncratic shocks) or macroeconomic imbalances (systemic shocks).Besides, inconsistent results in different studies among researchers were also another motive to conduct this study. To this end, the main objective of this study would be to examine the bank specific and macroeconomic determinants of NPLs of commercial banks in Ethiopia. This initiates the bank management and executives with applied knowledge on the management of identified variables and provides them with understanding of activities that would enhance their loan quality and play active part in the filling gap in undertaking the concept of NPLs.

1.2 Statement of the problem

One of the main functions of commercial banks was channeling funds from people who had surplus funds to people who have deficit fund by accepting deposit and granting loans and advances. Loans were forming a greater portion of the total assets in banks. But, granting loan was the riskiest service because of the credit risk, which was directly related to non-performing loans. Non-performing loans reduce the banks" earning capacity, leading to bank distress and financial crises that shrink the levels of domestic investment, put pressure on government revenue to bail the failed banks, and ultimately hinder the intermediation role of banks Aremu, Suberu & Oke, (2010) .According to Brown bridge, (1998) many empirical researches have shown that most of the time banking failures or banking crisis were caused by non-performing loans).

Despite the heavy regulation and ongoing efforts made to control the banking industry in general and the lending activities in particular, the NPLs problems were still a worldwide headache and a major concern for both international and local regulators (Baldrige 2009).In Ethiopia, the banking environment has undergone many regulatory and financial reforms like other African countries with the aim of improving profitability, efficiency and productivity (Lelissa 2007).Despite these changes,

the banking industry in Ethiopia was characterized by operational inefficient, little and insufficient competition and perhaps can be distinguished by its market concentration towards the big government owned commercial bank, poor credit risk management practices and eventually less contribution to the GDP as compared to the developed world financial institutions (Abera 2012, Tefera 2011 and Tilahun 2010). In this regard, to control the adverse impact of increasing non-performing loans in Ethiopian banking sector, the National Bank of Ethiopia has issued a directive which strictly requires all banks to maintain ratio of their non -performing assets below five percent in 2008.

Following the 2008 NBE declaration, NPLs of ECBs had shown a significant improvement and lowered to an average of 5 % (NBE 2011). However, there was a significant variation on the reduction of NPLs from banks to bank. In some bank the change was abrupt and surprise while in the others the change was steady and constant. Each non-performing loan in the financial sector was viewed as an obverse mirror image of an ailing unprofitable enterprise. Virtually all research on the causes of bank and thrift failures found that failing institutions had large proportions of non-performing loans prior to failure and those non-performing loans were a statistically significant predictor of insolvency (Berger & De Young, 1997). From this point of view, the eradication of non-performing loans was a necessary condition to improve the economic status of the financial institution. First and most effective step to treatment of this chronic and epidemic pain was pathology and then finding of effective solutions for modifying and improving of banks conditions as the country's greatest economic patient. Pathology of causes and factors that would raise NPLs amount and provision of practical solutions could reduce the damaging effect of NPLs on banks (Sinkey, 2002:90 sited in Biabani et al., 2012).

Many studies had examined the causes of non-performing loans in several countries around the world; however, little research has gone to the study of the determinant of NPLs in Africa (Onsarigo, et al., 2013). Like most Africa countries, in Ethiopia, to the knowledge of the researcher, there has not been much research which was conducted on determinants of loan defaults except for the study of Daniel (2010), Geletta (2012), Testate (2015), Habtamu (2015), Anisa (2015) and Mesay (2017). The related studies conducted by Daniel (2010), Geletta (2012), Tesfaye (2015) and Habtamu (2015) assessed the determinants of NPLs in Ethiopian commercial banks focusing on bank-specific variables. The study by Anisa (2015) and Mesay (2017) combined both the macroeconomic and bank specific factors but both the studies utilize the same macroeconomic variables. Accordingly, as

per the knowledge of the researcher, the macroeconomic determinants of NPLs in Ethiopian banking sector were not addressed. Moreover, all the studies except for the study of Mesay (2017) use the data before the year 2013 so the current impact of the determinants on NPLs was not studied. Therefore, the existing knowledge gap along with the very threat of NPLs initiates the researcher. Therefore, the purpose of this study would be to examine determinants of non-performing loan at commercial banks of Ethiopia.

1.3 Objectives of the study

1.3.1 General Objectives

The main objective of this study was to examine the determinants of nonperforming loan of commercial banks in Ethiopian.

1.3.2 Specific objectives

The specific objective of the study would be;

1. To would be better internal factors (liquidity, return on asset, capital adequacy, bank size, loan growth and interest rate) that affect NPLs of commercial Banks of Ethiopia
2. To would be better external factors (macroeconomic such as GDP, inflation, lending rate and exchange rate) factors affecting NPLs of commercial Banks of Ethiopia

1.4 Research Hypothesis

The purpose of this study was to examine the determinants of nonperforming loans (NPLs) of commercial banks in Ethiopia. The conventionalism investigation career around the international demonstrate deferent result on detractor of nonperforming loans of the financial surface. From the review of empirical literature, the researcher perceived as there was no consistency in the results for the (2012) on the title of "Determinants of Nonperforming Loans of Banking surface in Ethiopia" was find as interest rate has no impact on the limits of NPLs via OLS regression model. But, the investigation of Saba *et al.* (2012) on the title of "Determinants of Nonperforming Loan on US Banking sector" found negative interpretation ill turn of lending rate and positive version ill trun of truth GDP per capital and inflation rate on NPL via OLS regression model. According to the study of Louzis *et al.*(2010) examined the detractor of NPLs in the Greek financial surface using dynamic panel data model and find out as real GDP growth rate, ROA and ROE has negative whereas loan Jobless employee and inflation rate had positive version while loan to deposit ratio and capital

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adequacy ratio had interpretation ill turn on NPLs. However, Swamp (2012) examined the determinants of NPLs in the Indian banking sector used panel data and found as GDP growth rate, inflation, capital adequacy and bank lending rate had insignificant effect on NPLs. According to Shingjergji (2013) and Baldrige *et al.* (2009) ROA had significant negative effect on NPLs whereas Makri *et al.* (2014) find out as ROA does not sign any version impact over NPL ratio.   In this section the researcher developed testable hypotheses to examine the relationship between bank specific and macroeconomic determinants nonperforming loans of commercial banks in Ethiopia. Thus, focus on revise related literatures, the researcher maintain the following null hypotheses to esteem the appoint to relationship of certain bank and macroeconomic determinants with nonperforming loans of commercial banks in Ethiopia based on empirical evidence reviewed in the literature parts. Since, the null hypothesis was the statement or the statistical hypothesis that was actually being tested (Brooks, 2008 p. 52), the following hypotheses were null hypotheses to be tested.

H1. Capital Adequacy (CA) has negative relation with NPLs of commercial banks in Ethiopia.

H2. Bank size (BS) has positive relation with NPLs of commercial banks in Ethiopia.

H3. Exchange rate (EXR) has negative relation with NPLs of commercial banks in Ethiopia.

H4. Gross domestic product (GDP) has negative relation with NPLs of commercial banks in Ethiopia.

H5. Inflation rate (INF) has negative relation with NPLs of commercial banks in Ethiopia .

H6. Loan growth (LG) has positive relation with NPLs of commercial banks in Ethiopia.

H7. Liquidity (LIQ) has positive relation with NPLs of commercial banks in Ethiopia.

H8. Return on asset (ROA) has positive relation with NPLs of commercial banks in Ethiopia.

1.5 Significance of the study

The finding of this study which details with the determinants of nonperforming loan of Commercial banks in Ethiopia were beneficial for different stakeholders such as, for academicians, bank sectors, as well as for the researcher to develop technical knowhow of how academic research's developed technically. In addition, since such investigation had policy implication, the finding of this study might be used as a directive input in developing regulatory standards regarding the lending policies of commercial banks of Ethiopia. This study initiates the commercial Bank management to give due emphasis on the management of the identified variables and provides them with understanding of

activities to enhance their loan performance indicate which factors more affecting the banks business activity.

1.6 Scope of the Study

This study was adjusted to fit its objectives of examining the determinants of NPLs of commercial banks in Ethiopia within the limits of specified time and possibility. The researcher decided to limit this study to the commercial banks found in Ethiopia. These banks would be selected since they were senior banks and were expected to had more experience on the lending activities. Besides, these banks extend credit facilities to almost all major sectors of the economy. Again the nationwide credit operation of the banks presents an opportunity for a national outlook of the issues under study. The study covers from 2010 to 2019 NPL of commercial banks in order to get recent data.

1.7 Organization of the paper

The study was organized into five chapters. The first chapter starts with presenting background of the study, statement of the problem, objective of the study, significance of the study, scope and limitation of the study. The second chapter focuses on both theoretical and empirical review of related literature. The third chapter deals with the research methodology. Chapter four deals with the Result and Discussion and the fifth chapter contain the conclusion and recommendation of the study including the direction for further study

CHAPTER

TWO

2. REVIEW RELATED LITERATURE

2.1 Theoretical Review

2.1.1 Theories underpinning non-performing loan

2.1.1.1 Deflation theory

Fisher, (1933), which suggests that when the debt bubble bursts the following ensuing of events occurs; debt liquidation leading to distress solled and contraction of deposit money , as bank loans were paid off. This contraction of deposits causes a fall in the specific of prices, which leads to greater fall in the net worth of business, further more precipitating bankruptcies which leads the concerns running at a loss to make a reduction in output, in trade and in employment of worke. These cycles cause complicated disturbances in the rates of interest and a fall in the money value. The complicated disturbances described above can be summed as both external and internal forces (macro and micro factors) influencing state of over-indebtedness existing between, debtors or creditors or both which can compound to loan defaults.

2.1.1.2 Financial theory

Pioneered by Minsky (1974), also known as financial instability hypothesis, and attempted to provide an understanding and description of the characteristics of financial problem. The theory suggests that, in prosperous times, when corporate cash flow shows beyond what was needed to pay off debt, a speculative euphoria develops, and soon thereafter debts exceed what borrowers can pay off from their incoming revenues, which in turn produces a financial problem. As the outcome of such speculative borrowing bubbles, banks and lenders tighten credit available, even to firms that can afford lending and the economic subsequently contracts. The theory described three types of borrowers that contribute to the accumulation of insolvent debt: The "hedge borrower" caudle made debt payments (covering interest and principal) from current cash flows from investments. For the "speculative borrower", the cash flow from investments could be service the debt, i.e., cover the interest due, but the borrower must be similarly roll over, or re-borrow, the principal. The "Ponzi

borrower" borrows based on the belief that the appreciation of the value of the asset would be sufficient to refinance the debt but could not made sufficient payment on interest or search with the cash transfer from investments; only the appreciating the value of asset can keep the Ponzi borrower afloat. Financial theory underpins this study in that, a hedge borrower would had a normal loan and was paying back both the principal and interest; the speculative borrower would had a watch loan; meaning loans" principal or interest is due and unpaid for 30 to 90 or have been refinanced, or rolled-over into a new loan; and the Ponzi borrower would have a substandard loan, meaning the payments do not cover the interest amount and the principal was actually increasing. The primary sources of repayment are not sufficient to service the loan. The loan was past due for more than 90 days but less than 180 days. Watch loans and substandard loans were nonperforming loans, hence applicability of financial theory in this study.

2.1.1.3 Asymmetry Theory

The theory defined that inside the market, the party that possesses more deferent idea on a specific item to be transacted was in a direction to negotiate optimal term for the transaction than the other party (Auronen, 2003).The party that knows less about the same specific item to be transacted was therefore in a position of making either right or wrong decision concerning the transaction. It may be difficult to distinguish well from bad borrowers (Richard, 2011). This may outcome into adverse choice and moral hazards problems. Adverse selection and moral hazards had led to significant accumulation of Non-Performing loan in banks (Bester, 1994).

2.1.1.4 Agency Theory

According to the Agency theory, the principal agency problem could be reduced by better monitoring such as establishing more appropriate incentives for managers. In the field of corporate risk management agency issue had been shown to influence managerial attitudes towards risk taking and hedging Smith and Stulz (1985). Theory also identifies a possible mismatch of interest between shareholder management and debt holders due to asymmetries in earning distribution, which could outcome in the company taking too much problem or not engaging in positive net value project (Smith and Stulz, 1987). Therefore, agency theory implies that explain hedging policies could have important influence on company value (Fite and Pfleiderer, 1995).

2.1.1.5. Stakeholder theory

Stakeholders" theory, developed originally by Freeman (1984) as a managerial instrument, had since evolved into a theory of the campany with high explanatory potential. Stakeholder theory focuses explicitly on equilibrium of stakeholder's interests as the main detractor of corporate policy. The most promising contribution to risk management was the extension of implicit contracts theory form employment to other contracts, Including sales and financing Cornell and Shapiro, (1987). To certain industries, particularly high-tech and services, consumer trust in the company could be continuing offering its services in the future could substantially contribute to company value. However, the value of these implicit claims was highly sensitive to expected costs of financial distress and bankruptcy. Since corporate risk management training lead to a decrease in these expected costs, frim value shows (Kleczka, 2005). Here of, stakeholder theory provides a new high - minded into possible cause for risk management. However, it has not yet been tested directly. Investigations of currency distress hypothesis provide only indirect evidence (Judge, 2006)

2.1.2 Overview of NPL in Commercial banks of Ethiopia.

In Ethiopia, the banking environment had undergone many regulatory and financial reforms like other African countries with the aim of improving profitability, efficiency and productivity (Lelissa 2007).Despite these changes, the banking industry in Ethiopia had characterized by operational inefficient, little and insufficient competition and perhaps could be distinguished by its market concentration towards the big government owned commercial bank, poor credit risk management practices.Operational inefficiency and poor credit risk management were usually associated with sizeable volume of NPLs (Berger and Humphrey 1992). In this regard, to control the adverse impact of increasing non-performing loans in Ethiopian banking sector, the National Bank of Ethiopia had issued a directive which strictly requires all banks to maintain ratio of their non -performing assets below five percent in 2011. However, NPLs of EPCBs were still high as compared to the developing economy banks like, Namibia, Mozambique and Uganda (Fofack, 2013). Hence, EPCBs were still expected to reduce their NPLs as low as possible in order to achieve their optimal profit and ultimately improve the soundness of the financial system.

Presently there were seventeen private and one state owned commercial banks operating in Ethiopia. Surveyed financial data of banks at the end of September ,2020 indicate the ratio of NPL for Awash International Bank (AIB) 2.3%, Dashen Bank (DB) 1.7%, Bank of Abyssinia (BOA) 1.8%,

Cooperative bank of Oromia (CBO) 1.8%, Oromia International Bank (OIB) 2.3%, Zemene Bank (ZB) 8.8%, Wegagen Bank (WB) 3.1% , United Bank(UB) 1.2%, Nib International Bank (NIB) 3.1%, Lion International Bank (LIB) 2.6%, Buna International Bank (BuIB) 1.3%, Berhan International Bank (BIB) 4.7 % . This shows that NPL assets were still high, deserving due attention of managements and board of directors as well as regulatory body National Bank of Ethiopia (NBE).

The occasion for lend default change in different countries and have a multidimensional aspect both, in growing and developed nations. Theoretically there were so many reasons as to why loans fail to perform. Some of these include affected economic conditions, high real interest rate, inflation, lenient terms of credit, credit orientation, high credit growth and risk appetite, and poor monitoring. NPLs could arise from factors specific to the bank or macroeconomic conditions (Emmanuel, 2014).

2.1.3 Measurement of non-performing loans

In recent years the global financial problem and the subsequent recession in many developed countries had increased households' and company defaults, causing version losses for banks Khon and Best (2007). In this study the non-performing loans would be measured based on banks internal factors and customer related factors.

2.1.4 Banks' internal factors causing non-performing loans

These internal factors affect lending behavior of the bank. Literature on banks internal factors that affects non-performing loans were reviewed in the following Bank's loan supervision capacity

The impact of bank's loan supervision capacity on NPLs was extensively documented in the literature. In fact, several studies report that bank's loan supervision capacity was positively related to NPLs (Abafita, 2003, Aballey; 2009, Kagimba; 2010). According to these researches the related means that good supervision ability contributes to lower non- performing loans and bad supervision ability increases non- performing loans

2.1.4.1 Asset Quality

According to Grier (2007), "poor asset quality was the main cause occasion of most banks declared". A most important asset branch was the loan portfolio; the greatest risk facing the bank was the problem of loan losses derived from the delinquent loans. The credit analyst should carry out the asset quality assessment by performing the credit risk management and estimating the quality of loan

portfolio using trend analysis and peer comparison. Measuring the asset quality was difficult because it was mostly derived from the analyst's subjectivity.

2.1.4.2 Management Quality

Management quality was basically the capability of the board of directors and management, to identify, measure, and control the risks of an institution's activities and to ensure the safe, sound, and efficient operation in compliance with applicable laws and regulations William F. Caton, (1997) The top management with good quality and experience had preferably excellent reputation in the local communication. Management relationship to the competency of the bank's managers, using their expertise's to make subjective judgments, create a target vision, and other similarity of qualities. Management was the key variable which determines a banks" success. The evaluation of the management was the hardest one to be measured and it is the most unpredictable (Golin, 2001).

2.1.4.3 Liquidity

There could be adequacy of liquidity foundation compared to present and future needs, and availability of assets simply convert to cash without undue loss. The fund management practices should ensure an institution was could be maintain a level of liquidity sufficient to join its currency duties in a timely manner; and ability of quickly liquidating assets with minimal loss. Banks made money by mobilizing short-term deposits at lower interest rate, and loan or investing these funds in long-term at higher rates, so it was hazardous for banks mismatching their lending interest rate (Holger, 2008).

2.1.4.4 Return on Asset

It is an important indicator of the performance of a bank since it determines the profitability of the bank based on its assets. Growing NPLs slowdown interest earning capacity due to their no recognition of interest and, on the other hand, provision for NPLs grows interest suspense but decrease realized profits. In the context of emerging market economic, the foundation of Godlewski (2004) obtained that there was a negative impact of return on assets on the level of non-performing loans.

2.1.4.5 Capital Adequacy

One of the examined financial factors was the capital adequacy ratio. It measures the risk that a bank could undertake. Capital adequacy ratio was calculated by adding tier 1 capital to tier 2 capital and dividing by risk weighted assets which was guided by Basel accord. Generally, capital adequacy

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ratios affect positively or negatively to the aggregate NPLs (Sinkey and Greenaway 1991). According to Mukherjee (2003), the presence of large amount of NPLs was responsible for the decline in the profit margin of many banks.

2.1.4.6 Bank size

Rajan & Dahl (2003) in their study of commercial banks in India they used panel regression analysis. Their study also indicates that bank sizes had significance on occurrence of NPLs. Sala &Saurian (2003) indicated that bank size was among the factors that explained variations in NPLs for Spanish banks. Besides, Bikker & Hu (2002) also shows that bank size was significantly related rate of occurrence of loan default.

2.1.4.7 Loan Growth

Many studies indicate that loan delinquencies were associated with rapid credit growth. Keeton (1999) used data from commercial banks in the United States from 1982 to 1996 and a vector auto regression model indicates this association between loan and rapid credit growth. Sinkey and Greenwalt (1991) also studied large commercial banks in the US and found out that excessive lending explains loan loss rate.

The commercial banks that charge high interest rate would relatively face a high loan default rate. A study by Waweru & Kalini (2009) on commercial banks in Kenya used statistical analysis indicates that high interest rate charged by the banks was one of the internal factors that leads to incidence of non-performing loans. Bikker & Hu (2002) on 29 OECD countries, banks profit margin demonstrated by high interest rate affects occurrence of NPLs. In fact several studies report that high interest rate and non- performing loans were positively related (Sinkey and Greenwalt, 1999, Ewert, schenk and Szczesny, 2000, Fofack, 2005, Jimenez and Saurina, 2005, Mwakoba, 2011). The explanation provided by the literature was that banks charge high interest rates when they perceive higher risk of default. This causes more borrowers to borrow money from banks.

2.1.4.9 Lending rates

Lending rates were one of the essential financial determinant of nonperforming loans/bad credits. According to Glen and Mondragon-Velez (2011), changes of lending rate would influence the capacity of borrowers to continue paying interest for the loan borrowed. When economies develop strongly, bank would not anticipate abnormal deterioration in their credit portfolio execution. This was because only a small portion of loans would go default. However, in the event that the recession

happens, borrowers may not be able to pay for the interest of the loan borrowed.In this way, they accept that loan default positively related to lending rate.

2.1.5 Macroeconomic factors

Large number of the letter indicators the linkage between the phases of the financial cycle with banking stability. Macroeconomic stability and banking soundness were inexorably linked. Economic theories and other information hardly indicate that instability in the macroeconomic was associated with instability in banking and financial markets and vice versa. The relation between the macroeconomic environment and loan quality had been investigated in the literature linking the phase of the business cycle with banking stability. In this line of research, the estimation was formulated that the distribution phase of the economy was characterized by a relatively low number of NPLs, as both consumers and face accompany enough stream of income and revenues to service their debts. However, as the booming period continues, credit was extended to lower-quality debtors and subsequently, when the recession phase sets in, NPLs increase (Fisher 1999).

2.1.5.1 Gross Domestic Product (GDP)

According to Salas and Saurian (2002) there was a significant negative concurrent effect of GDP growth on the NPL ratio and infer a quick transmission of macroeconomics grows to the capacity of economic agents to service their loans. The clarification given by the writing for this relationship was that, Changes in business cycle affect the credit value of borrowers in terms of reimbursement capacity. Consequently, solid positive development in genuine GDP as a rule interprets into more pay which makes strides the obligation overhauling capacity of borrower which in turn contributes to lower NPLs. Then again, when there was moderate down in the economy low or negative GDP development), the financial exercises in common were diminishing and the volume of cash held for either businesses or families was diminishing. These conditions contribute in falling apart the capacity of borrowers to reimburse the advances, which lead to increment the probability of delays their budgetary commitments and hence banks" introduction to credit hazard increment. In this respect, how (2006) famous that, each NPL in the monetary division is seen as a front-side reflect picture of a sickly unbeneficial venture.

2.1.5.2 Inflation

Like GDP and exchange rates, inflation influences borrower's obligation overhauling capacity through diverse channels and its effect on NPL can be positive or negative (Fofack 2005, Pasha and Khemraj (2009) and Nukus 2011). The clarification given by the writing for this relationship was that, higher expansion can make obligation overhauling less demanding by decreasing the genuine esteem of extraordinary advances especially when the credit rates were settled (banks do not adjust rates in understanding to the inflation alter to preserve their genuine returns). However, it can additionally weaken some borrower's potential to provider debt by means of reducing real income. Besides, when advance rates were variable (adjusted in understanding to the inflation alter), inflation was likely to diminish borrower's advance overhauling capacity as lenders alter rates to preserve their genuine returns or essentially to pass on increments in arrangement rates coming about from financial approach activities to combat expansion. Against this foundation, the relationship between NPL and inflation can be positive or negative.

2.1.5.3 Exchange Rates

Exchange rate was influences borrower's obligation overhauling capacity through diverse channels and its effect on NPL can be positive or negative (Nkusu 2011). As famous in Pasha and Khemraj (2009), deterioration of the trade rate could have blended suggestions on borrower's obligation overhauling capacity. On the one hand, it could progress the competitiveness of export-oriented firms. As long as the esteem of household money deteriorated (lower), export-oriented firms could had rule the worldwide showcase at lower cost (since their production fetched was secured in household money which had lower esteem than foreign currency and their income was collected in foreign cash which had higher esteem as compared to the residential cash. Subsequently, devaluation of trade rate could move forward the debt-servicing capacity of export-oriented borrowers. On the other hand, it could unfavorably influence the debt-servicing capacity of borrowers who borrow in outside cash (import-oriented firms).

2.2 Empirical Literature

One of the studies in this regard was that of Sakiru et al. (2011) on macroeconomic determinants of nonperforming loan on banking system in Malaysia. Their study was covered bank`s data for monthly time series of 2007:1 to 2009: 12 periods.The study utilized ARDL approach and the finding reveals that lending rate had a significant positive effect on NPLs and justifies that, at the

duration of advanced lending rate, NPLs was anticipated to accession Justification a rise in the rate of default by borrowers.

Hyun and Zhang (2012) investigated the impact of macroeconomic and bank-specific factors of nonperforming loans in US for two distinct sub-sample periods that is from 2002-2006 (pre financial crisis) and 2007-2010(during financial crisis). The variables was included both macroeconomic factors namely GDP growth rate, Jobless rate and lending rate. Negative effect of lending rate on NPLs implies that an increase in lending rate curtail peoples' /business entity's' ability to borrow, which decreases the amount of loan and then reduce NPLs. Beside, statistically significant and negative solvency ratio effect on NPLs, implies that the higher the Solvency ratio, the lower the incentives to take riskier loan policies, and consequently, reduce the amount of problem loans. However, bank size has no effect. During financial crisis also solvency ratio, GDP growth rate, unemployment rate and ROE all have a negative impact on NPLs while lending rate has no significant effect on NPLs. Size allows for more diversification opportunities as larger banks can compose less concentrated portfolios that include borrowers from different industries, geographical Locations, capital size and other customer segments.

Besides, Ahmed and Bashir (2013) conducted a study on the "Macroeconomic Determinants of Nonperforming Loan of Banking Sectors in Pakistan": The study was conducted on 30 commercial banks from total of 34 banks in 1990-2011periods. The main aim of the study was to investigate impact of inflation, credit growth, GDP growth rate, Unemployment rate, consumer price index and lending/interest rate, on nonperforming loan. They found negative effect of lending rate and GDP growth rate on NPLs. Their justification for negative association between lending rate and NPLs implies that as lending rate increase, individuals with funds starts saving with the banks to pay on their funds but investors with the profitable projects was feel reluctant to borrow and invest. Besides, existing borrowers pay back their loans to keep their credit rating good as to get loans in the future at discount rates. Similarly, on their study of banks specific factor of NPLs of banking sectors in Pakistan from2006-2011in 2013, they found positive significant effect of ROA but insignificant effect of ROE on NPLs.

Their cause for positive idea to relationship between ROA and NPLs implies that in order to increase the short term earnings, banks management portray wrong picture to the investors relating the future profitability and positive return prospects. Consequently, investors start borrowing from the banks

and invest in the lower profitable projects. This outcome in the current good performance and profitability of the banks but because of the wrong forecasting, returns on the investments are not according to the investors' estimation, outcome the incapacity of the investors in repayment of loans thus leading to the grows in NPLs.

The study of Saba et al. (2012) in the title of "Determinants of Nonperforming Loan on US banking direction" also ermine that bank specific and macroeconomic variables of nonperforming loans from 1985 to 2010 period using OLS regression model. They considered total loans, lending rate and Real GDP per capital as independent variables. The finding reveals as real total loans have positive significant effect whereas interest rate and GDP per capital has negative significant association with NPLs.

Louzis et al. (2010) related study to analysis the determinants of NPLs inside the Greek financial sector using fixed influence model from 2003-2009 duration. The variables included were ROA, ROE, solvency ratio, loan to deposit ratio, inefficiency, credit growth, lending rate and size, GDP growth rate, unemployment rate and lending rates. The finding reveals that loan to deposit ratio, solvency ratio and credit growth has no significant effect on NPLs. However, ROA and ROE has negative significant effect whereas inflation and lending rate has positive significant effect on NPLs. It justifies that performance and inefficiency measures may serve as proxies of management quality.

Ali and Iva (2013) who conducted study on "the impact of bank specific factors on NPLs in Albanian banking system" considered Interest rate in total loan, credit growth, inflation rate, real exchange rate and GDP growth rate as determinant factors. They utilized OLS regression model for panel data from 2002 to 2012 period. The finding reveals a positive association of loan growth and real exchange rate, and negative association of GDP growth rate with NPLs. However, the association between interest rate and NPL is negative but week. And also inflation rate has insignificant effect on NPLs.

Besides, Mileris (2012) on the title of "macroeconomic determinants of loan portfolio credit risk in banks" was used multiple and polynomial regression model with cluster analysis, logistic regression, and factor analysis for the prediction. The finding indicates that NPLs are highly dependent of macroeconomic factors.

However, Swamy (2012) conduct study to examine the macroeconomic and indigenous determinants of NPLs in the Indian banking sector using panel data a period from 1997 to 2009. The variables

included were GDP growth, inflation rate, per capital income, saving growth rate, bank size, loan to deposit ratio, bank lending rate, operating expense to total assets, ratio of priority sector`s loan to total loan and ROA. The study found that real GDP growth rate, inflation, capital adequacy, bank lending rate and saving growth rate had insignificant effect.

Similarly, Farhan et al. (2012) in the title of "Economy Determinants of Non-Performing Loans: Perception of Pakistani Bankers" used both primary and secondary data in 2006 years.

 The data was collected from 201 bankers who are involved in the lending decisions or handling nonperforming loans portfolio. Relationship and regression examine was carried out to analyze the impact of selected independent variables. The variables included were interest rate, energy crisis, unemployment, inflation, GDP growth, and exchange rate. The study found that, interest rate, energy crisis, unemployment, inflation and exchange rate has a significant positive relationship whereas GDP growth has insignificant negative relationship with the non-performing loans.

According to an Empirical Study made on Commercial Banks in Pakistan by Badar & Yasmin (2013) in the study, inflation, exchange rate, interest rate, gross domestic product and money supply were included as macroeconomic variables. They applied vector error correction model. The study found that as there are strong negative long run relationships exist of inflation, exchange rate, interest rate, gross domestic product and money supply with NPls. The objectives of the study were to assess the impact of credit information sharing on nonperforming loans, to identify the factors that account for bad loans and to determine the economic sector that records higher bad loans and the efforts taken to reduce the risk in this sector.The study found as lending rates has positive significant effect on NPLs. It justifies as these causes make many borrowers not to pay their loans hence leading to many bad loans.

Similarly, Joseph (2011) who conducted study on the title of effects of interest rate spread on the level of non-performing assets of commercial banks in Kenya was considered interest rate spread/cost of loan as independent and NPLs ratio as dependent variables. The study applied descriptive research design. Both primary and secondary data were considered from 43 commercial banks in 2010. It was analyzed by the help of SPSS software.However, Konfi (2012) who conducted study on the determinants of nonperforming loans on the operations of SINAPI ABA TRUST microfinance institutions in Ghana found as high interest rate was not significant factors causing the

incidence of NPLs.If a borrower is in default of both principal and interest, then one cannot assert that high interest rate is the actually the cause of the loan default.

Besides, the study conducted in Ethiopia by Wondimagegnehu(2012) on "the determinants of Nonperforming loan on commercial banks of Ethiopia" also found as poor credit assessment, failed loan monitoring, underdeveloped credit culture, lenient credit terms and conditions, aggressive lending, compromised integrity, weak institutional capacity, unfair competition among banks, willful defaults by borrower and their knowledge limitation, fund diversion for un expected purposes and overdue financing has significant effect on NPLs. Besides, the study of Wondimagegnehu (2012) considers interest rate as bank specific factors and revealed as interest rate has no impact on the level of NPLs of commercial banks in Ethiopia. Besides, most of the related literatures reviewed cover different studies made both in developing and developed countries' banking industries. Even if quite numbers of studies have investigated on the determinants of NPLs, most of these studies have been done in developed countries with few being done in developing countries. Thus, as to the knowledge of the researcher, there is still limited number of literatures regarding to the problem in question, with the exception of a study made by Wondimagegnehu (2012), Gadise Gezu (2014), Habtamu (2015) on the determinants of NPLs of banking industry in Ethiopia. However, there is time gap and variable of study differences between the previous researches and the proposed study of this paper. This study therefore, seeks to fill this gap by establishing the link between nonperforming loans and its determinants (bank specific and macroeconomic factors) in case of commercial banks in Ethiopia. Therefore, the purpose of this study will be to examine determinants of nonperforming loan at commercial banks of Ethiopia

2.3 Conceptual Framework

The conceptual frame work which describes the relationship between NPL with internal bank factors and macroeconomic factors based on the theoretical and empirical perspectives will be formulated as follows: -
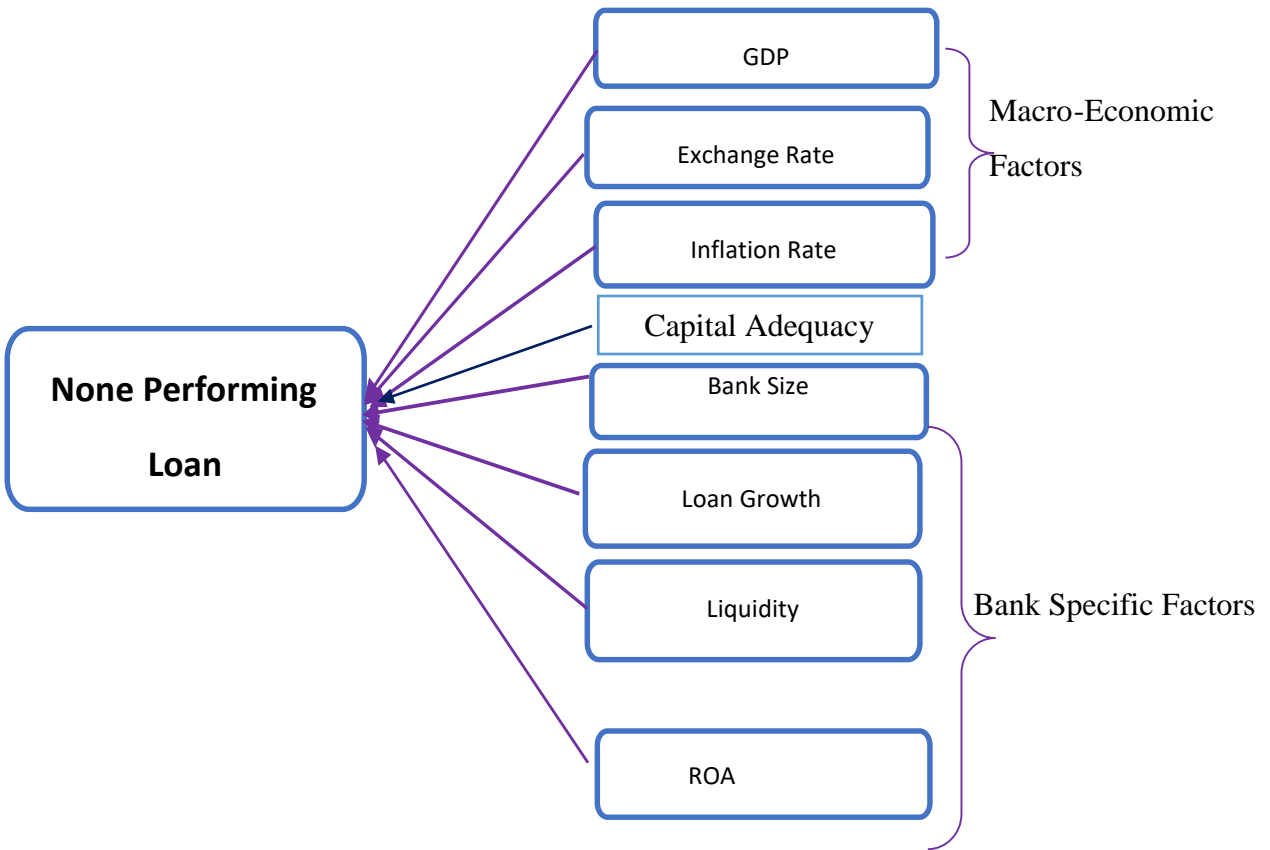
Figure 1 conceptual source.

CHAPTER THREE

RESEARCH METHODOLOGY

This investigation is target to examine the determinants of NPLs in the commercial banks find in Ethiopia. Accordingly, this chapter discussed the research procedure that is use to carry out this study. In case, it starts by discussing research design followed by sampling design, method of data collection, design and administration and method analysis. The subsequent section presents description of variable and model specification.

3.1 Research Design

Depending on the objectives of the study descriptive research design will have used to examine the determinants of NPLs in Ethiopian commercial. In this study, both descriptive and explanatory research design will be more appropriate. Descriptive statistics like table, mean, percentage, etc. are used to describe the data. Explanatory analysis using econometrics regression model will have employed to analyze data. Selecting of the descriptive and explanatory research design helps to describe and analyses the detail of data to reach at exact research findings for this study

3.2 Target Population

In this research, the target population was the commercial banking sector in Ethiopia. According to NBE annual report (2019/20), Ethiopia consists of 18 Commercial banks. Accordingly, the study target population will be 18 Commercial Banks currently operating in Ethiopia.

3.3 Sampling Technique and Sample Size

The study is uses non-probability sampling techniques called purposive sampling. The purposive sample that will have taken from the population can be saving time, money and it gives access to a subset of people. The non-probability sampling provides an alternative for selected samples, and the sample can be chosen based on personal judgment (Saunders et al, 2015). Currently, the country has eighteen commercial banks. Among these banks one is public-owned and seventeen are private owned. From these banks eight commercial banks which have ten years' data namely Commercial Bank of Ethiopia

(CBE), Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Wogagen Bank S.C (WB), United Bank S.C (UB), Bank of Abyssinia S.C (BOA), Nib International Bank S.C (NIB), and Cooperative Bank of Oromia (CBO) will be purposively selected as a sample. These banks will have selected with a purposive sampling technique with the criteria of having ten years' data .In this type of sampling, items for the sample are selected deliberately by the researcher; his choice concerning the items remains supreme (Kothari, 1990).

3.4 Method of Data Collection

The data collection methods and instruments was used mainly panel data and Quantitative in nature. Balanced panel data meaning that each cross sectional units was have same number of time series observations. The study takes highly focused on secondary data source from the audited annual financial report (2010 – 2019) from National Bank of Ethiopia and MOFEC, journals, articles, internet and books, online information which is relevant to explain the factors affecting bank's NPL.

3.5 Methods of Data Analysis

After collected the relevant data through the data gathered methods that was used in this study, the researcher was categorize the data appropriately for interpretation to achieve the stated objectives. In this study two type of statistical analyzed would be used to test the proposed hypotheses. These are descriptive statistics and inferential statistics to saw the cause and effect relationship between the dependent and independent variables. The descriptive statistics of both dependent and independent variables was calculated over the sampled periods. This helps to convert the raw data in to a more meaning full form which enables the researcher to understand the ideas clearly. Then, correlation analyzed between dependent and independent variables would be made and finally a multiple linear regression analyzed and diagnostic test was used to determine the relative importance of each independent variable in influencing NPLs of Ethiopian commercial banks by using E-views 10 software.

3.6 Description of Variables and measurement

Table 3.1: Description of Study Variables and their expected sign

Variables	Notation	Description	Measurement	Expected sign
Dependent				

Non Performing Loan	NPL	Loans that are outstanding both in its principal and interest for a long period of time contrary to the terms and conditions under the loan contract.	Non-performing loans/gross loans ratio	
Independent				
Loan growth	LG	An increase in the amount of loan	Percentage change in loan growth	+
Capital Adequacy	CAR	Capital Adequacy is a reserve of capital	Ratio of total capital to total asset	+
Liquidity	**(LIQ)**	The availability of liquid asset to bank	A higher ratio of liquid assets to total assets	+
Return on Asset	**(ROA)**	indicates how effectively the bank's assets are managed to generate revenues	the profits earned per birr of asset	+
Gross domestic product	*(GDP)*	TOTAL value of currently produced final goods and services that are produced within a country's boundary	The market values of final goods and services (GDP $=\sum PiQi$)	+
Exchange rate	EXR	The value of a currency against dollar	Annual Exchange rate of Ethiopian birr in terms of dollar	-
Inflation rate	**(INF)**	Sustainable increase in the general price level of commodity	Rate of inflation per particular time period	-
Bank size	**(BS)**	Bank size is among the factors that explained variations in NPLs	Number of banks branches	+

3.7.1 Dependent Variables

Non-Performing Loan

Like, NBE "Loans or a let have is that credit quality has deformed, such that full of raise and interest in accordance with the loan or advances in repayment terms of the loan or advances in question". As per Basel committee (2001) NPLs is loans which are not paid and their overdue time period is 90 days after maturity date. In line with this the economic impact of NPL may gone be source of bank failure; this crisis will have effect on the country overall economy. The rise of non-performing loan portfolios in banks significantly contributed to financial distress in the banking sector. NPLs can be determined both Macro and Internal determinant variables of the bank. Below the study was tries to explain both macro and internal bank factors or independent variables.

The dependent variable NPLs measured or indicated by the amount of NPLs to gross loans

3.7.2 Independent Variables

Independent variables are explanatory variables that explain the dependent variables. In case,

Independent variable included in this study are indictors of bank profitability (ROA), solvency/capital adequacy ratio (CAR), Loan growth (LG), lending rate(LR),inflation rate (IFR), Bank size (BS), Exchange rate (EXR), and Liquidity (LIQ). Majority of these variables are modified and adopted from previously done studies based on the extent of their effect on nonperforming loan.

Bank size (BS): Too big to fail hypothesis assumes that large banks take excessive risks by increasing their leverage too much and extend loans to lower quality borrowers, and therefore have more NPLs. Some researchers such as (Salas and Saurina, 2002) found a negative relation between bank size and NPLs and argued that bigger size allows for more diversification opportunities. In order to emphasize this possible non-linear relationship, as a proxy the study was used the logarithm of banks total assets.

Exchange rate (EXR): No one can predict what the exchange rate will be in the next time that could be, move in either stick up or sinker direction regardless of significance construe and prophecy was. An appreciation of exchange rate can have mixed effects. It may weaken the competitiveness of export-oriented firms and adversely affect their ability to pay their debts (Fofack, 2005). However; it may improve the debt servicing capacity of borrowers whose loans are

in foreign currencies. Therefore, the Correlation between Exchange rate and Non-performing loan would be mixed. An increase in the EXR was expected to decrease nonperforming loan ratio.

Another microeconomic determinant exchange rate appreciation in local currency can adversely affect the loan payment capacity of borrower, (Fofack, 2005). specifically it can positively affect the loan payment capacity of those borrowers who borrow in foreign currency, on the other side in our country perspective the manufacturing sector is more export oriented firms, according to the domestic currency depreciated they are obliged to focus on the international market and can dominate the international market at lower price (since their production cost is covered in domestic currency which has lower value than foreign currency and their revenue is collected in foreign currency which has higher value as compared to the domestic currency Hence, depreciation of exchange rate can improve the debt-servicing capacity of manufacturing sector borrowers. accordingly exchange rate have positive or negative correlation with NPL based on the nature of the business

Economic growth (GDP): There is a significant empirical evidence of negative association between economic growth and non-performing loans (Farhan et al. 2012). Carey (1998) the argument that the situation of the economics is the most useful cause   affecting copious debt portfolio abolition rates. Salas and Saurina (2002) found a significant negative effect of GDP growth on NPLs. Economic growth usually increases the income which ultimately enhances the loan payment capacity of the borrower which in turn contributes to lesser stringent lend and reversal (Khemraj and Pasha, 2009).

Inflation rate (INF): many researchers such as (Khemraj and Pasha, 2009) and (Fofack, 2005) found a positive relationship between the inflation and NPLs. While Nukus, (2011) argued that inflation could be affects the borrowers lend indemnification capability positively or negatively, advanced inflation can enhance the loan payment capacity of borrower by reducing the real value of outstanding debt; moreover, increased inflation can also weaken the loan payment capacity of the borrowers by reducing the real income when salaries are sticky. So according to literature relationship between inflation and nonperforming loans can be positive or negative depending on the economy of operations (Farhan et al. 2012).

Accordingly, when inflation is high and unexpected, it can be very costly to an economy. At the same time, inflation generally transfers resources from lender and savers to borrowers since borrowers can repay their loans with birr that are worthless. It is determined as the general

consumer price index. This indicates that, as inflation increase, the cost of borrowing gets more costly and deformed the superiority of loan portfolio. There are ambiguous results regarding the relationship between NPLs and inflation rate.

According to Farhan *et al.*(2012), Skarica(2013), Klein(2013) and Tomak(2013) found as there is a positive relationship between NPLs and Inflation rate. Theoretically, inflation should reduce the real value of debt and hence make lending easier. However, high inflation may pass through to nominal interest rates, reducing borrowers' capacity to repay their debt. Through it's engaging with the tribute system that could be aqueeze tribute burden by artificially aqueezing revenue and surplus. Besides, inflation cause firms to increase their costs of changing prices. Generally, it make private to hold lower cash and made more trips to banks since inflation less than the real value of currency possession. It can negatively affect the borrowers' truth income when wages are stick.

Loan Growth: The loan is typically the largest asset and the prevail source of revenue. As it was made by various empirical studies this study expected positive relationship between banks loan growth and NPLs. (Keeton, 2003) showed a strong relationship between credit growth and damaged assets.

Loan growth examines the lending behavior of the bank at different economic situation and period of time. According to Jiménez, et al. (2007), they linked the lenient credit terms with Non-Performing Loans i.e. when the economy was intensifying, bank managers are found to exercise leniency in giving credit because lower credit expansion means lesser income generation which indicates poor performance. Keeton (1999) emphasizes that close correlation between the business cycle and lend increases; in particular that loan growth tends to be high during business expansion, while loan losses tend to be high during business contraction. In Ethiopia private commercial bank there is no consistent growth rate during the research period,(2000-2015) that was vary based on their capital and other condition and the paper may want to analyze the effect of the growth rate on the increment of NPL, the paper expect a negative correlation between loan growth rate and NPL.

Capital Adequacy

Capital adequacy was a measure of banks financial strength since it was shows the ability to withstand/tolerate with operational and abnormality losses. It also represents the ability to undertake additional business (Habtamu, 2012). As noted by Makri *et al.* (2014), CAR determines risk behavior of banks. It was a measure of banks solvency and a capacity to absorb risk. Thus, this ratio

is important to counteract depositors and stimulate stability and competency of currency systems. As , Makri *et al.*(2014), that were negative correlation with NPLs explicatory a dangerous loan portfolio was manifest by advanced NPL (equality to advanced credit risk). However, Djiogap and Ngomsi (2012) found positive association between NPLs and capital adequacy ratio. . However, it is expected to have negative a relationship with NPLs in this study.

$$CAR = \text{Total equity}/\text{Total asset}$$

Liquidity (LIQ): High ratio of liquidity may send a positive signal to the depositors that the bank is liquid; hence, higher ratio is the depositors' confidence. However, a lower value of this ratio may signal that a bank is not in a good situation. On the other hand, higher liquidity may also imply the inefficient utilization of resources therefore may be associated with a high probability of failure. A higher ratio of liquid assets to total assets implies a greater capacity to discharge liabilities, and is therefore associated with a higher survival time.

Return on Asset (ROA): Described that surplus payed per birr of assets and indicates how effectively the bank's assets are managed to obtain incomes. This is may be the most useful single ratio in comparing the competency and operate performance of banks as it indicates the returns generated from the assets that bank owns. (Getahun, 2015). When the ratio of ROA is high, it indicates that it is better performance in order to generate profit. Strong bank profitability measured in terms of ROA might outcome from advanced loan growth rate, fees and expendable that lead bank increase in size and profitability. Thus, ROA gives an idea as to how efficient management is at using its assets obtain payments. The ratio is expected to have negative relationships with NPLs in this study. It was measured by the ratio of net surplus to total possession as follows;

$$ROA = \text{Net profit}/\text{Total asset}$$

3.8 Model Specification

The target of this investigation is to analysis that determinants of NPLs of commercial banks in to Ethiopia country. Similar to the most noticeable previous research works conducted on the nonperforming loans of financial sectors, this study used nonperforming loans ratio as dependent variables whereas independent variables including size of the banks, exchange rate, GDP, Inflation rate, Loan growth, Liquidity, Lending rate and Return on Asset. The regression model which is existed in most literature has the following general form;

$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta n X_{n+} \varepsilon_i$

Where: - Yi is the dependent variable; X_1…..n are explanatory variables; β_1.......$\beta_n$are slope coefficients ;$\alpha$is the constant term and εit the normal error term.

Thus, this study is based on the conceptual model adopted from Fawad and Taqadus (2013).

Accordingly, the estimated models used in this study are modified and presented as follow;

NPL= α+$\beta 1$SIZE +$\beta 2$EXR+$\beta 3$GDP+β4INFR+$\beta 5$LG+ $\beta 6$LIQ+ $\beta 7$ROA+β 8CA+εit Where;

α_{is} an intercept

β1, $\beta 2, \beta 3, \beta 4, \beta 5, \beta 6, and \beta 7$represent estimated coefficient for specific bank *i*at time *t,*

BS, EXR, GDP, INFR, LG, GDP, LIQ, ROA and CA represent Size of banks, exchange rate, gross domestic products, inflation rate, loan growth, liquidity, lending rate, return on asset and Capital adequacy respectively ε_{it} represents error terms for intentionally/unintentionally omitted or added variables.

3.8 Ethical Consideration

The researcher will be received letter of Cooperation from Jimma University and official permit from each bank to conduct this study. The respondents will be provided with details of explanation on the overall objective of the study ahead of time. Information obtained from each banks will be kept confidential in that it is not transmitted to a third party and not use for any other purpose.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1Trend analysis

The purpose of this chapter is to analyze different factors that determine nonperforming loans using 10 years data from commercial Banks of Ethiopia. The analysis is carried out in two parts. In the first part, results of descriptive statistics are presented; in the second part, we identified and examined determinants of nonperforming loans using Panel regression model with the help of EViews software version 10. Accordingly, the descriptive statistics of all the variables used in this study and the results of hypothesis testing i.e. the estimated parameters of the regression equation, their significance, the connection between the independent variables and dependent variable according to the sign and the value of the parameters for the regression model are presented and discussed in detail.

4.2. Descriptive statistics

The summary of descriptive statistics that was intended to give general descriptions about the data (both dependent and independent variables) is presented in Table 4.1. Totally 80 observations from 8 banks were included in the study, which were collected from 2010-2019. Some outlier values were adjusted for the purpose of analysis. Accordingly, mean, median, standard deviation, minimum and maximum values of each variable were used so as to show the overall trend of the data over the period under consideration.

Table 4.1: Summary of descriptive statistics for dependent and independent variables

	ROA	LIQU	LG	GDP	SIZE	INT	EXR	CAR	NPL
Mean	.2096666	.9289580	.1394270	.09065	4.10296	5.9260	21.93622	.153714	.02809
Median	.00131650	1.017550	.0903500	.09000	4.11855	5.4000	20.60075	.132200	.02510
Std. Dev.	.2632763	.4013809	.1545788	.01338	.593737	1.41416	4.409312	.091662	.01625
Range	.777416	1.65080	.74089	.043	3.9947	4.00	12.8942	.3881	.07518
Minimum	.000284	.01370	.01351	.061	3.0051	4.00	16.1178	.0108	.00026

Maximum	.777700	1.66450	.75440	.104	6.9998	8.00	29.0120	.3989	.07544

Table 4.1 showed that the mean of non-performing loans (NPLs) was 2.81% with a minimum of 0.26% and a maximum of 7.544%. This indicates that, from the total loans that Ethiopian commercial banks expended, an average of 2.81% were being default or uncollected over the sample period. This ratio is more than both the Basel standard and National bank of Ethiopia's limit of NPLs ratio which is 5%. This indicates that there is not a good movement by Ethiopian Commercial Banks towards minimizing NPLs in the sample years. The difference between the minimum 0.026% and the maximum 7.544% of NPLs indicate the margin that NPLs ratio of Ethiopian commercial banks ranged over the sample period. The standard deviation (.01625) of NPLs shows the variation of NPLs among Ethiopian commercial banks. According to Brooks, (2008), a low standard deviation indicates that the data point tend to be very close to the mean, when advanced standard deviation explicatory that the data direction are expand out over a large range of values.

Among the bank specific independent variables, from the total of 80 observations over the sample period of 2010 to 2019, ROA has a standard deviation of 26.327% which indicates the existence of high variation on the profitability of the bank based on its assets among Ethiopian commercial banks. The other bank specific variable liquidity had standard deviations of .4013809; lending increases had standard deviations of .1545788 and Bank size has standard deviations of .593737.

On the other hand, among the macroeconomic variables employed in this study inflation rate had mean of 5.926, median of 5.4, minimum inflation rate of 4 with maximum inflation rate of 8 and a standard deviation was 1.41416. This implies that Sustainable increase in the general price level of commodity in Ethiopia during the study period remains unstable. On the other hand, the mean of the exchange rate of Ethiopian commercial banks was 21.93622 with advanced standard deviation 4.409312. The standard deviation was the highest of all the macroeconomic factors used in this study. This indicates that the exchange rate of Ethiopian commercial banks was high over the study period. Similarly, table 4.1 showed that the mean gross domestic product was 9.065% and median also o9% with standard deviation are 1.338%.

4.3 Diagnostic unit root test

Diagnostic tests are robust statistical tests carried out to verify if the data used have met the assumptions underlying the ordinary least squares regression and where possible to remove problems associated with panel data. When the assumptions of classical linear regression model hold true, the coefficient estimators of both α (constant term) and β (independent variables) that are determined by OLS will have a number of desirable properties, and usually known as Best Linear Unbiased Estimators (BLUE). Hence, the following sections discuss results of the diagnostic tests (i.e., normality, heteroscedasticity, autocorrelation and multicollinearity) that ensure whether the data fits the basic assumptions of classical linear regression model or not. The diagnostic tests carried out in the study are detailed below.

4.3.1 Test for normality

Normality is a condition in which the variables to be used in the model follow the standard normal distribution. The Jarque-Bera statistics was used to test the normality of the variable under different conditions and under the hypotheses;

H_0: The data is normally distributed.

H_1: The data is not normally distributed.

If the series are normally distributed, the histogram should be bell shaped and the Jarque-Bera (J_B) statistic is insignificant. It thus follows that series will be normally distributed at 5% level of significance if the probability of J_B statistic is greater than 0.05. The normality test done for this study is follows as:

Figure 4.1 Jarque-Bera Normality Test
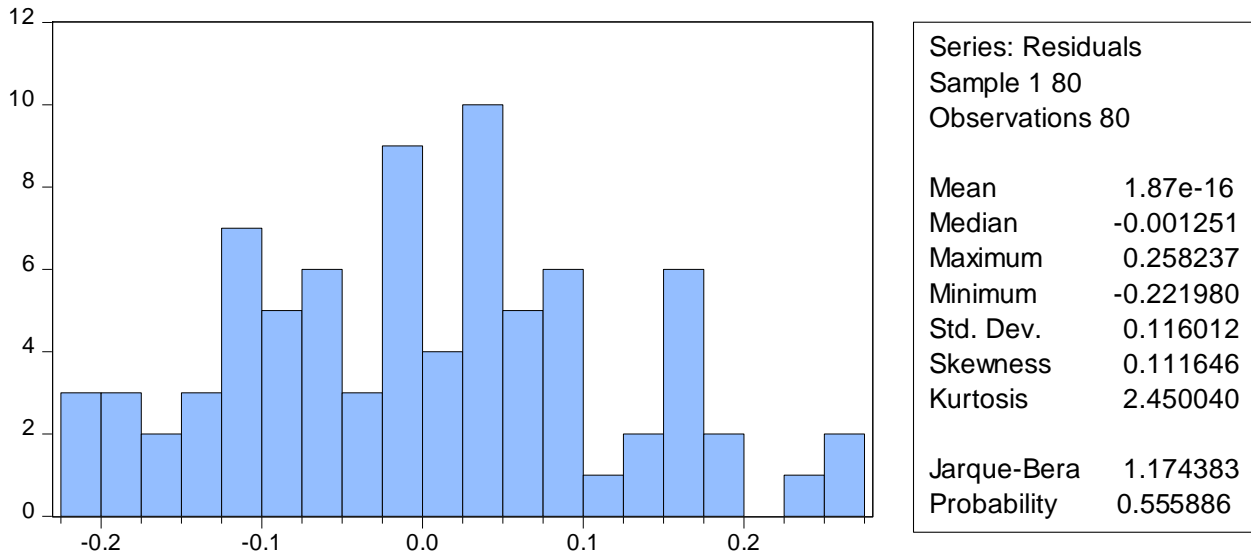
As the result shows the Jarque Berta probability is greater than 0.05 (i.e. 0.556). Then the null hypothesis is accepted (not rejected) and the data satisfied the assumptions of normally.

4.3.2 Test for Heteroscedasticity

Like (Brooks, 2008), Heteroscedasticity means that error terms does not have been a permanent change . If heteroscedasticity occur, the estimators of the ordinary least square method are inefficient and hypothesis testing is no longer reliable or valid as it will underestimate the variances and standard errors. There are several tests to detect the Heteroscedasticity problem, which are Harvey Test, Glesjer Test, Breusch-Pagan-Goldfrey Test, White's Test and Autoregressive Conditional Heteroscedasticity (ARCH) test. This study used Breusch-Pagan-Goldfrey test to detect the presence of Heteroscedasticity.

H_0**:** There was not heteroscedasticity problem.

H_1: There is problem on heteroscedasticity.

Table 4.2: Heteroscedasticity Test

Breusch-Pagan-Godfrey Test

F-statistic	0.761207	Prob. F(8,71)	0.6377
Obs*R-squared	6.319558	Prob. Chi-Square(8)	0.6115
Scaled explained SS	3.608888	Prob. Chi-Square(8)	0.8906

Table 4.2 showed that the p value is greater than the significant level 0.05 then accept H_0. Therefore, the data is no hetrosckedastiscity problem.

4.3.3 Test for serial correlation

Serial correlation is usually a result of model misspecification or genuine autocorrelation of the model error term. In the presence of such a phenomenon, ordinary least squares are does not longer BLUE (Best Linear Unbiased estimators). In such cases R-squared may be overestimated. There is thus each needs to test for serial correlation in the profits.

According to Brooks (2008) when the error term for any observation is related to the error term of other observation, it indicate that autocorrelation problem exist in this model. In the case of autocorrelation problem, the estimated parameters can still remain unbiased and consistent, but it is inefficient. The result of T-test, F-test or the confidence interval will become invalid due to the variances of estimators tend to be underestimated or overestimated. Due to the invalid hypothesis testing, it may lead to misleading results on the significance of parameters in the model. Breusch-Godfrey Serial Correlation LM Test was used to detect autocorrelation problem.

The hypothesis for the model specification test was formulated as follow;

H_0: There is no an autocorrelation problem.

H_1: There is an autocorrelation problem.

Table 4.3: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.462505	Prob. F(2,69)	0.6316
Obs*R-squared	1.058288	Prob. Chi-Square(2)	0.5891

Table 4.2 showed that the p value is greater than the significant level 0.05 then H_0 is not rejected. Therefore, the data is no autocorrelation problem.

4.3.4 Test for Multicollinearity

Multicollinearity is the linear relationship between explanatory variables that creates biased regression model. This problem occurs when the explanatory variables are very highly correlated with each other (Brook, 2008). According to (Pallant, 2010; Hair et al., 2010) multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.90. On the other hand, according to Guajarati (2004), if the correlation coefficient is higher than 0.8, it is considered as the model consists of

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serious multicollinearity problem. If multicollinearity problem is too serious in a model, either additional important variable should be added or unimportant independent variable should be dropped. This study uses pair-wise correlation coefficients method to detect the existence of multicollinearity. As it shown in the correlation matrix in table 4.4, all the values are less than 0.8. Therefore, there is no relationship between the explanatory variables and hence, that is an indication of no multicollinearity problem in the data.

Table 4.4: Correlation matrix among independent variables

	ROA	LIQ	LG	GDP	SIZE	INT	EXR	CAR
ROA	1							
LIQ	0.270825	1						
LG	0.083209	0.31623	1					
GDP	-0.38296	-0.05288	0.002265	1				
SIZE	-0.25837	0.01038	0.011924	0.082608	1			
INT	0.341586	0.14647	-0.03063	0.097178	-0.30702	1		
EXR	-0.59098	-0.19533	-0.11452	0.368259	0.08934	-0.27314	1	
CAR	-0.14288	0.31003	0.297185	0.021362	0.20375	-0.23776	0.06248	1

Furthermore, multicollinearity was also measured by variance inflation factors (VIF) and tolerance. If VIF value exceeding 4.0, or by tolerance less than 0.2 then there is a problem with multicollinearity (Hair et al., 2010)

Table 4.5: Variance inflation factor (VIF) and Tolerance

Tolerance	VIF
.744	1.344
.843	1.187
.745	1.341
.846	1.182
.711	1.406
.597	1.674
.754	1.327
.517	1.936

Table 4.5 showed that VIF and tolerance for the entire explanatory variables. However, all VIF were less than 4 (Tolerance were greater than 0.2), which indicates that there is no multicolinearity problem in the data.

4.4 Model Specification

Model specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form. When the omitted variable is correlated with the variable which included, the estimators will be biased and inconsistent and model specification error will tends to occur. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent and model specification error will not occur. Therefore, in order to select a correct estimated model, the researcher had carry out the Ramsey-RESET Test to check on the model specification. The hypothesis for the model specification test was formulated as follow;

H_0: The model specification is correct.

H_1: The model specification is incorrect.

Table 4.6: Ramsey RESET Test

Equation: UNTITLED

Specification: NPL C ROA LIQ LG GDP SIZE INT EXR CAR

Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	1.780834	(2, 69)	0.1762
Likelihood ratio	4.026424	2	0.1336

Since the results presented in table 4.6 showed that the p value is greater than 0.05 then H_0 is not rejected. Therefore, the model specification is correct.

Model selection criteria (Random vs. Fixed effect model)

In this study the method used in each model is selected based on the Correlated Random Effects-Hausman Test, Redundant fixed effect Tests-Likelihood ratio (Chow test) and Breusch-Pagan Test. The Hausman test that analysis whether the unobservable heterogeneity term is relation with descriptive variables, while continuing to assume that regressors are uncorrelated with the

disturbance term in each period. The null hypothesis for this test was that unobservable heterogeneity term is does not relationship or random effect model was appropriate, with the independent variables. If the null hypothesis is rejected then we employ Fixed Effects method (Padachi, 2006). The Redundant fixed effect Tests-Likelihood ratio (Chow test) also the other important test to examine whether ordinary least square (OLS) model or fixed effect model is appropriate. And, Breusch-Pagan Test is the most important and the final test for the purpose of examining ordinary least square (OLS) or random effect model is appropriate in the panel data. The null and alternative hypothesis for each tests with their corresponding results are given as:

1) Hausman Test

H_0: Random effects model was appropriate

H_1: Fixed effects model is appropriate

Table 4.7: Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	3.977826	8	0.8591

Summary results presented in table 4.7 showed that the p value is greater than 0.05 then H_0 is not rejected. Therefore, Hausman test showed that random effect is appropriate.

2) Redundant fixed effect Tests-Likelihood ratio (Chow test)

H_0: Ordinary least square model is appropriate

H_1: Fixed effect model is appropriate

Table 4.8: Redundant Fixed Effects Test

Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.335875	(7,64)	0.0346
Cross-section Chi-square	18.201840	7	0.0111

Since the results presented in table 4.8 showed that the p value is less than 0.05 then H_0 is rejected. Therefore, it indicated that fixed effects model is appropriate.

3) Breusch-Pagan Test

H_0: Ordinary least square model is appropriate

H_1: Random effect model is appropriate

Table 4.9: Breusch-Pagan Test

Null hypothesis: No effects
Alternative Hypothesis: Two-sided (Breusch-Pagan) and one-sided) all others alternative.

	Test Hypothesis Cross-section
Breusch-Pagan	17.62
	(0.000)

Summation outcomes   obtained in table 4.9 showed that the p value is lower than 0.05 then H_0 is rejected. Therefore, it indicated that Random effects model is appropriate. There for based on the Hausman Test and Breusch-Pagan Test the Random effects model is appropriate for this study.

4.5 Results of Regression analysis

The top panel generalized the input to the regression, the middle panel gives information about each regression coefficient, and the bottom panel used final statistics about that all regression equation. The two most important numbers, "R-squared" (the one who answered how much percent of the variance in the dependent variable in the regression accounted for) and "S.E. of regression." and the one that shows how far is the estimated standard deviation of the error term. Five other elements, "Sum squared residuals," "Log likelihood," "Akaike info criterion," "Schwarz criterion," and "Hannan-Quinn criter." are used for making statistical comparisons between two different regressions. The next two numbers, "Mean dependent variable" and "S.D. dependent variable," report the sample mean and standard deviation of the left hand side variable Brooks, (2008).

"Adjusted R-squared" makes an adjustment to the plain-old to take account of the number of right hand side variables in the regression. Measures what fraction of the variation in the left hand side variable is described by those regressions. The adjusted, sometimes written, subtracts a small penalty for each additional variable added.

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"F-statistic" and "Prob (F-statistic)" come as a pair and are used to test the hypothesis that none of the descriptive variables actually defined anything. Put more formally, the "*F*-statistic" computes the standard *F*-test of the joint hypothesis that the whole coefficients, except the intercept, equal zero. "Prob (F-statistic)" displays the *p*-value corresponding to the reported *F*-statistic.

The last generale statistic is the "Durbin-Watson," the classic test statistic for serial correlation. A Durbin-Watson close to 2.0 is consistent with no serial correlation, while a number closer to 0 means there probably was serial correlation Brooks, (2008). Hence, as concluded in the Hausman test and Breusch-Pagan Test above the random effects model is appropriate regression analysis to this study.

4.6 Discussion of Regression results

This section discusses in detail about the analysis of the results for each explanatory variable and their importance in determining NPL in Ethiopian commercial banks. The mo

del of this study was developed as ;-

$$NP = \beta_0 + \beta_1 ROA + \beta_2 LIQ + \beta_3 LG + \beta_4 GDP + \beta_5 SIZE + \beta_6 INF + \beta_7 EXR + \beta_8 CAR$$

The descriptions of all the variables included in the equation are discussed in the methodology part of the study. The regression result for this model is as follow:

Table 4.10: Panel Regression Results

Dependent Variable: NPL
Method: **Panel EGLS (Period random** effects)
Sample: 2010 2019
Periods included: 10
Cross-sections included: 8
Total panel (balanced) observations: 80
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.090742	0.193532	-0.468873	0.6406
ROA	0.120061	0.075155	1.597521	0.1146

LIQ	-0.141916	0.041078	-3.454828	0.0009*
LG	0.608986	0.100219	6.076530	0.0000*
GDP	-0.251496	1.230748	-2.043446	0.0447*
SIZE	0.075188	0.026039	2.887449	0.0051*
INF	-0.008227	0.011925	-0.689909	0.4925
EXR	-0.005451	0.004173	-1.306210	0.1957
CAR	0.164572	0.178724	0.920815	0.3603

Effects Specification

	S.D.	Rho
Period random	0.000000	0.0000
Idiosyncratic random	0.126398	1.0000

Weighted Statistics

R-squared	0.490795	Mean dependent var	0.280949
Adjusted R-squared	0.433420	S.D. dependent var	0.162575
S.E. of regression	0.122373	Sum squared resid	1.063236
F-statistic	8.554128	Durbin-Watson stat	1.576022
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.490795	Mean dependent var	0.280949
Sum squared resid	1.063236	Durbin-Watson stat	1.576022

Note: *denotes significant at 5 %

The estimated results reported in Table 4.10 showed that, The R-squared and an adjusted R-squared value is 0.4908 and 0.4334 respectively, which indicates that the model is somewhat good. This means about half percentage of variations in NPLs of Ethiopian commercial banks were explained by independent variables included in the model. According to table 4.10 also showed that, the F-statistic was 8.554 and the probability is significant and rejecting the null hypothesis that there is statistically a significant relationship existing between the dependent variable (NPL) and the independent variables, it

also tells that the overall model is highly significant and all the independent variables are jointly significant causes on the variation of non-performing loans.

Furthermore, the above table showed that the panel regression model of the study. Which were used to analyze the effect of each factor on nonperforming loans (NPL), while controlling the other independent variables in the model. Accordingly among eight predictor variables included in this study liquidity (LIQ), Loan growth (LG), gross domestic product (GDP), and bank size (SIZE) were found to be significant predictors for determinant of nonperforming loans (NPL) at 5% level of significance. Thus based on the result presented in table 4.10, the estimated model for this study is given by:

$$NP = -0.141916LIQ + 0.608986LG + 2.514966GDP + 0.075188SIZE$$

4.7 Good

This study aims to identify determinants of Nonperforming loans based on Commercial banks of Ethiopia using 2010-2019 sampled data. The following section provides the results of each explanatory variables and their significance in determining Nonperforming loans in commercial banks of Ethiopia through testing hypothesis. Accordingly descriptive analysis and panel regression models were used. In general, the results from this study were a little consistent with most previous studies in terms of the determinant factors of nonperforming loans and we can perform the hypothesis testing for each determinant factor on nonperforming loans in the following way:

Liquidity

The finding revealed that liquidity has negative and statistically significant (i.e. p value = 0.0009) impact on nonperforming loans in Ethiopian commercial banks. Its regression coefficient was -0.141916, which showed that a one unit increase in the quantity of liquidity, 14.19% decrease in nonperforming loans holding the other variables were constant in the model. . This finding supported by a report conducted by national Bank of Ethiopia which stated as non-performing, it will affect both profitability and liquidity of the bank (NBE, 2008).

Loan growth

The study showed that Loan growth has a positive and significant effect on Nonperforming loans in Ethiopian commercial banks. Its estimated coefficient is 0.608986, which indicates that the existence of strong direct relationship between loan growth of a bank and bank's nonperforming loans in

Ethiopian commercial banks. Holding the other variables constant in the model, when loan of a bank increases by one unit, nonperforming loans in Ethiopian commercial banks increased by 60.89%. This result is consistent with a study done by (Keeton, 2003), revealed that a strong positive relationship between banks loan growth and nonperforming loans (NPLs).

Gross domestic product

This study found that Gross domestic product (GDP) has negative and statistically significant effect on nonperforming loans in Ethiopian commercial banks at 5% level of significance. The coefficient of GDP is -0.2514966, implies that a one unit change in GDP, nonperforming loans in Ethiopian commercial banks decreased by 25.15% holding the other factors being constant in the model. This result is in agreement with a study employed by (Louzis *et al*, 2010; Salas and Saurina, 2002) suggested that GDP had negative significant effect on NPLs. Similarly, the finding is also supports a study done by (Hyun and Zhang, 2012) in US revealed that GDP growth rate had negatively affect NPLs. The finding is also consistent with a study conducted by (Saba et al., 2012) in US banking sector showed that GDP per capital has negative significant association with NPLs.

This result is also corresponds to a study employed in Albanian banking system revealed that negative association of GDP growth rate with NPLs (Ali and Iva, 2013). Since Economic growth usually increases the income which ultimately enhances the loan payment capacity of the borrower which inside turn contributes to less bad lend and reversal (Khemraj and Pasha, 2009). As underlined from the previous studies the relationship between GDP and NPL is negative, because improved macroeconomic conditions lead to lower NPLs due to higher incomes, lower default rates, etc.

Bank Size

Furthermore, this study found that Bank size has positive and statistically significant effect on nonperforming loans in Ethiopian commercial banks at 5% level of significance. The coefficient of Bank size is 0.075188. The coefficient indicates that a one unit change in Bank size, nonperforming loans in Ethiopian commercial banks changed by 7.5% holding the other factors being constant in the model. This result is consistent with a study conducted by (Girma Seifu) on the impact of bank marketing factors on Nonperforming Loans in Ethiopian Banking Industry using multiple regression analysis showed that Bank size was positive and significantly influence on NPLs. This finding supports a study done by (Bikker & Hu, 2002) suggested that bank size was significantly related rate

on the occurrence of loan default. This finding is also corresponds to a study employed in Turkish revealed that bank size have significant positive impact on the bank`s lending behavior (Tomak, 2013). Furthermore, the finding contradicts a study conducted by (Swamy, 2012; Salas and Saurina, 2002) suggested that the bank size has strong negative effect on the level of NPLs.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study was identified and examined internal (Bank specific) factors and external (Macroeconomic) factors that determine nonperforming loans in Ethiopian commercial banks. In order to achieve the objectives of the study, quantitative research approach were used. Accordingly, in this study five bank specific variables (i.e. liquidity, loan growth, bank size, capital adequacy and return on asset) and three macroeconomic variables (i.e. gross domestic product, exchange rate, and inflation rate) were considered.

The descriptive analysis of the study revealed that the average NPLs ratio in the sample commercial banks and the sample period is 28.09% which is greater than the Basel standard and National Bank of Ethiopia's limit of 5 percent.

The panel regression model showed that among the bank specific factors liquidity, loan growth and bank size were found to be statistically significant effect on nonperforming loans (NPLs) in Ethiopian commercial banks. Among these variables liquidity had a negative impact on NPLs and loan growth and bank size have had a positive effect on NPLs in Ethiopian commercial banks. The model also showed that among the macroeconomic variables gross domestic product had negative and statistically significant impact on nonperforming loans (NPLs) in Ethiopian commercial banks.

5.2 Recommendations

Based on the findings of this study, the following recommendations were forwarded:

- The study suggested that focusing on these Non-Performing Loan indicators could further reduce the probability of default while extending credit in the NPL at Basel standard.
- It is recommended that commercial banks should to establish regulations to amend their policies regarding credit advancement in alignment with the factors mentioned in the finding.
- Further studies were recommended by including more macroeconomic and bank specific factors by increasing the sampled periods; and similar studies may be required to newly emerging banks.

- Management of Ethiopian commercial banks should have a catalogue of remedies to correct bad loans from different situations that lead to the loans being difficult to reduce the impact of prolonged NPLs which reduces the income from already funded facilities not further study direction.

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Appendixes

Appendix I: Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.761207	Prob. F(8,71)		0.6377
Obs*R-squared	6.319558	Prob. Chi-Square(8)		0.6115
Scaled explained SS	3.608888	Prob. Chi-Square(8)		0.8906

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample: 1 80
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002157	0.024963	0.086414	0.9314
ROA	6.13E-05	9.69E-05	0.632031	0.5294
LIQ	-0.010630	0.005298	-2.006213	0.0486
LG	-0.003363	0.012927	-0.260184	0.7955
GDP	0.024597	0.158748	0.154944	0.8773
SIZE	0.003684	0.003359	1.096857	0.2764
INF	7.36E-05	0.001538	0.047860	0.9620
EXR	-6.72E-05	0.000538	-0.124777	0.9011
CAR	0.025269	0.023053	1.096151	0.2767

R-squared	0.078994	Mean dependent var	0.013290
Adjusted R-squared	-0.024781	S.D. dependent var	0.016105
S.E. of regression	0.016303	Akaike info criterion	-5.289239
Sum squared resid	0.018872	Schwarz criterion	-5.021261
Log likelihood	220.5696	Hannan-Quinn criter.	-5.181799
F-statistic	0.761207	Durbin-Watson stat	1.761099
Prob(F-statistic)	0.637719		

Appendix II: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.462505	Prob. F(2,69)	0.6316
Obs*R-squared	1.058288	Prob. Chi-Square(2)	0.5891

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Sample: 1 80

Included observations: 80

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.030810	0.191506	-0.160884	0.8727
ROA	-2.95E-05	0.000744	-0.039668	0.9685
LIQ	0.002728	0.040211	0.067831	0.9461
LG	0.004725	0.097934	0.048245	0.9617
GDP	-0.232647	1.240814	-0.187496	0.8518
SIZE	0.003003	0.025639	0.117116	0.9071
INF	0.001789	0.012105	0.147803	0.8829
EXR	0.001067	0.004220	0.252905	0.8011
CAR	0.017482	0.175312	0.099719	0.9209
RESID(-1)	0.080529	0.128970	0.624399	0.5344
RESID(-2)	0.089891	0.125879	0.714108	0.4776

R-squared	0.013229	Mean dependent var	1.87E-16
Adjusted R-squared	-0.129782	S.D. dependent var	0.116012
S.E. of regression	0.123310	Akaike info criterion	-1.221149
Sum squared resid	1.049171	Schwarz criterion	-0.893620
Log likelihood	59.84596	Hannan-Quinn criter.	-1.089833
F-statistic	0.092501	Durbin-Watson stat	1.969014
Prob(F-statistic)	0.999849		

Appendix III: Ramsey-RESET

Ramsey RESET Test

Equation: UNTITLED

Specification: NPL C ROA LIQUIDITY LG GDP SIZE INT EXR CAR

Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	1.780834	(2, 69)	0.1762
Likelihood ratio	4.026424	2	0.1336

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.052189	2	0.026094
Restricted SSR	1.063236	71	0.014975
Unrestricted SSR	1.011048	69	0.014653

LR test summary:

	Value
Restricted LogL	59.31328
Unrestricted LogL	61.32650

Unrestricted Test Equation:

Dependent Variable: NPL

Method: Least Squares

Date: 05/31/21   Time: 06:52

Sample: 1 80

Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.171056	0.366519	-0.466704	0.6422
ROA	0.001483	0.001968	0.753554	0.4537
LIQ	-0.203484	0.260585	-0.780873	0.4375
LG	0.699863	1.140592	0.613597	0.5415
GDP	4.111365	4.863957	0.845272	0.4009
SIZE	0.113005	0.138761	0.814385	0.4182
INF	-0.012088	0.017838	-0.677646	0.5003
EXR	-0.008594	0.012040	-0.713755	0.4778
CAR	0.381584	0.344977	1.106115	0.2725

FITTED^2	-2.873451	5.651301	-0.508458	0.6128
FITTED^3	4.066369	5.161652	0.787804	0.4335

R-squared	0.515789	Mean dependent var	0.280949
Adjusted R-squared	0.445614	S.D. dependent var	0.162575
S.E. of regression	0.121049	Akaike info criterion	-1.258162
Sum squared resid	1.011048	Schwarz criterion	-0.930634
Log likelihood	61.32650	Hannan-Quinn criter.	-1.126847
F-statistic	7.349990	Durbin-Watson stat	1.874250
Prob(F-statistic)	0.000000		

Appendix V: Panel Random Regression

Dependent Variable: NPL

Method: Panel EGLS (Period random effects)

Sample: 2010 2019

Periods included: 10

Cross-sections included: 8

Total panel (balanced) observations: 80

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.090742	0.193532	-0.468873	0.6406
ROA	0.001201	0.000752	1.597521	0.1146
LIQ	-0.141916	0.041078	-3.454828	0.0009
LG	0.608986	0.100219	6.076530	0.0000
GDP	2.514966	1.230748	2.043446	0.0447
SIZE	0.075188	0.026039	2.887449	0.0051
INF	-0.008227	0.011925	-0.689909	0.4925
EXR	-0.005451	0.004173	-1.306210	0.1957
CAR	0.164572	0.178724	0.920815	0.3603

Effects Specification

			S.D.	Rho
Period random			0.000000	0.0000
Idiosyncratic random			0.126398	1.0000

<div align="center">Weighted Statistics</div>

R-squared	0.490795	Mean dependent var	0.280949
Adjusted R-squared	0.433420	S.D. dependent var	0.162575
S.E. of regression	0.122373	Sum squared resid	1.063236
F-statistic	8.554128	Durbin-Watson stat	1.576022
Prob(F-statistic)	0.000000		

<div align="center">Unweighted Statistics</div>

R-squared	0.490795	Mean dependent var	0.280949
Sum squared resid	1.063236	Durbin-Watson stat	1.576022