Determinants of Non-performing Loans: Empirical Study on Ethiopian Commercial Banks

Zelalem Tsige

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This is to certify that the thesis prepared by Zelalem Tsige, entitled: *Determinants of Non-performing loans: Empirical Study on Ethiopian commercial Banks* and submitted in partial fulfillment of the requirements for the degree of Degree of Master of Science (Accounting and Finance) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Advisor Wollela Abehodie (PhD)___ Signature_____ Date _____

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ABSTRACT

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This study examines the bank-specific and macro-economic determinants of Non-performing loans (NPLs) of commercial banks in Ethiopia. The study adopts a mixed methods research approach by combining documentary analysis (structured review of documents) and in-depth interviews. More specifically, the study reviews the financial records of eight commercial banks in Ethiopia and relevant data on macroeconomic factors considered for the period from the year 2000 to 2011. The findings of the study show that, loan growth, financial performance, operational efficiency, effective exchange rate, inflation rate and gross domestic product have negative and statistically significant relationship with banks' NPLs. On the other hand, variables like bank size and state ownership have a positive and statistically significant relationship with banks' NPLs. However, the relationship for average lending rate and income diversification were found to be statistically insignificant. The study suggests that focusing and reengineering the banks alongside the key drivers of NPLs could reduce the probability of loan default in Ethiopian commercial banks.

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List of Acronyms

AIB	Awash International Bank
BoA	Bank of Abyssinia
BLUE	Best Linear Unbiased Estimators
CBB	Construction and Business Bank
CBE	Commercial Bank of Ethiopia
CIR	Cost to Income Ratio
CLRM	Classical Linear Regression Model
ECBs	Ethiopian commercial banks
EFEX	effective exchange rate
GDP	Gross Domestic Product
HP	Hypotheses
IDV	Income Diversification
INFL	Inflation
LG	loan growth
MoFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia
NIB	Nib International Bank

NPLs	Non-performing loans
OLS	Ordinary Least Square
OWS	ownership structure
RIR	real interest rate
ROA	Return on Asset
RQ	Research Question
UB	United Bank
WB	Wegagen Bank

Chapter one: Introduction

Credit creation is the main income generating activity of banks. The loan portfolio is typically the largest asset and the predominate source of revenue of banks (Achou and Tenguh 2008). Even if that is the case, all the risks that banks face, credit risk is considered as the most harmful as nonperforming loans (NPLs) would impair the bank profitability and its long-term operation significantly (Ahmed 2006). As noted in Adebola et al. (2011), increasing amount of NPLs in the credit portfolio of banks is antagonistic to banks in achieving their objectives and a substantial volume of NPLs indicates the existence of financial fragility and a cause of worry for banks management and regulatory authorities.

In the context of the above discussion, many scholars like, Caprio and Klingebiel (2002), Fofack (2005), Pasha and Khemraj (2009) and Azeem et al. (2012) agreed that, the existence of banking and financial crises has frequently been allied with a massive accumulation of NPLs. As noted in Caprio and Klingebiel (2002), during the 1997s East Asian banking and financial crises, many banks were increased by more than threefold in their volume of NPLs in the period leading up to the crisis. For instance, in Indonesia, NPLs of banks represented about 75% of their total loan which led to the collapse of over sixty banks. Furthermore, Fofack (2005) stated that, most banks in sub-Sahara African countries were also preceded by a rapid accumulation of NPLs during the 1990s crisis. For instance, in Benin, all banks were collapsed and their NPLs were above 80% of their total loans. More recently, there are abundant evidences that the current global financial

crisis, which was originated in the US, was also attributed to the rapid default of sub-prime loans/mortgages (Pasha and Khemraj 2009).

Regardless of the implications of NPLs on smooth functioning of banks, for anticipating banking and financial crises, the leading causes of these loans remain unknown for most countries especially in Sub-Saharan Africa (Fofack 2005). This is due to the fact that, most studies often used NPLs as an explanatory variable to other banking outcomes such as banks performance and failures. Consequently, there appears to be very limited number of studies investigated NPLs as an explained variable (Boudriga 2009). Those limited studies were also conducted in developed countries and banks in developing economies have so far received inadequate attention in the literature (Swamy 2012).

Coming back to the case of Ethiopia, like other African countries and the rest of the world experienced, Ethiopian commercial banks (ECBs) were also suffered from serious financial fragility manifested by high proportion of NPLs (Mehari 2012). Recently, the NPLs of ECBs have shown a substantial improvement and lowered to an average of 5 % (National Bank of Ethiopia 2011). However, NPLs of ECBs are still high as compared to the developing economy banks like, Namibia, Mozambique and Uganda[1]. Hence, ECBs are 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.

Despite the above fact, as best of the researcher knowledge, there is only the work of Negera (2012) that investigated determinants of NPLs in Ethiopian banks. However, the study was not comprehensive enough as result of different gaps. For instance, the study

[1] NPLs of Namibia, Mozambique and Uganda are an average of 1.9%, 2.3% and 2.5% of their total loans respectively (world bank 2012)

did not incorporate macroeconomic variables which have found as a significant determinates of NPLs in many others studies like, Azeem et al. (2012) and Louzis et al. (2010). Moreover, the study used only descriptive statistics and correlation matrix for the entire analysis. However, none of those methods are able to explain movements in a variable by reference to movements in one or more other variables (Brooks 2008). Hence, all the above discussed knowledge gaps clearly indicate that, the determinants of NPLs in ECBs have received inadequate attention in the literature and eventually the need for further investigation.

In the context of the above discussions, the purpose of this study is to investigate the determinants of NPLs in ECBs. The remaining discussions in the chapter are arranged in seven sections. The first section presents the problem statement. Section 1.2 discusses the broad objective, research question and research hypotheses of the study. Section 1.3 presents the research methodology. Scope of the study, limitations of the study and significance of the study are discussed in section 1.4, 1.5and 1.76respectively. Finally, the structure of the study is discussed in section 1.7.

1.1. Statement of the problem

Despite the heavy regulation and ongoing efforts made to control the banking industry in general and the lending activities in particular, the NPLs problems are still a worldwide headache and a major concern for both international and local regulators (Boudriga 2009). Given the harmful effects of NPLs on countries economy, in recent years, an issue of preventing NPLs is highly emphasized on the agenda of banking supervisory institution and policymakers throughout the world (Socuvkova 2012). As far as NPLs

problems left unsolved, it can greatly jeopardized the smooth functioning of banks through erosion of banks asset and reduction of income through accumulation of losses and increased provisions to compensate for these losses (Kunt and Detragiache1998). In the worst scenario, a high level of NPLs in a banking system poses a systemic risk, inviting a panic run on deposits and sharply limiting financial intermediation, and subsequently investment and economic growth (Ahmed 2006). According to Fofack (2005), the fiscal costs of NPLs are also significant. Resolution of these loans is usually undertaking through the creation of government owned Asset Management Companies whose main function is to take over NPLs of distressed financial institution. Consequently, the pressure on government revenues will be aggravated. Usually it accounted for 10% up to 20% of the GDP to cleaning up banking problems caused by NPLs (Galindo & Tamayo 2000). This interest is justified by the 1990ʻs Sub-Saharan countries financial crisis that resolution of NPLs accounted for over 17 % and 25% of GDP in Senegal and Cote dʻIvoire respectively (Caprio and Klingebiel 2002).

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, currently, the banking industry in Ethiopia is 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, there are ample empirical evidences that operational inefficiency and poor credit risk management are usually associated with

sizeable volume of NPLs (Berger and Humphrey 1992, Wheelock and Wilson 1994). For instance, in 2003 the two biggest state owned commercial banks, Commercial Bank of Ethiopia (CBE) and Construction and Business Bank (CBB) reported NPLs of 53% and 40% of their total loans respectively (NBE 2012). These are far from the average 30% NPLs of Sub-Saharan Africa countries that recorded during the 1990ʻs crisis (Fofack 2005). In the same year the two private banks Awash International Bank (AIB) and Bank of Abyssinia (BOA) also reported NPLs of 25% and 28.5% respectively (NBE 2012). Eventually, the government of Ethiopia being worried about the potential systemic crisis associated with credit risk and imposed restriction on the proportion of NPLs not to exceed 5% of their total loan outstanding (NBE 2008).

Following the 2008 NBE declaration[2], NPLs of ECBs have shown a significant improvement and lowered to an average of 5 % (NBE 2011). However, there is a significant variation on the reduction of NPLs from banks to bank. In some bank the change is abrupt and surprise while in the others the change is steady and constant. For instance, in 2006 NPLs of CBE were about 22% of their total loan outstanding. Surprisingly however, in 2011 it lowered to an average of 0.86%. On the other hand, within the same time range NPLs of NIB lowered from 8.4% to 5.04 % (NBE 2012). This is not significant as compared to the performance of CBE.

Despite the above discussion, the recent work of Mehari (2012) argued that, the exciting reduction of NPLs in ECBs is not resulted from improved credit risk controlling, measuring and monitoring system. Rather, it is merely from writing off and restructuring

[2] The declaration that required all commercial banks not hold a NPLs that exceed 5% of their total loan outstanding.

of loans. As far as both writing off and restructuring of NPLs are a post active measurement (after the occurrence of NPLs), the issue of preventing NPLs in ECBs is still in question. Moreover, there are still banks that are not fulfilling the 5% maximum allowable limit of NPLs. For instance, in 2011 NPLs of CBB was 7%. In addition, NPLs of Cooperative Bank of Oromia (CBO) and Nib International Bank (NIB), in 2010 was about14.58% and 7.37% of their total loans respectively (NBE 2012). These are far from the 5% maximum acceptable limit.

In context of the above discussion, many scholars like, Geda (2006), Tilahun (2010), Tefera(2011), Mekasha (2011) and Mehari (2012) agreed that, despite the existence of some improvement in the general risk management practice, ECBs are still weak on their credit risk management. In connection to this, the 2009/10 survey of NBE revealed that, significant proportion of commercial banks in Ethiopia lack: appropriate risk management strategies and programs, timeframe to review risk management documents, adequate risk management budget, up-to-date and relevant data for informed decisions, risk communication, risk management integration with human resource management and policies, risk management audit review, and initiatives to identify risks. The survey results conclude that, the existing risk management guidelines should be reviewed and commercial banks should be required to produce risk management programs acceptable to the NBE by giving due attention to credit, operational and liquidity risks. Among risks that ECBs face, credit risk has been dominant risks over the last two years, and will continue to be key risk over the next five years (NBE 2009/10). Accordingly, all the above problems (especially the lack of risk management audit review and initiatives to identify risks) indicate that, ECBs provide less consideration to their credit risk

management and ultimately the need for reexamine their credit risk management so as to reduce their NPLs.

Therefore, all the above discussed problems in the ECBs in relation to credit risk management in general and NPLs in particular along with the above deviant observation of NPLs at CBB, NIB and CBO (together with the knowledge gap to be established in the literature review) need extensive research to understand the cause of NPLs.

1.2. Broad objective, research questions and hypotheses

In the context of the problems highlighted above, the general objective of this study is to investigate the determining factors of NPLs in Ethiopian commercial banking sector. Having this general objective, the following sections discussed the research questions and hypothesis that have been used for investigation purpose.

Research questions (RQ)

In line with the broad objective highlighted above, the following two specific research questions were formulated:

RQ1. What are the determinants of banks' non-performing loans in Ethiopia commercial banking sector?

RQ2. What are the likely causes for the existence of variation on NPLs performance among Ethiopian commercial banks?

Hypotheses of the Study (HP)

The hypotheses of this study were formulated by referring the existing theories and past empirical studies that have been conducted on the determinants of bank‟s NPLs. The hypotheses of this particular study are intended to catch the determinants of NPLs quantitatively through structured review of documents. In line with the broad objective of the study the following ten hypotheses were formulated.

HP1: There is a significant positive relationship between loan growth of a bank and bank's NPLs.

HP2: There is a significant positive/ negative relationship between operational efficiency of a bank and bank's NPLs.

HP3: There is a significant negative relationship between financial performance of a bank and bank's NPLs

HP4: There is a significant positive/negative relationship between Income diversification of a bank and bank's NPLs.

HP5: There is a significant positive relationship between state ownership of a bank and bank's NPLs.

HP6: There is a significant negative relationship between size of a bank and bank's NPLs.

HP7: There is a significant negative relationship between real GDP growth and bank's NPLs.

HP8: There is a significant positive relationship between real interest rate and bank's NPLs.

HP9: There is a significant positive/negative relationship between inflation and bank's NPLs.

HP10: There is a significant positive/negative relationship between exchange rate and bank's NPLs.

1.3. Research Methodology

In order to achieve the broad objective of the study, a mixed methods research approach was adopted. However, by considering the nature of the study, quantitative research approach was dominantly used. To have a better insight and to gain a richer understanding about the research problem, the quantitative method was supplemented with the qualitative one. To collect the necessary data the study mainly used survey of documents. The survey was administered in a structured document review mode, and it was intended to elicit relevant data that was used to assess the factors that had impact on the NPLs of ECBs. In addition to the survey method, in-depth interviews were also conducted with selected ECBs credit officers.

The target populations of this study were all commercial banks registered by NBE and under operation in the country at least for the last twelve years. Accordingly, the study covered two government owned commercial banks namely, Commercial Bank of Ethiopia (CBE) and Construction and Business Bank (CBB). Besides, the study included the six leading private commercial banks in the country in terms of both branch

network and market share namely, Awash International Bank (AIB), Bank of Abyssinia (BoA), Dashen Bank (DB), Nib International Bank (NIB), United Bank (UB) and Wegagen Bank (WB).

1.4. Significance of the study

Despite the devastating effects of NPLs on nations‟ economy in general and banks operation in particular, the issue of NPLs in most developing economies like Ethiopia have so far received inadequate attention in the literature. As result, this study will extend the existing literature by providing evidence on the determinants of NPLs in Ethiopian commercial banking context by utilizing both macroeconomic and bank specific variables. Apart from contributing to the literature, this study may also have important practical implications for commercial banks mangers and bank regulators authorities in dealing with NPLs management. Moreover, it may also help other researchers as a source of reference and as a stepping stone for those who want to make further study on the issue of NPLs in the Ethiopian banking context afterwards. Finally, it may provide a possible opportunity to all stake holders to gain deep knowledge about the leading cause of NPLs in Ethiopian commercial banking sector.

1.5. Scope of the study

For the sack of robustness of the results, the scope of the study was restricted to all commercial banks that are registered by the NBE and that have at least twelve years data (i.e., 2000-2011). As a result, the study included the two large government owned commercial banks namely, CBE and CBB and six leading private commercial banks in

the country in terms of both branch network and market share namely, AIB, DB, BoA, WB, UB and NIB. Hence, commercial banks that are established newly in the country and that do not have a minimum of twelve years data were left in this study.

1.6. Limitation of the study

It obvious that, incorporating all independent variables in a single econometrics model is impossible. And, that is why a disturbance term is usually incorporated in econometrics model (Brooks 2008). Hence, the study limited to six bank specific variables (banks‟ loan growth, income diversification, operational efficieincy, financial performance, and ownership structure and bank size) and four macroeconomic variables (inflation, real interest rate, exchange rate and GDP growth). Different regulatory factors such as capital adequacy ratio, loan loss provision and time factors like the May 2011 NBE directive that require all commercial banks to purchase National Bank of Ethiopia bonds (contribution for the Great Renaissance Dam) worth 27% of their loan disbursements, and macroeconomic variables like unemployment rate were left in this study.

Since the quantitative part of this study is mainly analyzed by the ordinary listing square (OLS) method, all the limitations associated with this method might hinder the outcome of the study. To mitigate the limitation associated with OLS, diagnostic tests that insure the validity of the data and econometrics model were conducted. However, the autocorrelation test measured by the default Durbin-Watson (DW) test statistics did not able to detect whether the autocorrelation problem existed or not. To the contrary, results obtained from the Breusch-Godfrey (BG) test statistics shown the existence of

autocorrelation problem in this particular study. Hence, the inconsistence among the two tests might impair the outcome of the study.

As a result of the confidentiality policy of banks, the study limited to the officially disclosed financial data of banks and the personal perception of credit officers‟ of selected Ethiopian commercial banks towards the issue. Hence, intentionally or unintentionally the respondent might be biased. Finally, resource and time constraints were also some of the factors that hindered the outcome of the research.

1.7. Structure of the study

This study is organized into five chapters. Introduction of the study with respect to Problem statement and objective of the study are presented in chapter one. Chapter two presents literature review of the study. In this chapter both the theoretical and empirical reviews pertaining to the determinants of bank‟s NPLs are discussed. Research design and methodology are presented under chapter three. This is followed by the results and analysis of different data source in chapter four. Finally, chapter five presents the conclusions and recommendations.

Chapter two: Literature review

In the preceding chapter, background information of the study with respect to the research problem and objective of the study were discussed. The purpose of this chapter is to discuss both theoretical and empirical issues pertaining to the determinants of bank‟s NPLs. The review has three sections. The first section 2.1 presented theoretical review of NPLs. Section 2.2 presents a review of empirical studies that have been conducted so far on determinants of bank‟s NPLs. Finally, conclusions on the literature review and knowledge gaps are presented in section 2.3.

2.1. Theoretical review of Non-performing loans

According to Issa (2009), from a pragmatic point of view, the rationale behind the existence of banks is the provision of different types of loans, which in turn are considered as the main source of the banking profits. Therefore, commercial banks attempts to invest as much of the available funds as possible, in the form of loans and credit facilities so as to maximize their profit. This in turn results in the majority of commercial banking assets being in the form of loans and credit facilities (Achou and Tenguh 2008). Despite the loan portfolio is typically the largest asset and the predominate source of revenue of banks, the function of granting credit is not free of risks (Casu et al. 2006). In practice, loans are considered as the types of investment which have the highest levels of risks with regards to the difficulty of the funds' recovery. Commercial banks are exposed to numerous difficulties regarding the protection and recovery of funds granted in the form of loans and credit facilities. According to Casu et al (2006), the main difficulty that the commercial banks are

exposed to the failure of borrowers to repay their obligations on time. As noted in Heffernan (2005) the failure of the commercial banks' clients to repay their obligations caused the emergence of NPLs, and is considered the most serious financial problems facing commercial banks. Hence, the following sections discussed the meaning, classification and determinants of NPLs in detail.

2.1.1. Definition of Non-performing loans

The term „"bad loans"" as described by Basu (2003), is used interchangeably with NPLs and impaired loans as identified in Fofack (2005). Berger and De Young, (1997) also considers these types of loans as "problem loans". Thus these descriptions are used interchangeably throughout the study.

Theoretically, there is no global standard to define NPLs which could be applied to all economies of the world (Hou 2006 and Bloem and Gorter 2002). Variations exist in terms of the classification system, the scope, and contents. Such problem potentially adds to disorder and uncertainty in the NPL issues (Hou 2006). Thus, the definition of NPLs varies from one banking system to another according to banking laws and regulations (Issa 2009). In practical terms, Quantitative and qualitative criteria are used individually or collectively by credit institutions to identify the situation of the loan. A quantitative criterion uses numbers of days or months to determine the weakness of borrowers to repay their debt, while a qualitative criterion uses all the information about the future of loans and borrowers (Bloem and Gorter 2002).

In referring to the period of NPLs, Rose (2002 p.118) defined NPLs as "a loan is placed in the NPLs category when any scheduled loan repayment is past due for

more than 90 days". In addition, Bloem and Freeman (2005 p.8) give the definition of NPLs as "a loan is NPLs when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement". Others consider NPLs as a borrower stopping to repay the installments in a period of over six months. For instance, Cho (2002 p.10) define NPLs as "a loan was considered NPLs only when it was past due six months or more while provisioning requirements".

In light of the above discussion, a study for the International Monetary Fund (IMF), Cortawarria et al. (2000) define NPLs according to region where they originate from. For instance, in countries like France, Spain, Portugal, Switzerland and Norway, loans became NPLs when principal and interest uncollected for more than 90 days. Others countries like Greece and Italy used more than 90 days. In countries like U.K and Germany there is no explicit criteria to be used in determining loans as good or bad.

As per NBE(2012 p.3), NPLs are defined as "loans or advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment terms of the loan or advances in question". It further provides that:

"Short term loans are NPLs when principal and/or interest is due and uncollected for 90(ninety) consecutive days or more beyond the scheduled payment day or maturity. Medium and long term loans are NPLs when principal and/or interest is due and uncollected for 12(twelve) consecutive months or more beyond the scheduled payment day or maturity".

According to NBE (2012) directive, Ethiopian commercial banks are required to classify their loans as pass, special mention, substandard, doubtful and loss in accordance with Bank for International Settlements (BIS)[3] standards as presented below:

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

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

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

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

Loss: Short term loan past due for 360 days or more, and Medium and long term loans past due for3 years or more.

According to NBE (2012) directive, all Ethiopian commercial banks required holding provisions for each loans mentioned above so as to absorb the potential losses in their loans portfolio. The minimum provision requirements are mentioned below:

[3] Bank for International Settlements (BIS) is an international banking supervisory institution that was established by the central bank governors of the Group of Ten countries in 1975. It consists of senior representatives of bank supervisory authorities and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States (Coen 2010).

Table2.1 Minimum provision requirement

Classification of loans	Minimum percentage
pass	1%
Special mention	3%
Substandard	20%
Doubtful	65%
loss	100%

Source: NBE (2012)

Among the above classified loans, the last three loans such as, substandard, doubtful and loss are considered as NPLs (NBE 2012). In fact, such type of classification is in accordance with BIS standards except some variation on the percentage of provision requirement. For instance, as per BIS standard doubtful loans are required 50% provision whereas under the NBE directive banks are required to hold 65% provision.

2.1.2. Determinants of Non-performing loans

Unfortunately, there is no particular theoretical framework that emphasizes on the determinants of NPLs (Issa 2009). However, with the major contribution of Akerlof (1971), the asymmetric information as concepts have been used to analyze the individual behaviour in the market in relation to having knowledge in transactions or exchanges. These concepts can be extended to NPLs, since, NPLs are the result of a particular behavioural pattern emerging from moral hazard on the side of

borrower and adverse selection on the side of lenders (Issa 2009). Therefore, the concepts of asymmetric information can be examined to give further meaning and to understand behavioural aspects of NPLs.

According to Arestis and Sawyer (2001), the first important theoretical concept in relation to NPLs, as the articulation of asymmetric information, is the adverse selection issue. Adverse selection problem occurs before the transaction takes place, in the event that the lender's inability to distinguish between a high-risk borrower and a low-risk borrower is compromised. In this regard, Hafer (2005) noted that, increasing the interest rate and required additional collateral lead the low risky clients to go elsewhere in order to obtain loans, while the high risky clients will accept the conditions at hand. In other word, those who want to take on big risks are likely to be the most eager to take out a loan, even at a high rate of interest, because they are less concerned with paying the loan back.

As noted in Breuer (2006) conflict of interest between bank managers and shareholders may aggravate the adverse selection. Bank managers have short term decision horizons because their reputations are strongly influenced by public perceptions of their performance, as evidenced by short term earnings. Managers‟ reputations suffer if they fail to expand credit when the economy is expanding and bank earnings are improving. This herd behavior will result in some loans going to customers with higher default risk. In addition, the macroeconomic condition may also aggravate the adverse selection. During the expansion phase of the economy banks characterized by a relatively low number of NPLs, as both consumers and firms face a sufficient stream of income and revenues to service their debts. However as the booming period continues,

credit is extended to lower quality debtors and subsequently, when the recession phase sets in, NPLs increase (Fisher 1933, Minsky 1986, Kiyotaki and Moore 1997, Geanakoplos, 2009).

According to Arestis and Sawyer (2001), the second theoretical concept derived from asymmetric information is `moral hazard', which can be applied to NPLs. A borrower may have incentives to misallocate funds for personal use and to undertake investment in unprofitable projects that serve only to increase their personal power or stature. Thus, a lender is subjected to the hazard that the borrower has incentives to engage in activities that are undesirable from the lender‟s point of view: that is, activities that make it less likely that the loan will be paid back. In addition, banks credit managers may intentionally provide loans to lower quality debtors.

Ultimately, it could be concluded that asymmetric information often leads to the emergence of the economic and financial problems especially NPLs in the credit market. Therefore, it can be said that the economic and commercial banks will not operate as efficiently as they should, in the absence of sufficient information, related to both clients and the general environment. Hence, by having theory of asymmetric information as standing point the following sections discussed the determents of NPLs that are intended to cover under this study. It should be noted that all the determinants of NPLs that are discussed in the following sections do not necessarily have a direct relationships with theory of asymmetric information.

2.1.1.1. Bank specific factors

Bank-specific variables refer to those factors which characterized individual banks. Those factors can be influnecd by managerial decisions and usually associated with the specific policy choices of a particular bank with regard to its efforts to maximize efficiency and improve its risk management. Hence, bank specific variables that are usually theorized as determinats of NPLs are include , loan growth, financial perfrormance, bank size, ownership structure, the quality of the loan portfolio and operatinal efficicecy of bank‟s. Hence, the following part of this particular section clearly presents the bank-specific variables that are used in this study.

Loan growth: The credit policy of the bank plays an essential role in determining the subsequent levels of NPLs. Loan growth has a direct (positive) association with the volume of NPLs reported by commercial banks (Sinkey and Greenwalt (1991), Keeton (1999), Salas and Saurina (2002), Jimenez and Saurina (2006) and Metaxas et al (2010)). To maximize the short run benefits, managers seek to rapidly expand credit activities and may hence take inadequate credit exposures. In this regard, Keeton (1999) suggests that rapid growth of loans can be triggered by return maximization strategies. Particularly, during periods of economic growth, the financial institutions engage in market share conquest campaigns discarding the necessary assessment of credit quality of borrowers (Fernandez De Lis et al., 2000). The search for rapid growth of loans is achieved by either reducing interest rate charged to borrowers or by lending to lower credit quality borrowers. This will lead, through adverse selection reasoning in which banks lend to lower credit quality borrowers and ultimately increase the probability of NPLs.

Operational efficiency: Theoretically, the relationship between operational efficiency of a bank and bank‟s NPLs might appear to be largely unrelated, because operations personnel typically do not participate in screening and monitoring loan customers, and because loan officers typically do not participate in overseeing operations costs. However, issues of NPLs and cost of efficiency are in fact related in several important ways. Hence, the impact of operational efficiency on NPLs can be positive or negative. In one hand, a number of researchers have found that failing banks tend to be located far from the best-practice frontier (Berger and Humphrey 1992, Barr and Siems 1994, DeYoung and Whalen 1994, Wheelock and Wilson 1994). A number of other studies have found a positive relationship between low cost of efficiency and NPLs even among banks that do not fail (Hughes and Moon 1995, Resti 1995). According to Berger and DeYoung (1997), the positive association among low cost efficiency and NPLs is hypothesized as „bad management‟ hypothesis. The basic argument here is that, low cost efficiency considers as signal of poor managerial performance (bad management), which can greatly affects loan granting behavior of a bank. As „bad‟ managers, they may a) have poor skills in credit scoring and therefore choose a relatively high proportion of loans with low or negative net present values, b) be less than fully competent in appraising the value of collateral pledged against the loans, and c) have difficulty monitoring and controlling the borrowers after loans are issued to assure that covenants are obeyed. Hence, under the „bad management‟ hypothesis, there is a positive association between low cost efficiency and NPLs. On the other hand, low cost efficiency may have a negative impact on NPLs. According to Berger and DeYoung (1997) this relationship is hypothesized as „Skimping‟ hypothesis. According to this view, there

exists a trade-off between allocating resources for underwriting and monitoring loans and measured cost efficiency. In other words, banks which devote less effort to ensure higher loan quality will seem to be more cost-efficient; however, there will be a growing number of NPLs in the long run. Hence, banks which have adequate budget to screening loan customers, appraising collateral, and monitoring and controlling borrowers after loans are issued seem to be cost inefficient in the short run. However, the volume of NPLs tends to be lower as compared to banks which do not have adequate budget to ensure higher loan quality. Thus, under the skimping hypothesis, the association between measured cost efficiency and NPLs is negative.

Financial performance: the financial performance of a bank is usually related to the risk taking behaviour of managers (Hu et al. (2004), Jimenez and Saurina (2006), Jellouli et al (2009), Metaxas et al (2010) and Vogiazas and Nikolaidou (2011)). As noted in Hu et al. (2004), profitable banks are less engaged in risky activities as they have less pressure to create revenues. Profitable banks have an opportunity to choose a loan applicant who has strong financial performance and lower risk. Hence, as the profitability of banks increases, the probability that managers engaged in risky investment will reduce and ultimately the probability that loans become a nonperforming loans will also reduce with the same manner. To the contrary, unprofitable (inefficient) banks might engage in risky lending activity in particularly when managers have short term incentives. As long as banks engaged in risky activity the likelihood that loans become default is high and ultimately resulted with sizeable volume of NPLs.

Income diversification: The traditional argument based on Diamond (1984) suggests the wisdom of not putting all eggs in one basket. Recently however, there is no general

consensus on the benefit of income diversification. On one side, there are supporter of the concept of portfolio theory which states that banks can reduce firm-specific risk by diversifying their portfolios as it makes possible the compensation for losses in some products by gains in others (Winton 1999, Templeton and Severiens 1992 and Gallo et al. 1996). Hence, the potential losses on the loan activity might be overcome by looking for non interest sources of revenues (financial revenues and capital gains). On the other side, scholars like, Maksimovic and Philips (2002), DeYoung and Roland (2004) and Stiroh (2006) argued that, diversification of revenue does not guarantee low level of NPLs. Because, too many operating items make the banks lose their focus on specialized field and reduce their monitoring effectiveness that may increase the probability of failure. Hence, banks should focus on a single line of business so as to take greatest advantage of management‟s expertise which ultimately reduced the probability of NPLs.

Ownership structure: According to the Coase Theorem, cited in Hu (2006), the assignment of property rights (ownership) will not affect economic efficiency as long as the transaction cost is zero. However, the real world is imperfect and the transaction cost can be sufficiently high. In an imperfect world with high transaction costs, ownership does matter to economic efficiency and making different ownership types is associated with different transaction costs (Cooter and Ulen 2000). In this regard, most existing literature suggested that state-owned banks are usually associated with high NPLs than privately owned banks. Salas and Saurina (2002) argue that to enhance the economic development of the country, state-owned banks have more incentives to fund riskier projects and to allocate more favorable credits for small and medium firms. Private institutions clearly have an incentive to solve adverse selection and moral hazard

problems and lend to borrowers who have productive investment opportunities. Governments have less incentive to do so because they are not driven by the profit motive. The absence of a profit motive also means that state-owned banks are less likely to manage risk properly and be efficient (Hu 2004). This inadequate risk taking behavior (compared to the return profile) will lead to a higher level of NPLs.

Bank size: The existing literature provides evidence that suggests a negative association between size of a bank and bank‟s NPLs (Salas and Saurina (2002), Hu et al. (2004), Cole et al. (2004), Micco et al. (2004), Garcia and Robles (2007) and Swamy (2012)). As noted in Hu et al. (2004), large banks have more resources and are more experimented for efficient information gathering, processing and analyzing to tackle moral hazard and adverse selection and ultimately better deal with bad borrowers. Small banks, on the contrary, may be exposed to the adverse selection problem because of the lack of sufficient competencies and experience to effectively assess the credit quality of borrowers. In addition, Cole et al. (2004) suggested that, smaller banks adopt small business loan underwriting practices. Hence, the extents that the failure rates of small businesses are higher than those of larger and established firms.

2.1.1.2. Macroeconomic factors

The existing literature provides evidence that suggests a strong association between NPLs and macroeconomic factors. Several macroeconomic factors which the literature proposes as important determinants of NPLs are: real GDP growth, inflation rate, effective exchange rate, real interest rate, unemployment rate, broad money supply (M2) and GDP per capital (Salas and Suarina 2002, Fofack 2005 and Jimenez and Saurina 2005). This

study only considers the growth in real GDP, annual inflation rate, real interest rate and the real effective exchange rate.

Real GDP growth: there is an inverse relationship between GDP growth and the level of NPLs reported by commercial banks (Salas and Suarina(2002), Jajan and Dhal (2003), Fofack (2005) , Hou (2006) , Jimenez and Saurina (2005), Pasha and Khemraj (2009), Louzis et al. (2010) and Azeem et al. (2012)). The explanation provided by the literature for this relationship is that, Changes in business cycle impact the credit worthiness of borrowers in terms of repayment capacity. Hence, strong positive growth in real GDP usually translates into more income which improves the debt servicing capacity of borrower which in turn contributes to lower NPLs. Conversely, when there is a slowdown in the economy (low or negative GDP growth), the economic activities in general are decreasing and the volume of cash held for either businesses or households is decreasing. These conditions contribute in deteriorating the ability of borrowers to repay the loans, which lead to increase the likelihood of delays their financial obligations and thus banks‟ exposure to credit risk increase. In this regard, Hou (2006) noted that, each NPL in the financial sector is viewed as an obverse mirror image of an ailing unprofitable enterprise.

Real Interest rate: Asymmetric information and the resulting adverse selection problem can lead to "credit rationing," in which some borrowers are denied loans even when they are willing to pay a higher interest rate (Stiglitz and Weiss 1981). This occurs because as interest rates rise, prudent borrowers are more likely to decide that it would be unwise to borrow, whereas borrowers with the riskiest investment projects are often those who are willing to pay the highest interest rates. In this general setting, a higher interest rate leads

to even greater adverse selection; that is, the higher interest rate increases the likelihood that the lender is lending to a bad credit risk and ultimately increases NPLs (Sinkey and Greenwalt (1991), Jimenez and Saurina (2006), Pasha and Khemraj (2009), Ahmad et al (2009) and Metaxas et al (2010)).

Inflation: Inflation affects borrowers‟ debt servicing capacity through different channels and its impact on NPL can be positive or negative (Fofack 2005, Pasha and Khemraj (2009) and Nkusu 2011). The explanation provided by the literature for this relationship is that, higher inflation can make debt servicing easier by reducing the real value of outstanding loans particularly when the loan rates are fixed (banks do not adjust rates in accordance to the inflation change to maintain their real returns). However, it can also weaken some borrowers‟ ability to service debt by reducing real income. Moreover, when loan rates are variable(adjusted in accordance to the inflation change), inflation is likely to reduce borrowers‟ loan servicing capacity as lenders adjust rates to maintain their real returns or simply to pass on increases in policy rates resulting from monetary policy actions to combat inflation. Against this background, the relationship between NPL and inflation can be positive or negative.

Real effective Exchange rate: like inflation a change in effective exchange rate can also affects borrowers‟ debt servicing capacity through different channels and its impact on NPL can be positive or negative (Nkusu 2011). As noted in Pasha and Khemraj (2009), depreciation of the exchange rate can have mixed implications on borrowers‟ debt servicing capacity. On the one hand, it can improve the competitiveness of export-oriented firms. As long as the value of domestic currency depreciated (lower), export-oriented firms 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 export-oriented borrowers. On the other hand, it can adversely affect the debt-servicing capacity of borrowers who borrow in foreign currency (import-oriented firms).

2.2. Empirical Studies on the determinants of non-performing loans

There are many studies that have been conducted so far in determinants of bank‟s NPLs. Their results have shown that, banks NPLs are determined by either internal or external factors. Hence, the following section presents the empirical evidence on the determinants of bank‟s NPLs with a particular focus on those studies that have been conducted more recently, as far as they are the best indicators of the current situation. Hence, section 2.2.1 presents studies that have been conducted in single country. This is followed by a review of cross countries studies in section 2.2.2. Finally, Section 2.2.3 presents related studies that have been conducted in the Ethiopian context.

2.2.1. Single country studies

One of the earliest studies on the determinants of NPLs is the work of Keeton and Morris (1987), who investigated the fundamental drivers of loan losses for a sample of nearly 2,500 US commercial banks for the period 1979–1985. Using simple linear regressions, they found that local economic conditions along with the poor performance of certain

sectors explain the variation in loan losses recorded by the banks. The study also reported that commercial banks with greater risk appetite tend to record higher losses.

Several studies which followed the publication of Keeton and Morris (1987) have since proposed similar and other explanations for problem loans in the US. For instance, Sinkey and Greenwalt (1991) investigated the loan loss experience of large commercial banks in the US from 1984 to 1987 by using a simple log linear regression model. They found that both internal and external factors explain the loan loss rate of US banks. These authors found a significant positive relationship between the loan loss rate and internal factors such as high interest rates, excessive lending, and volatile funds. In addition, they reported that depressed regional economic conditions also explain the loss rate of the commercial banks. In addition, Keeton (1999) analysed the impact of credit growth and loan delinquencies in the US banks from 1982 to 1996 with a vector auto regression model. The result has shown that, there is a strong relationship between credit growth and impaired assets. Specifically, rapid credit growth was associated with lower credit standards and contributed to higher loan losses in US banks.

Studies that have been conducted in other financial systems also provided similar results to those in the US. For instance, Bercoff et al (2002) examined the fragility of the Argentinean Banking system over the periods of 1993-1996 by using survival analysis. They argue that NPLs are affected by both bank specific factors and macroeconomic factors. In addition, Salas and Saurina (2002) investigated the determinants of problem loans of Spanish commercial and saving banks using a dynamic model and a panel dataset covering the period 1985-1997. The study revealed that real growth in GDP, rapid

credit expansion, bank size, capital ratio and market power explain the variation of NPLs in Spanish commercial banking sector.

By using the panel regression model, the work of Jimenez and Saurina (2006) analyzed credit cycles, credit risks, and prudential regulation of Spanish commercial banks. The study utilized the ratio of NPLs as a dependent variable, and on the other side, independent variables are represented by the growth rate of GDP, the real interest rate, total collaterized loans, size of the banks, and two Herfindhal indexes (one for region and one for industry). The study found that the macroeconomic control variables, i.e. growth rate of GDP and real interest rates are both significant. The acceleration of GDP as well as decline in real interest rates brings about decline in problem loans. The size of the bank does not have a significant association to the problem loan ratio. Finally, the rate of loan growth found to be highly significant at the 1 percent level and has positive association with problem loans.

Hu et al (2006) examined the relationship of ownership structure, size of banks and income diversification with NPLs of commercial banks in Taiwan with a panel dataset covering the period 1996-1999. The study shows that banks with higher government ownership recorded lower NPLs. Hu et al (2006) also show that bank size is negatively related to NPLs while diversification has not found a significant association with banks NPLs in Taiwan commercial banking sector.

Pasha and Khemraj (2009) empirically examined the determinants of NPLs in the Guyanese banking sector using a panel dataset. The result revealed that, both microeconomic and macroeconomic variables have significant association with NPLs.

Among macroeconomic variables, exchange rate and GDP growth found out a significant relationship with NPLs. Specifically, the real effective exchange rate has a significant positive impact on NPLs. This indicates that whenever there is an appreciation in the local currency the NPLs portfolios of commercial banks are likely to be higher. On the other hand, the study found that, GDP growth is inversely related to NPLs, suggesting that an improvement in the real economy translates into lower NPLs. Among micro-specific variables, Interest rate and credit growth have a significant positive association with NPLs. This indicated that, banks which charge relatively higher interest rates and lend excessively are likely to incur higher levels of NPLs. However, contrary to previous studies, the study does not support the view that large banks are more effective in screening loan customers when compared to their smaller counterparts.

Ahmad et al (2009) examined factors affecting banks credit risk in Jordan banks from 1995-2005 using dynamic panel regression analysis. Their findings reveal that at the macroeconomic level, GDP, inflation and market interest rate have significant impact on credit risk. While at microeconomic level, previous NPLs, loan growth, loan concentration and bank size are significant determinants. Specially, conditions associated with good economic periods contribute in decreasing the banks‟ credit risk exposure.

Louzis et al (2010) examined the determinants of NPLs in the Greek financial sector by using dynamic panel regression method. The study utilized a panel data set comprising the 9 largest Greek banks (which account for approximately 90% of Greece‟s banking sector) for the period 2003-2009 includes both a period of growth as well as the downturn. The study concluded that macroeconomic variables, specifically the real GDP growth rate, the unemployment rate and the lending rates have a strong effect on the level

of NPLs. Furthermore, bank specific variables such as financial performance and efficiency have also a strong relationship with the level of NPLs.

Ramachandran et al (2011) empirically investigated determinants of the credit risk in the Indian commercial banking sector by using an econometric model. The study utilized a panel data at bank level for 22 public sector banks and 15 private sector banks. The study revealed that both macroeconomic and bank specific factors play crucial role in determining the credit risk of the commercial banking sector. Specifically, the lagged nonperforming assets had a strong and statistically significant positive influence on the current non-performing assets. There is also a significant inverse relationship between the GDP and the credit risk for both public and private sector banks.

Jusoff et al (2011) investigated the relationship between NPLs, interest rate and inflation rate in Malaysian banking sector for the period January 2006- December 2009. The study utilized a vector Error correction model (VECM) to determine whether interest rate and inflation rate may affect the NPLS based on 48 monthly data. The long run relationship shows that interest rate has a significant relationship towards NPL. On the other hand, there is no significant relationship between inflation rate and NPL. In the short run relationship, the finding shows that both inflation and interest rate cannot influence the NPLs in Malaysian commercial banking sector.

Vogiazas and Nikolaidou (2011) investigated the credit risk determinants of the Bulgarian banking sector by means of time series modeling approach. The study was motivated by the hypothesis that macroeconomic variables such as, interest rates, financial markets" and bank-specific variables have a role to play on the NPLs in the

Bulgarian banking system. Using monthly data series from January 2001 to December 2010 that covers both the booming period and the recent global financial turmoil. Findings indicated that, the macroeconomic and financial markets‟ variables, specifically the unemployment rate, the construction index, the industrial production index and the real effective exchange rate jointly with the credit growth and the global financial crisis influence the NPLs of Bulgarian banks.

Farhan et al (2012) investigated the economic factors causing NPLs in the Pakistani banking sector using a primary data collected via a structured questionnaire from 201 bankers who are involved in the lending decisions or analyze the credit risk or handling NPLs portfolio. Correlation and regression analysis was carried out to analyze the impact of selected independent variables(Interest Rate, Energy Crisis, Unemployment, Inflation, GDP Growth, and Exchange Rate) on the NPLs of Pakistani banking sector. According to the results Pakistani bankers perceive that Interest Rate, Energy Crisis, Unemployment, Inflation, and Exchange Rate has a significant positive relationship with the non-performing loans of Pakistani banking sector while GDP growth has significant negative relationship with the non-performing loans of Pakistani banking sector. This study also discusses how good loans are turning into bad loans due to disaster in energy sector of Pakistan and how these energy crisis are badly affecting the banking sector of Pakistan

Recently, Swamy (2012) examined the determinants of default risk of Indian commercial banks using panel data set over the period of 1997-2009. The study used quantitative method with econometrics module. A multiple regression result revealed some interesting

inferences contrary to the perception of few opinion makers. Lending rates have been found to be not so significant in affecting the NPLs, which is contrary to the general perception. Bank size has a significant and negative association with level of NPLs, indicating that large banks may have better risk management procedures and technology which definitely allows them to finish up with lower levels of NPLs compared to smaller banks. Further, this study suggests that private banks and foreign banks have advantages in terms of their efficiencies in better credit management that contains NPLs. That indicates that bank privatization can lead to better management of NPLs.

Very recently, Azeem et al. (2012) also investigated the determinants of NPLs of US commercial banks from 1985-2010 by using correlation and regression tests. Their result have shown that a significant association between NPLs and real interest rate and GDP. Particularly, real interest rate has a significant positive relationship with NPLs of US commercial banking sector while GDP growth has significant negative relationship.

2.2.2. Cross country studies

Fofack (2005) investigated the leading causes of NPLs during the economic and banking crises that affected a large number of countries in Sub-Saharan Africa in the 1990s. The study used correlation, causality analysis and pseudo-panel models based on data drawn from 16 African countries. The result revealed that both macro and microeconomic factors have significance association with NPLs of banks in Sub-Saharan African countries. The econometric analysis have shown a strong causality between NPLs and, economic growth, real exchange rate appreciation, the real interest rate, net interest margins and interbank loans. Specifically, the dramatic increase in the size of NPLs is

largely driven by macroeconomic volatility and reflects the vulnerability of undiversified African economies, which remain heavily exposed to external shocks. Macroeconomic stability and economic growth are associated with a declining level of NPLs; whereas adverse macroeconomic shocks coupled with higher cost of capital and lower interest margins are associated with a rising scope of NPLs. Interesting enough, inflation does not appear to be particularly significant in explaining the dynamics on NPLs.

Masood and Aktan (2009) investigate the factors that contributed to the increase in non-performing loans (NPLs) in large state-owned commercial banks over the period 1999–2001 and 1996–1998 in Turkey and Pakistan respectively. This paper uses the survey-based methodology to investigate the determinants of NPLs. Data are mainly obtained from credit managers of Turkey and Pakistan commercial banks through questionnaire. The study found that external government intervention; loans to insiders and poor credit risk assessment have significant influence in the size of NPL in Turkey. The result also show that communication facilities provided to credit managers, credit managers' years of service in the banks and years of experience in the bank of credit managers, were the significant determinants of non-performing loans in Pakistan.

Jellouli et al (2009) empirically analyzed the determinants of problem loans and the potential impact of both business and institutional environment on credit risk exposure of banks in the Middle East and North Africa (MENA) countries region based on a sample composed of 46 commercial banks from 12 countries over the period 2002-2006. The study used a random-effects panel regression model that controls for cluster effects at the country level. Their results have shown that, foreign participation from developed

countries reduces the NPL level; highly capitalized banks experience high levels of NPLs, high credit growth is associated with a reduced level of NPLs. Concerning business environment factors, it appears that only the relevance of information published by credit bureaus favorably impacts the credit exposure of banks.

Boudiga (2009) empirically analyzed the cross-countries determinants of NPLs and the potential impact of regulatory factors on credit risk exposure. The study used aggregate banking, financial, economic and legal environment data for a panel of 59 countries over the period 2002-2006. The study used the ratio of NPLs as dependent variable. On the other hand, the independent variables includes capital to risk-weighted assets minus the required minimum capital, one year lagged loan loss reserves to total loans ratio, one year lagged return on assets ratio, percentage of state-owned banks, percentage of foreign ownership, percentage of assets held by the five largest banks and one year lagged real GDP growth. The results imply that higher capital adequacy ratio and prudent provisioning policy are correlated with a decrease in NPLs. In addition, private ownership, foreign participation and bank concentration have a positive association with NPLs. Interestingly, the regulatory devices are either counterproductive or do not significantly improve the credit risk exposure for countries characteristic with weak institutions, corruption environment and little democracy. Further, the presence of state does not enhance the NPLs problem either.

Espinoza and Prasad (2010) attempted to ascertain the determinants of NPLs in the Gulf Cooperative Council (GCC) banking sector. The study used data drawn from 80 banks in the region over the period of 1995–2008. The result of multiple regressions models supported the view that both macroeconomic factors and bank-specific characteristics

determine the level of NPLs. In particular, the study found strongly significant and inverse relationship between real GDP growth and NPLs. The study also showed that global financial market conditions have an effect on NPLs of banks. Among bank specific variables factors, efficiency and past expansion of the balance sheet were found to be significant. High credit growth in the past could generate higher NPLs in the future. Finally, larger banks would also have lower NPLs in GCC banking sector.

Nkusu (2011) empirically investigated the link between NPLs and macroeconomic performance on a sample of 26 advanced countries that spans the period from 1998 to 2009 using two complementary approaches. First, the study investigated the macroeconomic determinants of NPL in panel regressions and confirms that adverse macroeconomic developments are associated with rising NPLs. Second, the feedback between NPLs and its macroeconomic determinants is investigated in a panel vector autoregressive (PVAR) model. The findings of the study suggested that, deterioration in the macroeconomic environment such as adverse shock to GDP growth, higher inflation, unemployment or falling asset prices is associated with debt service problems, reflected into rising NPL. Conversely, a favorable macroeconomic environment is associated with subdued NPL.

Castro (2012) analyzed the link between the macroeconomic developments and the banking credit risk in a particular group of countries those recently affected by unfavorable economic and financial conditions such as Greece, Ireland, Portugal, Spain and Italy (GIPSI). Employing dynamic panel data approaches to those five countries over the period 1997-2011. The result conclude that the banking credit risk is significantly affected by micro and macroeconomic variables. Specifically,

GDP growth has a significant negative relationship with banks NPLs. On the other hand, NPLs of banks have a significant positive association with rises of unemployment rate, interest rate, credit growth increase and appreciation of real exchange rate.

De Bock and Demyanets (2012) examined how credit growth and asset quality in 25 emerging markets (EM) relate to different domestic and external factors by using dynamic panel regressions analysis over the period 1996-2010. The panel regressions result has shown that a slowdown in economic growth, a weaker exchange rate or terms of trade, and rapid credit growth are independently associated with higher NPL levels.

2.2.3. Studies on Ethiopia

In the context of Ethiopia, there appears to be very limited studies on the determinants of bank‟s NPLs. To the knowledge of the researcher there is only the work of Negera (2012) that investigated the determinants of NPLs in the context of ECBs. However, there are also other studies that investigated the other aspect of NPLs in ECBs. These studies are the work of Tilahun (2010) and Ayalew (2009). Thus, this particular section provides a detailed review of those related studies conducted in the context of Ethiopia.

Negera (2012) assessed the determinants of NPLs in Ethiopian commercial banking sector using a survey data collected from both private and state owned commercial Banks using a self-administered questionnaire. In addition to the survey data, the study used interview with senior bank officials. A descriptive statistics and correlation matrix were used so as to analyze the data. The findings of the study shows that 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 default by borrowers and their knowledge limitation, fund diversion for unintended purpose, over/under financing by banks ascribe to the causes of loan default. However, the study outcome failed to support the existence of relationship between banks size, interest rate they charge and ownership type of banks and occurrences of nonperforming loans.

On the other hand, the study of Tilahun (2010), identified the underlying NPLs management difficulty of ten privately owned commercial bank in Ethiopia given in to consideration that the managements are different from bank to banks based on their perception towards the NPLs. The study applies mixed research approach. The data obtained from questionnaires and unstructured interviews presented and analyzed through descriptive statistics. The result revealed that, Credit Policy and supervision by the management has less contribution to the NPLs. Most of the NPLs are caused by factors after the loan released like moral hazard of the borrower, ineffective monitoring, and operational loss of the borrower. Ineffective monitoring system has contributed to the NPLs because of less amount and type of information assessed, understaffing and lack of communication among branches of the bank. Dealing with NPLs on a timely manner is also another problem identified by the paper. The directive from NBE have a positive impact by creating safe ground the bank can do business and by giving absolute right to the banks to take their collateral at any time the bank need to do so without notifying courts.

By using a mixed research approach, Ayalew (2009), investigated legal problems in realizing nonperforming loans of Ethiopian commercial Banking sector. The finding of the study indicated that legal gaps that exist in procedural laws and institutional

problems affect the resolution process. Furthermore, the study argued that, issuing appropriate laws covering financial securities, establishing a comprehensive institutional framework including Asset Management Companies (AMCs) with clear accountability and transparency are found to be very important.

2.3. Conclusions and knowledge gap

The literature review that are discussed so far showed that, banks NPLs are determined by macroeconomic and bank specific factors. The empirical evidence shows that, favorable macroeconomic conditions, such as sustained economic growth, low unemployment and interest rates, tend to be associated with a better quality of bank loans. The studies in general depicted the association between real GDP growth, inflation, real interest rate, unemployment rate and effective exchange rate . On the other hand, bank specific factors like, bank size, financial performance, operational efficiency, rapid loan growth, ownership type, income diversification, risk assessment and monitoring are found to be having significance on the occurrence of NPL.

However, Most of the literature that are discussed so far appeared to have focused on studies that were conducted in the banking sector of developed economies (such as united state of American, Spanish, Greek and Italian) and some emerging economies (such as Indian, Chinese, Malaysian, and Indonesia). Consequently, the Banking sectors in most developing economies like Ethiopia have so far received inadequate attention in the literature. Moreover, NPLs of different countries does not necessarily share identical immediate causes since those studies were based on the data from diverse countries. Apart from the data originated from, those literatures by themselves provided

contradictory conclusions because of different models and methodologies they used. Hence, their results may not be applicable to Ethiopian banking sector.

In the context of Ethiopia, the related study conducted by Negera (2012), assessed the determinants of NPLs in Ethiopian commercial banks by using bank-specific variables. Accordingly, this study clearly failed to identify macroeconomic determinants of NPLs which have found as a significant determinates of NPLs in many others studies like, Azeem et al. (2012) and Louzis et al. (2010). Furthermore, the study used only descriptive statistics and correlation matrix for the entire analysis. However, none of those methods are able to explain casual relationship between variables (i.e., movements in a variable (dependent) by reference to movements in one or more other variables (independent)). For instance, a correlation between two variables measures only the degree of linear association between them (Brooks 2008).

In addition, the work of Tilahun (2010) was not mainly intended to investigate the determinants of NPLs, the major aim of the study was to identify the underlying NPLs management difficulty of privately owned commercial bank of Ethiopia without including the two biggest state owned commercial banks that have higher market share in the industry. Moreover, the study used only a descriptive statistics for the entire analysis without considering a lot of limitations associated with it. Similarly, the work Ayalew (2009) mainly emphasized on the legal problems in realizing NPLs of Ethiopian banking sector. Thus, the cause of NPLs was not the concern of the study since legal issues comes after the occurrence default loans.

Furthermore, the data that has been used in the analysis of all the above studies (i.e., studies that are conducted in Ethiopian commercial banking context) are mainly obtained from banks officials‟ through questionnaire and interviews. Hence, intentionally or unintentionally the respondent might be biased.

In general, the lack of sufficient research on the determinants of NPLs in the context of Ethiopia banking sector and the existence of knowledge gap in the area initiate this study. Hence, the purpose of this study is to investigate the determinants of NPLs in Ethiopian commercial banking sector by utilizing an econometrics model so as to estimate both the macroeconomic and bank specific determinants of NPLs.

Chapter three: Research design

The preceding chapter presented the review of litreature on the determinats of NPLs and identified the existing knowledge gap. The purpose of this chapter is to discusses the research design. The chapter is organized in to the following three sections. The first section 3.1 presents variabe specification of the study with respect to the research hypotheses. This followed by research approachs in section 3.2. Finally , Section 3.3 discusses the research method used in the study.

3.1. Variable specification, Hypotheses and research qustions

As already shown in the first chapter, the broad objective of this research is to investigate the determinats of NPLs in the context of ECBs. In line with the broad objectiv ten hypotheses and two specific research questions were formulated. Hence, subsection 3.1.1 presents the dependent variable (NPLs). Then the independent variables that are selected and categorized into bank-specific and macroeconomic determinants of banks‟ NPLs are presented in subsection 3.1.2.

3.1.1. Dependent variable

As mentioned in the literature review part of this study, there is no global standard to define NPLs at the practical level. Variations exist in terms of the classification system, the scope, and contents. Neversless, as far as this study intends to ivestigate the determinats of NPLs in ECBs, the measurement of NPLs is in accordance with the NBE directive. As per the NBE(2012)directive, NPLs are are clacified as Substandar,

Doubtfull and Loss. Hence, the ratio of NPLs to total loans was used as aproxy for this study.

3.1.2. Independent variables

Pervious researches on the determinants of banks‟ NPLs have shown that, independent variables that can explain the variation on NPLs are classified into bank-specific and macroeconomic variables (Azeem et al. 2012, Delgado and Vallcorba 2007, Louzis et al. 2010 and Aktan 2009). The bank-specific variables are internal factors and controllable for banks‟ managers while the macroeconomic variables are uncontrollable and hence external. Therefore, the following subsections presented the bank-specific and macroeconomic variables used in the econometrics model of this study.

3.1.1.1. Bank specific variables

The existing literature provides evidence that suggests a strong association between NPLs and several bank specific variables. The bank specific variables that are usually theorized as determinats of NPLs are include, loan growth, financial perfrormance, bank size, ownership structure, the quality of the loan portfolio and operatinal efficicecy. Hence, the following part of this subsection presents the bank-specific variables used in this study.

Loan growth: as mentioned in the literature, to maximize the short run benefits, managers seek to rapidly expand credit activities. The search for rapid growth of loans is achieved by either reducing interest rate charged to borrowers or by lending to lower credit quality borrowers (Fernandez De Lis et al., 2000). This will lead, through adverse selection reasoning (lending to lower credit quality borrowers) and ultimately increase

the probability of NPLs. Empirically; various Studies found strong positive relationship between rapid credit growth and NPLs (Sinkey and Greenwalt 1991, Weinberg 1995, Keeton 1999 Salas and Saurina (2002), Jimenez and Saurina (2006) and Metaxas et al (2010)). Hence, a positive relationship between loan growth and NPLs is expected in this study. The variable used to capture credit growth was constructed by finding the annual percentage change in the loan portfolio for each Ethiopian commercial bank.

HP1: There is a significant positive relationship between loan growth of a bank and bank's NPLs.

Operational efficiency: as shown in the literature, the relationship between operational efficiency of a bank and bank‟s NPLs can be positive or negative. A number of researchers have found a positive (Berger and Humphrey 1992, Wheelock and Wilson 1994) and a negative (Hughes and Moon 1995, Resti1995) relationship between cost of efficiency and NPLs. Hence, the sign of the coefficient estimate among operational efficiency and NPLs is remain indeterminate in this study. Cost to income ratio of Ethiopian commercial banks used as a proxy measurement to capture the operational efficiency of banks.

HP2. There is a significant positive/negative relationship between operational efficiency of a bank and bank's NPLs

Financial performance: As noted by Hu et al. (2004), profitable banks are less engaged in risky activities as they have less pressure to create revenues. At the opposite, inefficient institutions might engage in risky lending in particularly when managers have short term incentives. In this regard many scholars found a negative association between

financial performance of a bank and bank‟s NPLs (Jimenez and Saurina (2006), Jellouli et al (2009), Metaxas et al (2010) and Vogiazas and Nikolaidou (2011)). Hence, a negative relationship is expected in this study. In this study the financial performance of a bank was measured by the ratio of Return on asset (ROA).

HP3: There is a significant negative relationship between financial performance of a bank and bank's NPLs

Income diversification: as mentioned in the literature review part of this study, there is no general consensus on the benefit of income diversification. In this regard, vast empirical literature found both a significant positive (Lepetit et al. (2007), Stiroh (2002, 2006) and negative (Winton 1999, Templeton and Severiens 1992) association between income diversification and NPLs. Hence, the sign of the coefficient between income diversification and NPLs is indeterminate in this study. The variable used to capture the income diversification of banks was measured by the ratio of non interest income to total asset of banks.

HP4: There is a significant positive/negative relationship between income diversification of a bank and bank's NPLs.

Ownership structure: most existing literature suggested that state-owned banks are usually associated with high level of NPLs than privately owned banks. Empirically, Salas and Saurina (2002), Hu et al. (2004), Micco et al. (2004), Barth et al. (2004) , Garcia and Robles (2007) and Swamy (2012) suggested a positive association between state ownership of banks and the volume of NPLs . Hence, in this study a positive relationship between NPLs and state owned banks is expected. The variable used to

capture the ownership structure of banks was measured by dummy variables (1=state owned banks and 0 =private banks).

HP5: There is a significant positive relationship between state ownership of banks and bank's NPLs.

Bank size: The empirical evidence relating to the impact of bank size on NPLs suggested an inverse relationship (Rajan and Dhal, 2003; Salas and Saurina, 2002; Hu et al, 2006). According to these studies, the inverse relationship means that large banks have better risk management strategies and technology which definitely allows them for efficient information gathering, processing and analyzing which finish up with lower levels of NPLs as compared to smaller banks. Hence, a negative relationship between the size of a bank and bank"s NPLs is expected in this study. The size of a bank was measured by the Natural log of total assets of each bank.

HP6: There is a significant negative relationship between size of a bank and bank's NPLs.

3.1.1.2. Macroeconomic variables

Apart from bank specific variables, there is abundant empirical evidence that suggests that several macroeconomic factors are important determinants of NPLs. Several macroeconomic factors which the literature proposes as important determinants of NPLs are: annual growth in GDP, the annual inflation rate, real effective exchange rate (REER), annual unemployment rate, broad money supply (M2) and GDP per capital (Salas and Suarina, 2002; Rajan & Dhal, 2003; Fofack, 2005; and Jimenez and Saurina,

2005). This study only considers the growth in real GDP, inflation, real interest rate and effective exchange rate.

Real GDP growth: the empirical evidence suggested a negative relationship between the growth in real GDP and NPLs (Salas and Suarina, 2002; Rajan & Dhal, 2003; Fofack, 2005; and Jimenez and Saurina, 2005). The explanation provided by the literature for this relationship is that strong positive growth in real GDP usually translates into more income which improves the debt servicing capacity of borrower which in turn contributes to lower NPLs. Hence, a negative relationship between GDP and NPLs is expected in this study. The variable used to capture real GDP growth was constructed by finding the annual percentage change in the real GDP.

HP7: There is a significant negative relationship between real GDP growth and bank's NPLs.

Real interest rates: empirically, several studies report that high real interest rate is positively related to NPLs (Sinkey and Greenwalt (1991), Fofack (2005) and Jimenez and Saurina(2005)). The basic argument here is that, as interest rates rise, prudent borrowers are more likely to decide that it would be unwise to borrow, whereas borrowers with the riskiest investment projects are often those who are willing to pay the highest interest rates. Hence, a positive relationship real interest rate and bank"s NPLs is expected in this study. In this study, the average lending rate of Ethiopian banks used as proxy measurement.

HP8: There is a significant positive relationship between real interest rate and bank's NPLs.

Inflation: as mentioned in the literature, inflation affects borrowers‟ debt servicing capacity through different channels and its impact on NPL can be positive or negative. Empirically, Fofack (2005) found a positive relationship between inflation and NPLs in a number of Sub-Saharan African countries with flexible exchange rate regimes. On the other hand, Smadi (2010) found a negative association between inflation and NPLs in Jordanian commercial banking sector. Hence, the relationship is indifferent in this study. In this study, annual inflation rate was used as a proxy measurement.

HP9: There is a significant positive/negative relationship between inflation and bank's NPLs.

Real effective Exchange rate: like inflation a change in effective exchange rate can also affects borrowers‟ debt servicing capacity through different channels and its impact on NPL can be positive or negative. Hence, the sign of the relationship between exchange rate and NPL is indeterminate in this study. The variable was measured by the annual effective Exchange rate of Ethiopian birr in terms of dollar.

HP10: There is a significant positive/negative relationship between effective exchange rate and bank's NPLs.

In addition to the above ten hypothesis, the following two specific research questions were also formulated.

RQ1. What are the determinants of banks' non-performing loans in Ethiopia commercial banking sector?

RQ2. What are the likely causes for the existence of variation on NPLs performance among Ethiopian commercial banks?

The following table 3.1 presents the summary of hypothesized expected sign for the relationship between variables (dependent and independent) along with the proxy measurement for each variable.

Table 3.1 Descripton of the variables and their expected relationship

Variables	Measure	Notation	Expected sign
Nonperforming loans	Non-performing loans/gross loans ratio	NPL	
Loan growth	Percentage change in loan growth	LG	+
Operational efficiency	Cost/income ratio	CIR	+/-
Income diversification	Non-interest income/total assets ratio	IDV	+/-
Financial performance	Return on asset	ROA	-
Size	Natural log of total assets	SIZE	-
Ownership structure	Dummy, "1" denote stated owned banks and "0" for private banks	OWS	+
Exchange rate	Annual effective Exchange rate of Ethiopian birr in terms of dollar	EFEX	+/-
Real interest rate	The average lending rate of banks	RIR	+
Economic growth	Real GDP growth (in %)	GDP	-
Inflation	The annual inflation rate	INFL	+/-

3.2. Research approaches

As noted in Creswell (2003, p.13) in terms of investigative study there are three common approaches to business and social research namely, quantitative, qualitative and mixed methods approach. Quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell 2009, p.4). In quantitative research approach there are two strategies of inquiries namely, survey design and experimental design. The chief advantage of this approach is making generalizations for a broader population based on the findings from the sample. However, as noted in Dunn (1999) quantitative research approach has its own disadvantages. For instance, the sample selected may not represent the total population and the researchers know much about the collective or average experience of research participants, but not their individual experiences (Dunn 1999).

On the other hand, Qualitative research is an approach in which the investigator often makes knowledge claims based primarily on the multiple meanings of individual experiences, socially and historically constructed meanings, participation in issues with an intent of developing a theory or pattern (Creswell 2003, p. 18). As noted in Sarantakos (2005, p. 45 cited in Yesegat 2009, p. 73) qualitative research approach uses strategies of inquiry such as narratives, ethnographies, grounded theory studies, or case studies. Qualitative research design has advantages of flexibility and emergent without being constrained by standardized procedures (Liamputtong and Ezzy 2005, p. 204, cited in Yesegat 2009, p. 74). However, qualitative research design has also its own weaknesses.

As noted in Dunn (1999) the demerits of this approach includes; absence of quick response, difficulty, inefficiently, and lack of generalization among others. Finally, mixed research is an approach to inquiry that combines or associates both qualitative and quantitative forms (Creswell, 2009).

3.3. Research Methods adopted

Based on the above discussions of the three research approaches and by considering the nature of the study a mixed methods research approach was used. The decisive argument here is that the use of both quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach achieves alone. As noted in Greene et al. (1989, p. 259 cited in Yesegat 2009, pp.75-76) adopting a mixed methods approach has a number of benefits. The first benefit is triangulation pertaining to a situation where researchers seek convergence, corroboration, correspondence of results from quantitative and qualitative methods to increase validity of constructs and inquiry results. Secondly, by mixing methods complementarily, researchers seek elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method. Thirdly, by mixing methods with developmental intent, researchers seek to use the results from one method to help develop or inform the other method. Finally, to increase the scope of inquiry mixed method with expansion intent seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.

Mixed method research involves both collecting and analyzing quantitative and qualitative data either sequentially or concurrently. Accordingly, the quantitative method

was dominantly used to investigate determinants of NPLs of ECBs. Following to this, the qualitative method was used to support the quantitative findings and to gain additional insight into the factors that may affect NPLs of ECBs. Hence, the following sections present consecutively the quantitative and qualitative aspects of the research method.

3.3.1. Research method: Quantitative aspect

According to Leedy & Ormord (2005), among quantitative strategies of inquiry, a survey research is the most common and economical way of conducting business research. As a result, in order to generalize the findings to the whole banks operated in the country, in the current study the researcher adopted a survey design that was administered through structured review of documents.

3.3.1.1. Survey design: structured review of documents

As noted in Creswell (2003), the purpose of survey is to generalize description of trends, attitudes, or opinions from a sample to a population so that inferences can be made about some characteristic, attitude, or behavior of this population. Moreover, Fowler (1986) noted that, it is also rational to use survey designs because of its benefits such as the economy of the design and the rapid turnaround in data collection and identifying attributes of a large population from a small group of individuals. Hence, by having the above discussion, it is logical to apply survey method for this study. The subsequent discussions present the structured review of documents in respect of sampling design and data collection.

Sample design

The target population for this study was all commercial banks that were registered by NBE and operational in the country. Currently, the country has two public-owned and eighteen private commercial banks which are operating throughout the country (NBE 2012). However, as a result of lack of 12 years data (that was required for the analysis purpose) in most of the newly established private banks the number of sampled banks were reduced to eight. The researcher believes that the sample size is sufficient to make sound conclusion about the population as far as it covers around 40% of the total population. Moreover, the inclusion of CBE in the sample which takes the lions share in the country‟s banking activity makes the sample more representative and reasonable.

Data collection

In order to achieve the stated objective, a panel data were collected through structured document review. As noted in Brooks (2008) using a panel data has the following advantages: First, and perhaps most importantly, researchers can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross-sectional data alone. Second, by combining cross-sectional and time series data, researchers can increase the number of degrees of freedom and the power of the test by employing information on the dynamic behaviour of a large number of entities at the same time. Finally, the additional variation introduced by combining the data in this way can also help to mitigate problems of multicollinearity that may arise if time series and cross sectional are modelled individually. Hence, audited financial statements of eight banks (CBE, CBB, AIB, DB, WB, BoA, UB and NIB) for 12

consecutive years (i.e., from 2000-2011) were collected. The secondary data that were collected through structured document reviews were mainly from the records held by NBE and the banks themselves. Moreover, in order to analyze the relationship that exists between NPLs and macroeconomic variables, macroeconomic data were also collected for the same years. Those macroeconomic data were mainly gathered from the records held by NBE and MoFED through structured document review

Data analysis techniques

So as to achieve the stated objective, the collected panel data was analyzed using descriptive statistics, correlation matrix and multiple linear regression analysis. The descriptive statistics (Mean values and standard deviations) was used to analyze the general trends of the data from 2000 to 2011 based on the sample of 8 banks, and the correlation matrix was also used to examine the linear relationship between the dependent variable and independent variables. Finally, a multiple linear regression model was used to determine the relative importance of each independent variable in explaining the variation of NPLs in ECBs. Accordingly, a two step multiple linear regression equations were run. In the first step (general) regression equation, all the proposed independent variables (i.e., LG, CIR, ROA, IDV, SIZE, STATEDUMMY, INFL, GDP, EFEX and RIR) were regressed with respect to the dependent variable (NPLs). To this end, only the significant variables that were found from the first step regression equation were regressed once again.

The multiple linear regressions model was conducted by the ordinary listing square (OLS) method using EVIEWS[4] 6 econometric software package. The rational for choosing OLS is that, if the Classical Linear Regression Model (CLRM) assumptions[5] hold true, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators(Brooks 2008). In addition, as noted in Petra (2007) OLS outperforms the other estimators when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS. Thus, the following section discussed the CLRM assumptions.

Test for Heteroscedasticity: as noted in Brooks(2008), the variance of the errors must be constant (homoscedasticity). If the errors do not have a constant variance, they are said to be heteroscedastic. If this problem ignored, the standard errors could be wrong and hence any inferences made could be misleading. Hence, To test for the presence of heteroscedasticity, the popular white test was employed in this study(Brooks 2008).

Test for Autocorrelation: This is an assumption that the errors are linearly independent of one another (uncorrelated with one another). If the errors are correlated with one another, it would be stated that they are auto correlated (Brooks 2008). To test for the existence of autocorrelation, the popular Durbin-Watson test was employed. As noted in Brooks (2008) the rejection / non-rejection rule would be given by selecting the appropriate region from the following figure:

[4] EViews is software package, providing the tools most frequently used in practical econometrics

[5] The conditions for OLS optimality

Figure 3.1 Rejection and non-rejection regions for Durbin-Watson Test

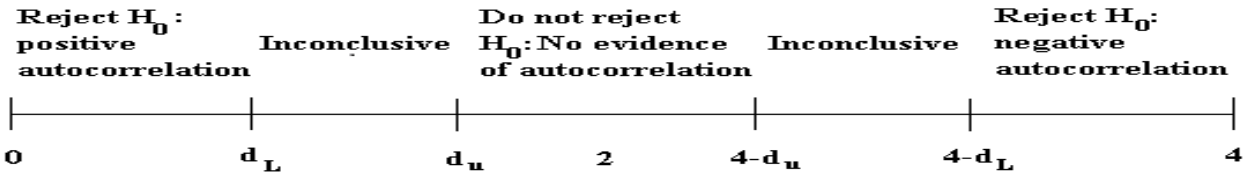


Figure 3.1 shows as Durbin-Watson has 2 critical values: an upper critical value (dU) and a lower critical value (dL).

Test for normality: As noted in Brooks (2008) a normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. One of the most commonly applied tests for normality; the Bera-Jarque formalizes these ideas by testing whether the coefficient of skewness and the coefficient of excess kurtosis are zero and three respectively. Brooks (2008) also stated that, if the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant at 5% significant level.

Test for Multicollinearity: An implicit assumption that is made when using the OLS estimation method is that the explanatory variables are not correlated with one another. To test the presence of multicollinearity problem in regression model the study used a correlation matrix of independent variables. The problem of multicollinearity usually arises when certain explanatory variables are highly correlated. As noted by Hair et al. (2006) correlation coefficient below 0.9 may not cause serious multicollinearity problem. In contrary to this, Kennedy (2008) argued that as any correlation coefficient above 0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results.

Model estimation

So as to investigate the bank-specific and macroeconomic determinants of bank NPLs, the following general multivariate regression equations were adopted:

$$Y_{i,t} = \alpha + \beta X_{i,t} + \varepsilon_{i,t} \quad \ldots\ldots(1)$$

Where $Y_{i,t}$ is the NPLs ratio of bank i at time t, with i=1… N, t=1… T, α is a constant term, $X_{i,t}$ is the explanatory variables(bank specific and macroeconomic variables) of bank i at time t and $\varepsilon_{i,t}$ the disturbance term. As noted in Brooks (2008) the rational for the inclusion of disturbance term are: first, even in the general case where there is more than one explanatory variable, some determinants of $Y_{i,t}$ will always in practice be omitted from the model. Second, there may be errors in the way that $Y_{i,t}$ is measured which cannot be modelled. Finally, there are bound to be random outside influences on $Y_{i,t}$ that again cannot be modelled. For example, a computer failure, human behaviour. Hence, the disturbance term intends to mitigate the above problems.

Based on the general model provided above and on the base of selected variables the empirical model used in the study was as follows:

$$NPL_{i,t} = \beta o + \beta 1\ LG_{i,t} + \beta 2 ROA_{it} + \beta 3 CIR_{it} + \beta 4 IDV_{it} + \beta 5 OWS_{it} + \beta 6\ SIZE_{it} + \beta 87 GDP_{it} + \beta 8\ INFL_{it} + \beta 9\ EEXR_{i,t} + \beta 10\ RIR_{i,t} + \varepsilon_{i,t} \quad \ldots\ldots (2)$$

Where: $LG_{i,t}$=loan growth of bank *i* at time *t*, CIR_{it} = cost to income ratio of (operational efficiency) bank *i* at time *t*, ROA_{it} = return on asset of bank *i* at time *t*, IDV_{it} = Income diversification for bank *i* at time *t* , $SIZE_{it}$ = The natural logarithm of total asset for bank *i* at time *t*, OWS_{it} = ownership structure of bank , GDP_t = Real GDP growth at time *t* ,

$INFL_t$ = Inflation rate at time *t*, $EEXR_{i,t}$ = effective foreign exchange rate at time *t* , $RIR_{i,t}$ = real interest rate (average interest rate)of banks at time *t*, ε_{it} = the error term.

3.3.2. Research method: qualitative aspect

To supplement the gap that might not be captured by the quantitative survey , unstructured interviews with five senior Ethiopian bank officials (credit vice presidents and senior credit committee members) were conducted. The interviewees were from both private and state owned banks namely CBE, CBB, AIB, DB and WB who had over 8 years credit experience in addition to their several years of banking experience. The interviews were conducted to know about both the internal and external factors affecting the non-performing loans of banks in Ethiopia. The interview questions were focused on the identification of factors that were not incorporated in the quantitative part of this study. To this end, the result obtained from in-depth interviews were analyzed using triangulation with the findings of the structured record reviews. As a result, the response of the interviewees‟ for the interview questions were used for supporting the result obtained from analysis of structured record reviews.

Finally, links between research question/hypotheses and variables on the one hand and different data sources on the other hand are presented in table 3.2 below.

Table 3.2 Link between research question/hypotheses, variables and the different data sources

Research question and hypotheses	Variables	Data sources
RQ1. What are the determinants of banks' NPLs in Ethiopia commercial banking sector?	Factors affecting Banks‟ Non-performing loans	In-depth unstructured face-to-face interviews with

RQ2. What are the likely causes for the existence of variation on NPLs performance among banks?		senior Ethiopian bank officials
HP1: There is a significant positive relationship between loan growth of a bank and bank's NPLs.	**Dependent variable:** Non-performing loans **Independent variables:** -Loan growth -Operational efficiency -Income diversification -Financial performance -Size -Ownership structure -Exchange rate -Real interest rate -Economic growth -Inflation	Bank-specific data from Income statement and Balance sheet held by NBE and the banks and macroeconomic data from the records held by NBE and MOFED
HP2: There is a significant positive/negative relationship between operational efficiency of a bank and bank's NPLs.		
HP3: There is a significant negative relationship between financial performance of a bank and bank's NPLs		
HP4: There is a significant positive/negative relationship between Income diversification of a bank and bank's NPLs.		
HP5: There is a significant positive relationship between state ownership of a bank and bank's NPLs.		
HP6: There is a significant negative relationship between size of banks and bank's NPLs.		
HP7: There is a significant negative relationship between real GDP growth and bank's NPLs.		
HP8: There is a significant positive relationship between real interest rate and bank's NPLs.		
HP9: There is a significant positive/negative relationship between inflation and bank's NPLs.		
HP10: There is a significant positive/negative relationship between exchange rate and bank's NPLs.		

Chapter four: Results and Analysis

The preceding chapter presented the research design along with the justification for adopting a mixed methods research approach in this particular study. The purpose of this chapter is to present results and analysis of data obtained from different methods involved in this study. Accordingly, the remaining part of the chapter is organized into three sections. The first section 4.1 presents research hypotheses and questions as presented in the previous chapter. This is followed by the results of both documentary analyses (structured review of documents) and in-depth interview in section 4.2. Finally, Section 4.3 presents detail analysis of results.

4.1. Research Hypotheses and Questions

As mentioned in chapter one the broad objective of this study is to investigate the determinants of NPLs in ECBs. So as to achieve this broad objective the study developed the following ten hypotheses and two specific research questions:

HP1: There is a significant positive relationship between loan growth of a bank and bank's NPLs.

HP2: There is a significant positive/negative relationship between operational efficiency of a bank and bank's NPLs.

HP3: There is a significant negative relationship between financial performance of a bank and bank's NPLs

HP4: There is a significant positive/negative relationship between Income diversification of a bank and bank's NPLs.

HP5: There is a significant positive relationship between state ownership of a bank and bank's NPLs.

HP6: There is a significant negative relationship between size of banks and bank's NPLs.

HP7: There is a significant negative relationship between real GDP growth and bank's NPLs.

HP8: There is a significant positive relationship between real interest rate and bank's NPLs.

HP9: There is a significant positive/negative relationship between inflation and bank's NPLs.

HP10: There is a significant positive/negative relationship between exchange rate and bank's NPLs.

In addition to the above ten hypotheses the following two specific research questions were also formulated:

RQ1. What are the determinants of banks' NPLs in Ethiopia commercial banking sector?

RQ2. What are the likely causes for the existence of variation on NPLs performance among banks?

4.2. Results

The purpose of this section is to present the results of data obtained from different data sources. Accordingly, the results of the documentary analysis (structured reviews of documents) and in depth interviews are presented in the following subsections.

4.2.1. Structured review of documents

As mentioned earlier, the major purpose of this study is to investigate the determinants of NPLs in ECBs. To achieve this objective, quantitative research approach along with survey design (structured review of documents) was dominantly used. To this end, the necessary data gathered from the documents held by NBE, MoFED and the banks themselves were analyzed using descriptive statistics, correlation matrix and multiple linear regression analysis. Accordingly, the following discussion presents the results of the documentary analysis as follows. Section 4.2.1.1 presents results of the descriptive statistics followed by tests for the classical linear regression model assumptions in section 4.2.1.2. Section 4.2.1.3 presents the correlation analysis among the dependent and independent variables. Finally, the outcomes of the panel data regression analysis are presented in section 4.2.1.4.

4.2.1.1. Descriptive statistics

The summery of descriptive statistics that was intended to give general descriptions about the data (both dependant and independent variables) is presented in Table4.1. The total number of observation for each variable was 96 (i.e., data for 8 banks for the period from the year 2000 to 2012). 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

Variables	Observations	Mean	Median	Max	Min	Std. Dev.
NPLs	96	0.133	0.087	0.535	0.0086	0.118
CIR	96	0.673	0.523	3	0.190	0.433
LG	96	0.180	0.175	0.719	-0.140	0.153
IDV	96	0.030	0.030	0.062	0.009	0.010
SIZE	96	21.797	21.678	25.461	18.778	1.364
ROA	96	0.032	0.036	0.056	0.003	0.013
INFL	96	0.109	0.089	0.364	-0.106	0.117
EFEX	96	0.101	0.088	0.165	0.083	0.024
GDP	96	0.086	0.108	0.126	-0.021	0.044
RIR	96	0.113	0.111	0.127	0.105	0.008

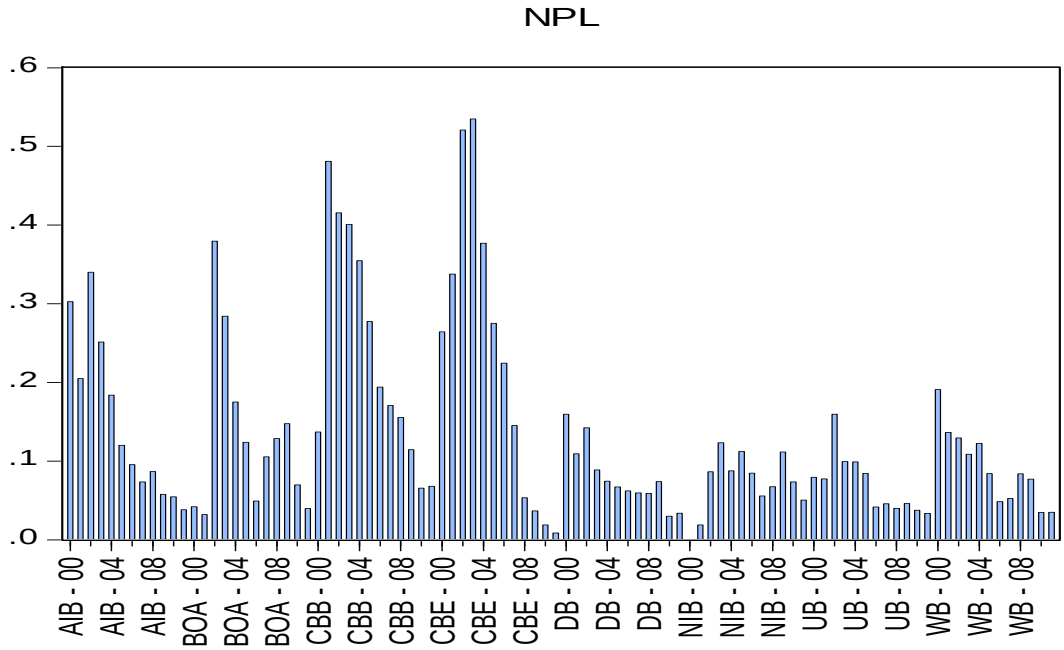
Note: Non-performing loans (NPLs), Cost to income ratio (CIR), Loan growth (LG), Income diversification (IDV), Size (SIZE), Return on asset (ROA), Inflation (INFL), Effective exchange rate (EFEX), Growth domestic product (GDP) and Real interest rate (RIR)

Source: Financial statements of banks, MoFED reports and own computation

As can be seen from table 4.1, for the total sample, the mean of NPLs was 13.3% with a minimum of 0.86 % and a maximum of 53.5%. This indicates that, from the total loans that ECBs disbursed, an average of 13.3% were being default or uncollected over the sample period. The lowest NPLs ratio that ECBs experienced over the sample period was 0.86 %. On the other extreme, the highest NPLs ratio of ECBs was 53.5% which was in excess of the average 30% NPLs recorded in sub-Saharan African countries during the 1990ʻs financial crisis (Fofack 2005). The disparity between the minimum 0.86 % and the maximum 53.5% of NPLs indicate the margin that NPLs ratio of ECBs ranged over the sample period. The standard deviation (0.118) of NPLs also shows the existence of high variation among ECBs in terms their loan recovering capacity as compared to other

variables like ROA, IDV and RIR. As shown in figure 4.1, the NPLs ratio of Ethiopian private banks was relatively lower as compared to state owned banks and shown small variation among banks except some deviant observation in Awash International Bank (AIB) and Bank of Abyssinia (BoA). AIB and BoA were the only private banks that experienced NPLs ratio over 30% of their total loans. On the other hand, NPLs ratio of state owned banks shows high disparity and tends to be higher as compared to private banks. As the raw data indicates, both the maximum 53.5% and the minimum 0.86 % of NPLs were recorded in Commercial bank of Ethiopia (CBE). This clearly indicates the existence of variation on NPLs of ECBs in terms of their ownership structure.

Figure 4.1: Nonperforming loans of ECBs



Source: Financial statements of banks

Regarding the independent variables of the model there are some interesting statistics that have to be mentioned. For instance, the size of banks which was measured by natural log of total asset revealed the highest standard deviation (1.364), which means, it was the

most deviated variable from its mean compared to other variables. This indicates the existence of high variation among ECBs in terms of their size. Another interesting observation was the cost-to-income ratio of banks which indicated by the range between 300% and 19.1%. The standard deviation of 0.433 also indicates relatively high operational efficiency disparity among ECBs. In addition, the average loan growth of ECBs was 18%, with a minimum of -14% and a maximum of 71.9%. A negative sign of loan growth indicates the existence of different conditions that decreased the loans disbursement practice of Ethiopian banks over the sample period. The standard deviation of 0.153 also shows high disparity among ECBs in terms of their loan disbursement practice next to size and operational efficiency. On the other hand, the mean of ROA was 3.2% with a minimum of 0.3% and a maximum of 5.7%. That means during the period under consideration sampled ECBs earned an average of 3.2 cents of profit before tax for a single birr invested in their assets. The standard deviation for ROA was 0.013 which indicates that the profitability variation between the selected banks was very small. Among bank-specific variables, the smallest standard deviation was reported in income diversification of banks which was 0.010. This indicates the existence of less variation among ECBs in terms of diversifying their source of revenue.

Among macroeconomic variables employed in this study inflation had a higher standard deviation which was 0.117. This implies that inflation rate in Ethiopia during the study period remains somewhat unstable. On the other hand, the average lending rate of ECBs was 11.3%; the standard deviation (0.008) was the lowest of all the variables used in this study. This indicates that the average lending rate of ECBs was highly stable over the sample period. In addition, the average real GDP growth in Ethiopia for the last twelve

years was 0.086 (8.6%), with a standard deviation of 0.045 implies the economic growth in Ethiopia during the sample period remains stable as compared to the inflation rate. Moreover, the Standard deviation of exchange rate (0.024) indicates the existence of less volatility of dollar in terms of Ethiopian birr over the period under consideration. Thus, it can be concluded that, the macroeconomic variables were relatively stable over the sample periods as compared to bank specific variables with the exception of some instability on inflation rate.

4.2.1.2. Test results for the classical linear regression model assumptions

As mentioned in the methodology part of this study, as far as 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., heteroscedasticity, autocorrelation, multicollinearity and normality) that ensure whether the data fits the basic assumptions of classical linear regression model or not.

Test for Heteroscedasticity

To test for the presence of heteroscedasticity, the popular white test was employed (Brooks 2008). As shown in table 4.2, all versions of the white test statistic(F-statistic , Chi-Square and Scaled explained SS) gave the same conclusion that there was no evidence for the presence of heteroscedasticity in this particular study since the p-values for all versions of the test statistic were in excess of 0.05. Accordingly, the null

hypothes that the variance of the errors is constant (homoscedasticity) should not be rejected.

Table 4.2 Heteroscedasticity Test: White

F-statistic	1.265153	Prob. F(61,34)	0.2312
Obs*R-squared	66.64071	Prob. Chi-Square(61)	0.2892
Scaled explained SS	56.20589	Prob. Chi-Square(61)	0.6499

Source: Financial statements of banks, MoFED reports and own computation

Test for Autocorrelation

As mentioned in the previous chapter to empirically analyze the determinants of NPLs in ECBs, 96 observations and ten regressors along with an intercept term were used in the model. Accordingly, the relevant critical values for 96 observations and 10 regressors in Durbin-Watson test statistic table have shown an upper critical value (dU) of 1.765 and a lower critical value (dL) of 1.335 which is an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. Thus, as shown in table 4.3, the Durbin-Watson test statistic of this study (1.40) was clearly between the upper limit (1.765) and the lower limit (1.335) and thus the null hypothesis of no autocorrelation neither rejected nor not rejected.

Table 4.3 Autocorrelation Test: Durbin Watson

Variables	DW test static result
All bank-specific & macro-economic	1.40

Source: Financial statements of banks, MoFED reports and own computation

To mitigate the above problem, the Breusch-Godfrey test statistic was used. As shown in table 4.4, all versions of the Breusch-Godfrey test statistic (F-statistic and Chi-Square) show the existence of autocorrelation problem in this particular study. However, the problem was not strong since the p-values (especially F-statistic) were very much closer to the highest significant level in this test (5%). Hence, the autocorrelation problem of this study can be tolerable. In this regard Brooks (2008) noted that, the coefficient estimates derived using OLS in the existence of autocorrelation problem may not be Best Linear Unbiased Estimators (BLUE), but they are still unbiased.

Table 4.4 Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.121483	Prob. F(2,83)	0.0493
Obs*R-squared	6.715652	Prob. Chi-Square(2)	0.0348

Source: Financial statements of banks, MoFED reports and own computation

Test for Multicollinearity

According to Kennedy (2008) multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.70. As shown in table 4.5, in this study there is no correlation coefficient that exceeds or even closer to 0.70. Moreover, as noted in Brooks (2008) if the independent variables are not correlated with one another, adding or removing a variable from a regression equation would not cause a change on the values of the significant level and the coefficients estimates of other variables. In this study a two step multiple regression analysis were made (i.e., in the first step all the proposed variables were regressed and then, only the significant variables that were found in the first regression analysis were regressed once again). Hence, as shown in

table 4.8 dropping the insignificant variables (i.e., RIR and IDV) from the regression equation of this study did not cause any change on the values of other variables (both in terms of the significance level and the coefficient estimates). Therefore, it can be concluded that there is no multicollinearity problem in this particular study.

Table 4.5 Correlation matrixes of independent variables

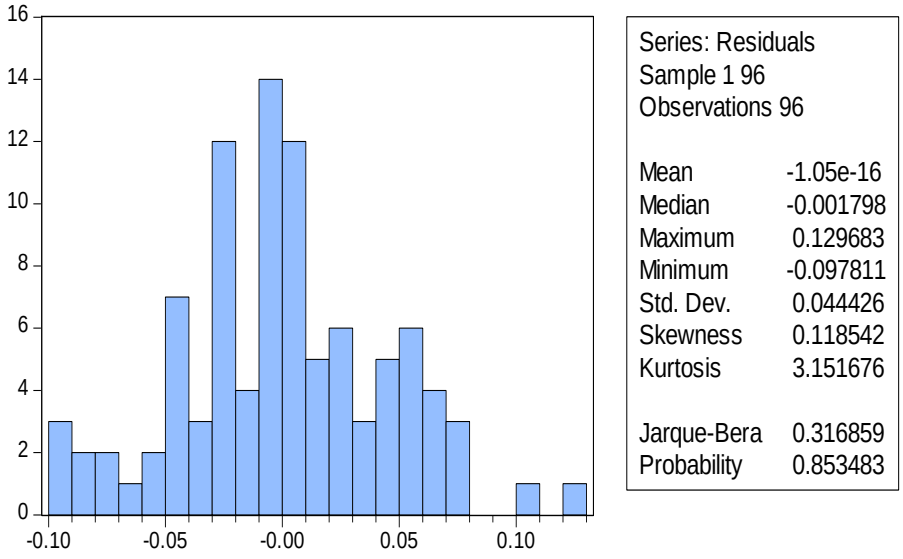
	CIR	LG	ID	SIZE	ROA	GDP	INFL	EFEX	RIR
CIR	1								
LG	-0.132	1							
ID	-0.302	0.167	1						
SIZE	-0.558	-0.373	0.083	1					
ROA	-0.624	0.200	0.666	0.299	1				
GDP	-0.369	0.011	0.365	0.364	0.536	1			
INFL	-0.326	-0.156	0.260	0.391	0.367	0.383	1		
EFEX	-0.255	-0.226	0.506	0.491	0.454	0.303	0.331	1	
RIR	0.092	-0.095	0.175	0.076	0.162	0.074	0.157	0.465	1

Source: Financial statements of banks, MoFED reports and own computation

Test for normality

In this study, the normality of the data was checked with the popular Bera-Jarque test statistic (Brooks 2008). According to Bera-Jarque test statistic, normally distributed data is not skewed and has a coefficient kurtosis of 3. As shown in figure 4.2, the coefficient kurtosis(3.15) of the data in this particular study was much closer to 3, and the Bera-Jarque statistic had a P-value of 0.853 implying that there was no evidence for the presence of abnormality in the data. Thus, the null hypothesis that the data is normally distributed should not be rejected since the p-value was considerably in excess of 0.05.

Figure 4.2 Normality test for residuals: Bera-Jarque



Source: Financial statements of banks, MoFED reports and own computation

4.2.1.3. Correlation analysis

As mentioned in the third chapter, the purpose of correlation matrix in this particular study was to show the linear association between the dependent and independent variables. Accordingly, the ownership structure of Ethiopian banks (measured by a dummy variable i.e., 1=state owned banks and 0= private banks) was excluded from the correlation matrix since a dummy variable is a qualitative data that do not have any linear association with any of other variables. As can be seen in table 4.6, return on asset (ROA), income diversification(IDV) and loan growth(LG) of a bank were the most negatively correlated bank-specific variables with the movement of bank"s NPLs with a correlation coefficient of -0.593, -0.480 and -0.473 respectively.

Those correlation results clearly indicate the existence of strong inverse linear association among the above mentioned variables and NPLs of Ethiopian banks. In other words, as bank‟s ROA, LG and IDV increases, NPLs of Ethiopian banks moves to the opposite direction. In addition, size of a bank also negatively correlated with the movement of NPLs. However, the magnitude of the correlation coefficient (-0.02) was very small as compared to the above variables. To the contrary, the movement of cost to income ratio was positively correlated with NPLs. On the other hand, all the macro economic variables, real GDP growth, inflation, effective exchange rate and real interest rate show a negative linear association with NPLs. This implies as the above macroeconomic variables increase, NPLs of Ethiopian commercial banks moves towards the opposite direction. The magnitude of the correlation coefficient for real GDP growth (-0.45) and effective exchange rate (-0.40) had shown a strong inverse linear association with the movement of NPLs as compared to other macro economic variables.

Table 4.6 Correlation matrix of dependent and independent variables

	NPL	LG	CIR	ID	SIZE	ROA	GDP	INFL	EFEX	RIR
NPL	1									
LG	-0.51	1								
CIR	0.22	-0.13	1							
ID	-0.52	0.16	-0.30	1						
SIZE	-0.16	-0.37	-0.55	0.08	1					
ROA	-0.64	0.09	-0.62	0.66	0.33	1				
GDP	-0.45	0.01	-0.36	0.36	0.36	0.53	1			
INFL	-0.39	-0.16	-0.32	0.26	0.39	0.36	0.38	1		
EFEX	-0.41	-0.24	-0.25	0.50	0.49	0.45	0.30	0.33	1	
RIR	-0.23	-0.05	0.09	0.17	0.07	0.16	0.07	0.15	0.46	1

Source: Financial statements of banks, MoFED reports and own computation

It should be noted that all the above correlation coefficient results merely show the linear association among the dependent (NPLs) and independent variables. In other words, the relationships are not casual (i.e., the change in one variable is not resulted from the movement of the other variable).

4.1.1.1. Regression results

As mentioned in the previous chapter, in this study a two step multiple linear regression equations were run. In the first step (general) regression equation, all the proposed independent variables (i.e., LG, CIR, ROA, IDV, SIZE, STATEDUMMY, INFL, GDP, EFEX and RIR) were regressed with respect to the dependent variable (NPLs). To this end, only the significant variables that were found from the first step regression equation were regressed once again. Table 4.7 shows the first step regression results. The R^2 and the adjusted- R^2 statistics of the model were 83.72% and 81.81% respectively. These results are intended to show how well does the model containing the explanatory variables that can explain variations in the dependent variable and usually known as goodness of fit statistics (Brooks 2008).

Thus, the adjusted- R^2 of this study indicates that, 81.81% of the variation on the dependent variable (NPLs of ECBs) was explained by the changes in the independent variables. In other words, the change in annual inflation rate, real interest rate, effective exchange rate, real GDP growth, loan growth, income diversification, size, performance, ownership structure, and operational efficiency collectively explain 81.81% of the

variation in NPLs ratio of ECBs. In contrary, the remaining 18.19 % of changes on the NPLs of ECBs were explained by other factors which were not included in the econometrics model of this study. Thus it can be concluded that, all the independent variables used in this study collectively, were good explanatory variables of NPLs in ECBs. Thus, the null hypothesis of F-statistic (the overall test of significance) that the R2 is equal to zero was rejected at 1% significance level (p-value =0.0), which enhanced the reliability and validity of the model.

Table 4.7 First Step (General) Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.255358	0.124459	2.051750	0.0433
CIR	-0.027556	0.015833	-1.740337	0.0854
LG	-0.293450	0.036765	-7.981801	0.0000
IDV	0.646428	0.680856	0.949434	0.3451
SIZE	0.009856	0.004643	2.122890	0.0367
ROA	-2.829388	0.686064	-4.124087	0.0001
STATEDUMMY	0.076057	0.013080	5.814793	0.0000
INFL	-0.235798	0.047757	-4.937420	0.0000
GDP	-0.451706	0.135930	-3.323086	0.0013
EFEX	-1.531906	0.297262	-5.153390	0.0000
RIR	0.063976	0.690610	0.092636	0.9264
R-squared	0.837277	Durbin-Watson stat		1.4011
Adjusted R-squared	0.818133			
F-statistic	43.73601			
Prob(F-statistic)	0.000000			

Source: Financial statements of banks, MoFED reports and own computation

As shown in table 4.7, the coefficient estimate of real GDP growth, effective exchange rate, inflation rate, loan growth and financial performance of a bank (ROA) were negative and statistically significant at 1% significance level. The coefficient estimates of the aforementioned five independent variables were -0.451, -1.531, -0.235, -0.293 & -2.829 respectively. The negative sign of the coefficient estimate with 1% significant level indicate the existence of strong inverse relationship between NPLs and the above mentioned independent variables. Thus, it can be concluded that, an increase on those variables lead to a decrease in NPLs of Ethiopian commercial banks. In addition, the coefficient estimate of operational efficiency was negative and statistically significant at 10% significance level. However, the magnitude of the coefficient estimate (-0.027) was very low as compared to the above variables. On the other hand, the coefficient estimate of ownership structure (STATEDUMMY) was positive and statistically significant at 1% significant level. This clearly indicates that, state owned banks tend to have high level of NPLs as compared to privately owned banks. In addition, size of a bank had also a positive and statistically significant (at 5% significance level) association with NPLs. However, the magnitude of the coefficient estimate (0.009) was the lowest of all the variables used in the model. Hence, the explanatory power of bank size on the variation of NPLs in ECBs was very small as compared to other variables. Furthermore, income diversification (IDV) and average lending rate (RIR) had also positive coefficient estimate of 0.646 and 0.063 respectively. However, the results of t - statistics for both IDV and RIR were insignificant since the p-values were considerably in excess of 10%. Hence, based on the above results it can be conclude that, both bank-specific (loan growth, financial performance, ownership structure, operational efficiency and size of a

bank) and macroeconomic (real GDP growth, inflation and effective exchange rate) variables were the determinants of NPLs in Ethiopian commercial banks.

As mentioned earlier, only the significant variables(LG, CIR, ROA, SIZE, STATEDUMMY, INFL, GDP and EFEX) that were found in the first step regression analysis were regressed once again in order to ensure the reliability and the consistency of the first step regression results (both in terms of the coefficient estimates and the level of significance). Table 4.8 shows the second step multiple regression results in which the insignificant variables (IDV and RIR) were dropout. Comparing the results of the two regression analysis, major differences were not found. As shown in table 4.8, the R^2 (83.55%) and the adjusted- R^2 (82.04%) statistics in the second step regression were much closer to the R^2 (83.72%) and the adjusted- R^2 (81.81%) results obtained in the first step regression. Similarly, the results of Durbin-Watson statistics in both the first and second step regression were almost equal. In addition, significant variables that were found in the first step regression were remained significant (with the same significance level) in the second step regression. Moreover, the sign and the magnitude of coefficient estimates in both the first and second step regression were almost similar.

Table 4.8 Second Step Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.275838	0.098027	2.813900	0.0061
LG	-0.293679	0.036521	-8.041285	0.0000
ROA	-2.523769	0.598648	-4.215785	0.0001
CIR	-0.025478	0.015142	-1.682544	0.0960
SIZE	0.009189	0.004528	2.029289	0.0455
STATEDUMMY	0.073909	0.012794	5.776680	0.0000

GDP	-0.445923	0.134830	-3.307285	0.0014
INFL	-0.234712	0.047214	-4.971184	0.0000
EFEX	-1.434699	0.248540	-5.772513	0.0000
R-squared	0.835550	Durbin-Watson stat		1.365317
Adjusted R-squared	0.820429			
F-statistic	55.25469			
Prob(F-statistic)	0.000000			

Source: Financial statements of banks, MoFED reports and own computation

Based on the above discussions, it can be concluded that the results obtained from the first (general) regression analysis were consistence with the result of the second regression analysis, which enhanced the reliability and validity of the data used in the model.

4.2.2. In-depth interview results

As mentioned in the previous chapter the purpose of qualitative research approach in this particular study was to supplement the data obtained from structured review of documents and to investigate other factors that could not obtained from documents. Accordingly, unstructured interview with five senior Ethiopian bank officials (credit vice presidents and senior credit committee members) was conducted. The interviewees were from both private and state owned banks namely CBE, CBB, AIB, DB and WB who had over 8 years credit experience in addition to their several years of banking experience. All the interviewees were interviewed independently at different times. To this end, the interview questions were focused on the identification of factors affecting the NPLs of ECBs in general by giving due attention on factors that were not incorporated in the

quantitative part of this study. In addition, the interview questions tried to identify how those factors can influence NPLs of ECBs, the major determining factors among the influential factors and their general opinion regarding the matter. As per the interview results, the general reasons which lead to the emergence of NPLs in ECBs can be grouped into the following three major categories:

The first category includes the internal factors associated with the specific policy choices of a particular bank and usually termed as bank-specific determinants. Those factors include variables that can be influenced by managerial decisions of a bank such as loan growth, size, financial performance and operational efficiency of bank. As per the interviews, loan growth, performance and operational efficiency of banks have a negative association with NPLs of ECBs. On the other hand, state ownership of a bank has positive relationships with the volume of NPLs. Besides, inadequate credit risk management from identifying, measuring and monitoring of credit were also considered as the major internal factors that can affect NPLs of ECBs. Moreover, collateral based lending system, absence of adequate man power, lack of comprehensive studies on the credit applicants, lack of follow-up on the borrower's activities (failure to follow up the collateral provided by the borrowers) were also considered as the major internal determinants of NPLs in ECBs.

The second category that was considered as the most important reason to the emergence of NPLs in ECBs was factors related to the client (borrower). As per the interviews, those factors include, providing false information , using the loan for other purposes that are undesirable from the banks' point of view (fund diversion), bad intentions of the client with respect to non-payment of the loan at the maturity date

(willful default). In addition, operational losses of borrower were also cause a loan default to Ethiopian banks especially in the event of absence of adequate collateral.

The third category was factors related to the external conditions. As per the interviews, those factors include variables such as macro economic variables (real GDP growth, inflation and effective exchange rate), the international conditions, government regulation and the surrounding natural environment. All the above external factors can adversely or positively affect the loan quality of ECBs. Under the macroeconomic conditions inflation, effective exchange rate and real GDP growth had a negative association with the volume of NPLs in ECBs. However, the importance of average lending rate in determining the variation of NPLs in ECBs had not supported by the interviewees. On the other hand, the absence of credit rating agency in the country, the national bank regulation, the surrounding natural environment and international competition in the global market can also affect the NPLs of Ethiopian banks in different aspects.

4.3. Discussions of Results

The preceding sections presented the result of the documentary analysis and in-depth interviews. The purpose of this section is to discuss the results obtained from different data sources. The hypotheses and specific research questions presented in section 4.1 deal with the casual relationship between NPLs and such factors as loan growth, financial performance, operational efficiency (cost to income ratio), income diversification, ownership structure, bank size, growth domestic product, inflation, effective exchange rate and real interest rate. The subsequent discussions hence try to present the analysis of results in respect of those factors in an orderly manner.

Loan growth

As mentioned in the literature review part of this study, a rapid loan growth in the banking sector may aggravate the problem of asymmetric information (adverse selection) and ultimately increases the probability of NPLs. In this regard, most of the empirical studies suggested a positive relationship between loan growth of a bank and bank‟s NPLs. Despite this fact, the coefficients estimates of loan growth in this particular study revealed a negative association with NPLs reported by ECBs. As can be seen from table 4.7, a variable used to capture loan growth of a bank (LG) had a coefficient estimate of -0.2934 and statistically significant at 1% significance level (P-value=0.0). This indicates the existence of strong inverse relationship between loan growth of a bank and bank‟s NPLs in ECBs. That means an increase in loan disbursement practice of Ethiopian banks, lead to a decrease in their volume of NPLs. In this general setting, it can be concluded that, loan growth of a bank was key determinate of NPLs in ECBs. The finding was consistent with previous studies of Pasha and Khemraj (2009), Jellouli et al (2009), and Vogiazas and Nikolaidou (2011).

Similarly, the result obtained from interview also clearly supports the regression output. As per the interview conducted with credit vice president and senior credit committee members of selected ECBs, loan growth was one of the major factors that can affect Ethiopian banks NPLs negatively. According to the interviewees, the existing loan disbursements practice of ECBs was not aggressive (rapid) as compare to the demand of loans in the market. This is due to the fact that, the current ever increasing economic growth in Ethiopia results a high demand of loans in many sectors of the economy. Consequently, the existing unparallel high demand of loans in the market (as compared to

the limited supply of loans) provides an opportunity to ECBs so as to choose loan applicant who has strong financial performance and lower risk.

In addition, the traditional lending system of Ethiopian banks in which every branch managers approved a loan had changed and currently loan applications can only be approved at district or at head office level. Hence, the existing centralized loan application evaluation system enables banks to use their management expertise and reduce risk associated with lending. Furthermore, ECBs began to establish a close relationship with the borrowers through customer relation managers (CRMs) whose major function is reducing information asymmetries between the borrowers and their banks. Each CRMs of Ethiopian banks are responsible for the activity of borrowers under their supervision. Hence, the segregated duty provided to each CRMs increase their influence on borrowers management through frequent dealings over time and enable them to get important non public information. Such information advantages allow banks to improve decision making if borrowers face distress. Moreover, a close relationship between a lender and a borrower enables a bank to be better in offering future loan and reduce risk and uncertainty associated with lending.

Financial Performance

The coefficient estimate of banks financial performance (measured by the ratio of ROA) revealed negative and statistically significant association with NPLs. The magnitude of the coefficient estimate (-2.83) for ROA was the largest of all the variables used in the model. This indicates that, ROA had a great impact in explaining the variation of NPLs in ECBs. Moreover, the coefficient estimate was statistically significant at 1% significant

level (p-value of 0.0). This implies that, an increase in the ratio of bank‟s ROA, leads to a decrease in NPLs of ECBs. The finding was in consistent with prior expectation and theory that indicated profitable banks are less engaged in risky activities as they have less pressure to create revenues and ultimately resulted with lower volume of NPLs (Kwan and Eisenbeis (1995), Berger and DeYoung (1997), Barth et al., (2002)). In this general setting, it can be concluded that, as the financial performance (profitability) of Ethiopian banks increase, the likelihood that banks engaged in risky activities would reduced and ultimately the probability that loans became NPLs will reduce with the same manner. Therefore, the findings suggested that, financial performance (profitability) of banks was a vital determinant of NPLs in ECBs. This finding was also consistent with the previous study of Hu et al. (2004), Godlewski (2004), Jellouli et al (2009) and Metaxas et al (2010). Similarly, the result obtained from interview supports the regression output. This is due to the fact that, the financial performance of Ethiopian banks determines the risk taking behaviour of managers.

As per the interviewees, Ethiopian commercial banks are profitable enough and hence managers have less pressure to create revenues. This condition provides Ethiopian commercial banks an opportunity to compromise risks so as to choose loan applicant who has lower risk. In this regard, all Ethiopian commercial banks are reluctant to provide loan to the transport sector (which can generate high interest income) due to high risk associated with the sector. Moreover, this result was also consistent with the existing reality in the Ethiopian banking industry where the NPLs shows a parallel decrease as the financial performance (profitability) of banks grow up.

Operational efficiency

As mentioned in the literature the impact of operational efficiency on NPLs of banks can be positive or negative. According to Berger and DeYoung (1997), the positive association among low cost efficiency and NPLs is hypothesized as „bad management" hypothesis. The basic argument here is that, low cost efficiency considers as signal of poor managerial performance (bad management), poor skills in credit scoring, monitoring and controlling the borrowers after loans are issued. On the other hand, low cost efficiency may have a negative impact on NPLs. According to Berger and DeYoung (1997) this relationship is hypothesized as „Skimping" hypothesis. According to this view, there exists a trade-off between allocating resources for underwriting and monitoring loans and measured cost efficiency. In other words, banks which devote less effort to ensure higher loan quality will seem to be more cost-efficient; however, there will be a growing number of NPLs in the long run.

Despite the above fact, the coefficient estimate of operational efficiency (measured by cost to income ratio of banks) in this particular study revealed a negative relationship with the volume of NPLs reported by ECBs. The inverse relationship implies that, as the volume of cost to income ratio of Ethiopian banks increases, their size of NPLs will decline. However, the magnitude of the coefficient estimate of -0.0275 was not strong as compared to other variables like ROA and IDV implying the operational efficiency of Ethiopian banks had a little impact in explaining the variation of NPLs in the industry. In addition, coefficient estimate was statistically significant at 10% significant level (p-value=0.0854) which was the highest significant level. Hence, the findings suggested that, operational efficiency of banks was one of the modest determinants of NPLs in

ECBs (both in terms of significance level and the magnitude of the coefficient estimate). This was in favor of „skimping" hypothesis that banks which have adequate budget to screening loan customers, appraising collateral, and monitoring and controlling borrowers after loans disbursement resulted with lower volume of NPLs as compared to banks which seem to be cost efficient but, do not have adequate budget to ensure higher loan quality. Similarly, the result gathered from interview clearly supports the regression output. As per the interview results, cost of efficiency was considered as a major determinant that affects NPLs of Ethiopian banks negatively. The inverse relationship among cost of efficiency and NPLs of ECBs was justified by the ever increasing cost incurred by Ethiopian banks so as to achieve improved credit risk management through adequate loans screening, monitoring and controlling of borrowers. Hence, it can be conclude that, an increase in operating cost of Ethiopian commercial banks can enhance the loan quality of banks and ultimately reduced the probability of NPLs.

Income diversification

Despite the absence of general consensus on the impact income diversification on bank"s NPLs, in this study the ratio of non-interest income to total assets which was used to measure the level of income diversification of ECBs revealed a positive coefficient of estimate. This indicates as the source of revenue increases (diversified), the size of NPLs would also increase. In other words, the size of NPLs tends to be higher in banks that have diversified source of revenue (income other than interest) than banks that are specialized on the traditional source of revenue (interest income). The intensity of the coefficient estimate (0.64) was the third largest of all the variables used in the model next

to performance (ROA) and effective exchange rate (EFEX). However, the coefficient estimate of income diversification was statistically insignificant since the p-value (0.3451) was considerably in excess of the acceptable 10% significance level. That means the importance of income diversification in explaining the variation of NPLs in the Ethiopian banking industry was not significant. Hence, income diversification was not considered as the determinant of NPLs in ECBs. This finding was consistence with previous studies of Hu et al. (2004) and Jellouli et al (2009). Regardless of the findings of the regression analysis, the results obtained from interview had no consensuses on the importance of income diversification in explain NPLs of ECBs. Most of the interviewees suggested that, income diversification of a bank was one of the major determinants that can affect NPLs of ECBs negatively since the potential losses on the loan activity of banks might be overcome or compensate by looking for non interest sources of revenues. On the other hand, some interviewees did not support the significance of income diversification in explaining the variation of NPLs in ECBs. Therefore, the conclusion about the impact of IDV on the NPLs of ECBs remains ambiguous and further research is required.

Ownership structure

The coefficient estimate of ownership structure of banks which was measured by a dummy variable (1=state owned banks and 0=private banks) revealed a positive and statistically significant at 1% significance level (p-value of 0.00). This result was agreement with the previous expectation and theory that suggested state owned banks tends to have high volume NPLs. A positive association between state ownership and

NPLs in Ethiopian banking sector indicates that, the level of NPLs tends to be higher in state owned banks of Ethiopia than privately owned banks. However, the magnitude of the coefficient estimate (0.076) was very small as compared to other variables like financial performance and effective exchange rate. The finding was consistence with the previous studies of Salas and Saurina (2002), Hu et al. (2004), Micco et al. (2004), Barth et al. (2004) , Garcia and Robles (2007) and Swamy (2012). Moreover, the result generated from the interview also supports the regression output.

As per the interview result, ownership structure of Ethiopian banks was one of the determinants of NPLs and the positive association between state ownership and NPLs in ECBs could explain in the following two facts. First, in developing countries like Ethiopia the mandate of economic development usually given to state-owned banks, thus so as to achieve the development program of a country state-owned banks have more incentives to fund riskier projects and to allocate more favorable credits for small and medium firms. Hence, the high risk taking behavior of state owned banks may hinder the quality of their loan portfolios. As per the interviewees, commercial bank of Ethiopia (the largest state owned Ethiopian bank) was the only bank that providing a fund for government real estate programs (condominiums). Second, the lack of a profit motive in state-owned banks (as compared to private banks) may hinder the efficient credit risk management of banks and ultimately lead to higher level of NPLs.

As can be seen in figure 4.1, the variation of NPLs among private banks was very small and in the same way the variation of NPLs among the two state owned banks also small. However, the variation of NPLs between private and state owned banks was significantly high. When we see merely the average NPLs ratio of ECBs over the sample period, NPLs

of state owned banks tends to be higher. Currently however, NPLs ratio of state owned bank (especially CBE) considerably small as compared to the privet banks. For instance, NPLs of CBE lowered from 22% in2006 to an average of 0.86% in 20011. Having the above discussions the interviewees were asked their own opinion on the likely causes of NPLs disparity among state especially CBE and privet banks. In this regard, interviewees from CBE suggested that, the existing abrupt change in their volume of NPLs was resulted from the implementation of business process reengineering (BPR) that improved the overall system of the bank in general and their lending activity in particular. Accordingly, the traditional lending system in which every branch managers approved a loan had changed and currently loans applications could only approved at district or at head office level after the passage of different channels. Hence, as per the interview, the existence of improved loan screening, measuring, monitoring and controlling system in CBE enable to reduced their NPLs as low of the industry.

On the other hand, most of the interviewees from privet banks credit officer were strongly questioning about the existence of Political reasons that made them incapable to compete with state owned banks especially CBE. As per the interviewees, state owned banks get strong support from government. For instance CBE has a priority to write letter of credit in the case of foreign trade, to involve in government Treasury bill market, bond market and to pay salary for federal organizations. The stiff competition from state owned banks forces private banks to involve in risky businesses like loans and advances. As result, the reduction of NPLs in Ethiopian private banks was not significant as compared to the performance of CBE.

Bank Size

As mentioned in the literature, many scholars suggested an inverse relationship between size of a bank and bank‟s NPLs. large banks have better risk management strategies and technology which definitely allows them for efficient information gathering, processing and analyzing which finish up with lower levels of NPLs as compared to smaller banks. Despite this fact , the coefficient estimate of bank size (measured by the natural log of total assets) in this particular study found to be positive and statistically significant at 5% significance level (P-value of 0.0345). This indicates that, as the size of Ethiopian banks increases, their volume of NPLs would also increase. In other words, in ECBs, the level of NPLs was relatively higher in banks that have large size. However, the magnitude of the coefficient estimate (0.009) for bank size was the smallest of all the variables used in the model implying that the responsiveness of bank size on the variation of NPLs was very low as compared to other variables. Hence, the finding suggested that, bank size was the modest determinate that can affect NPLs of ECBs positively. This was inconsistence with prior expectation and theory that suggesting larger banks have more resources for efficient information gathering, processing and analyzing to tackle moral hazard and adverse selection and ultimately deal with lower volume of NPLs. In addition, the finding was not in agreement with those reported by the majority of previous studies such as Salas and Saurina (2002), Rajan and Dhal (2003), Hu et al, (2006) , Jellouli et al (2009) and Espinoza and Prasad (2010). This is due to the fact that, larger banks in Ethiopia are state owned banks that have less incentive to profit as compared to private banks(small banks). Hence, in order to achieve the development program of country Ethiopian state-owned (large) banks may have more incentives to fund riskier projects

that ultimately increase the volume of NPLs. Correspondingly, the result generated from the interview also supported the output of the regression analysis fully. That is Ethiopian banks NPLs reduce as the size of the banks decreases. Moreover, this result was also consistent with the result of the descriptive analysis that smaller banks are enjoying lower NPLs than larger banks of the country.

Gross domestic product

The coefficient estimate of real GDP growth revealed a negative and statistically significant association with NPLs of Ethiopian commercial banks at 1% significance level (p-value of =0.00). The magnitude of the coefficient estimate (-0.45) indicates the existence of strong inverse relationship between real GDP growth and NPLs of Ethiopian banks which was in accordance with the theory and prior expectation. This implies that, an increase in the real GDP growth, certainly lead to a decrease in the likelihood that loans became default. This is due to the fact that, strong positive growth in real GDP usually translates into more income which improves the debt servicing capacity of borrower (households and businesses). Whenever there was a positive GDP growth, the economic activities in general were increasing and the volume of cash held for either businesses or households was increasing. These conditions contributed to decrease the likelihood that borrowers delay their financial obligations. Hence, the findings suggested that, real GDP growth was one of the vital determinants of NPLs in Ethiopian commercial banks. This result was in consistent with the findings of Salas and Suarina(2002), Jajan and Dhal (2003), Fofack (2005) , Hou (2006) Jimenez and Saurina (2005), Pasha and Khemraj (2009), Louzis et al. (2010) and Azeem et al. (2012). In addition, the result obtained from the interview also highly supported the output of the

regression analysis since strong performance in the real economy results in lower NPLs. Moreover, this result also consistent with the existing reality in the Ethiopian banking industry where the volume of NPLs shows a parallel decrease as the economy grows up.

Inflation

As mentioned in the literature review part, inflation affects borrowers‟ debt servicing capacity through different channels and its impact on NPL can be positive or negative. Higher inflation rate can make borrowers debt servicing easier by reducing their real value of outstanding loans. However, it can also weaken some borrowers‟ ability to service debt by reducing their real income. Nevertheless, in this study the coefficient estimate of inflation was negative and statistically significant at 1% significant level (P-value of 0.000). The negative coefficient estimate of inflation (-0.235) indicates a strong inverse association with NPLs. That means an increase in inflation rate; lead a decrease in NPLs. This result was inconsistent with the findings of Fofack (2005), Pasha and Khemraj (2009), Louzis et al. (2010) and Azeem et al. (2012). As the existing theories suggested this relationships appeared in the banking system where the lending rate is not adjusted to the inflation change.

Correspondingly, the result obtained from interview revealed the existence of similar fact in Ethiopia banking system. As per the interview conducted with the credit vice president and senior credit committee members of the selected banks, inflation was one of the major factors that can affect NPLs of ECBs negatively. The inverse relationship between inflation and NPLs in ECBs is due to the fact that, in Ethiopia the maximum lending rate is determined by National bank of Ethiopia and ECBs are unable

to adjust their lending rate in accordance with different factors such as time value of money, inflation and business risk. For instance, the average annual inflation rate in Ethiopia over the period of consideration was 11% with a maximum of 36.4%. Despite this fact, the average lending rate of ECBs never exceeds 12.75% over the sample period. This clearly indicates the lending rate in Ethiopia was far below from the market interest rate since ECBs were not allowed to adjust their lending rate to compensate the existing high inflation rate. In this general setting, it could be conclude that, the existing higher inflation rate in Ethiopia was in favour of borrowers since it can make debt servicing easier by reducing the real value of outstanding loans.

Real effective Exchange rate

As shown in the literature review part of this study, the impact of exchange rate on bank‟s NPLs have mixed implications. Hence, the sign of the relationship between exchange rate and NPL can be positive or negative. A depreciation of the exchange rate can have mixed implications on NPLs of banks. On the one hand, it can improve the competitiveness of export-oriented firms and ultimately increase their ability to service debt (Fofack, 2005). On the other, it can negatively affect the debt-servicing capacity of borrowers who borrow in foreign currency (import-oriented firms). Despite this fact, the coefficient estimate of effective exchange rate (EFEX) in this particular study revealed negative association with NPLs of ECBs. This result was inconsistent with the findings of Jajan and Dhal (2003), Fofack (2005), Pasha and Khemraj (2009), De Bock and Demyanets (2012) and Castro (2012). The magnitude of the coefficient estimate (-1.53) result of EFEX was the second largest amount next to performance of a bank (ROA). This indicates that, EFEX had a great impact in explaining the variation of NPLs in

Ethiopia commercial banks. Moreover, the coefficient estimate of EFEX was statistically significant at 1% significant level (p-value = 0.0). This implies that, an increase in EFEX (i.e., a depreciation of Ethiopian birr in terms of dollar); lead to a decrease in NPLs of ECBs. More specifically, as the value of Ethiopian birr depreciated in terms of dollar, it can increase the competitiveness export-oriented Ethiopian firms in the international market. This due to the fact that, the operating cost of export-oriented Ethiopian firms was very less as compared to the international firms since the value domestic currency was very small in terms of foreign currency (dollar). Consequently, the debt-servicing capacity of export-oriented Ethiopian firms would improve. This result was in accordance with the import substitution policy of Ethiopian government that encouraging export-oriented firms. In this regard, ECBs are providing loans with lower interest rate to export-oriented firms so as to encourage the export sector. For instance, commercial bank of Ethiopia providing a loan with 7.5 % interest rate for export-oriented firms which is considerably lower than the stated 9.5% interest rate for any other sectors. Hence, the lower interest rate for export-oriented firms can also make their debt servicing easier.

On the other hand, as the theory suggested, depreciation of domestic currency in terms of foreign currency obviously deteriorate the performance of import-oriented firms. In Ethiopia the trading system was often manifested by deficit (high import). In this condition, a negative association between exchange rate (appreciation of dollar) and NPLs was surprised. As per the interviewee‟s opinion, the import market in Ethiopia was dominated by limited numbers of importers that have strong relationship with banks. Whenever the value of dollar appreciated, small and medium importers go out of market and those limited large importers dominate the market monopoly. This allows them to

manipulate the price as they wish and maximize their profit. Hence, the profit originated from the monopolistic advantage of importers enables their debt servicing easier.

Real interest rate

The coefficient estimate of real interest rate (measured by the average lending rate of ECBs) was positive which was in accordance with prior expectation and theory (Sinkey and Greenwalt (1991),Fofack (2005), Jimenez and Saurina(2005)).This implies that an increase in the average lending rate of ECBs, ultimately increase the size of their NPLs. That means as interest rates rise, prudent borrowers are more likely to decide that it would be unwise to borrow, whereas borrowers with the riskiest investment projects are often those who are willing to pay the highest interest rates. Hence, higher interest rate leads to greater adverse selection that increases the likelihood that the lender is lending to a bad credit risk which ultimately increases the volume of banks NPLs. However, the magnitude of the coefficient estimate (0.064) was the smallest of all variables used in the model next to size and operational efficiency of banks. This indicates that, the average lending rate of ECBs had a very limited impact in explaining the variation of NPLs in Ethiopia banks.

In addition, the coefficient estimate of real interest rate was statistically insignificant since the p-value (0.93) was considerably in excess of the acceptable (10%) significance level. Hence, the findings suggested that, there was no significant association among real interest rate and bank‟s NPLs in ECBs as far as the parameter for this variable was insignificant as illustrated by the large p-values of 0.93. Similarly, the result generated from the interview supported the output of the regression analysis fully. As per the

interview conducted with credit vice presidents and senior credit committee members of ECBs, real interest rate was not considered as the determinate of NPLs since banks are not allowed to make any adjustment on their lending rate so as to compensate losses from the existing high inflationary rate. Consequently, the volatility of the average lending rate of ECBs being very small, in fact this interest was justified in the summary of descriptive statistics that real interest rate had the smallest standard deviation of all the variables used in the model. This implies the existence of very small variation on the average lending rate of ECBs over the sample period. Therefore, as long as the variation in the average lending rate of ECBs very small, the significance in explaining the variation of NPLs would also be very small or insignificant. The finding was inconsistence with the result of Swamy (2012), De Bock and Demyanets (2012), Azeem et al. (2012) and Castro (2012).

In addition to the discussions so far, this study also identified several other factors that have their own impact on NPLs in the context of ECBs. As the interview results shown in section 4.2, inadequate credit risk management from identifying, measuring and monitoring of credit, and collateral based lending system were considered as the major internal factors that can affect NPLs of ECBs. In relation to credit risk management practice of ECBs, deficiencies in credit information was considered as the reason for NPLs since sole reliance on the incorrect and inadequate information provided by the clients especially who had not previously dealt with the bank significantly affect the loan quality of banks.

As per the interviewees, Ethiopian commercial banks are considering collateral as the prime factor for assessing loan application in all conditions and most important factors

such as the repayment capacity of the client, the feasibility of the project and the management experience of the company are coming after the issue of the collateral. Hence, weaknesses of estimating the value of the guarantees provided by the clients can cause a high level of NPLs in Ethiopian banks. This is due to the fact that, employee of the bank may intentionally (moral hazard) or unintentionally (due to lack of experience) overvalued the collateral provided by the loan applicants. In this condition borrowers usually preferred to default at the date of maturity since the market value of the collateral is lowered than the value of loan outstanding. Furthermore, absence of adequate man power, lack of comprehensive studies on the credit applicants (the financial analyses of the customer), lack of follow-up on the borrower's activities or failure to follow up the collateral provided by the borrowers were also suggested by the interviewees as the major internal determinants of NPLs in ECBs. As per the interviewees, borrowers fund diversion for unintended purpose was a major determinate of NPLs in ECBs. For instance, borrowers who took a loan for a new investment purpose or for expanding his/her existing business may use the loan for other unproductive activates like buying luxury car. In addition, borrowers who obtained short term loans from banks through overdraft (in any other form of short term loan application) may use the fund for capital expenditures that do not generate immediate income for servicing their debt in accordance to the sated agreement. In addition, intentional or willful default of borrowers at the date of maturity also the major factors of NPLs in Ethiopia banks. As per the interview, the rationale behind the intentional default of borrowers was usually the market value of the collateral. Borrower usually makes their own cost and benefit analysis between the market value of the collateral and the value of loan outstanding.

Hence, whenever the market value of the collateral less than the value of the outstanding loan borrowers preferred to default since there is no rule that allowed banks to claim any other personal property of borrowers more than the agreed collateral. As per the interviewees, the national bank regulation can also affect the NPLs of Ethiopian banks in different aspects. For instance, the 2009 directive which required all Ethiopian banks not to hold NPLs in excess of 5% of their total loans outstanding pressurized banks not engaged in risky investment. In contrary, the absence of rules that allowed banks to claim beyond the pledged collateral could encourage willful defaulter in the condition where the market value of the collateral lower than the value of outstanding loans. In addition, due to the absence of credit rating agency in the country, the loan repayment capacity of borrowers was exclusively measured by bank"s credit officers. Hence, the exclusively burden of Ethiopian banks in screening the loan application may hinder the quality of their loan portfolios. Besides, the surrounding natural environment also affects the loan quality of Ethiopian banks. Particularly, loans granted to the agriculture sector greatly affected by the climate change. Whenever a bad climate condition like flood and famine happened in the country the income of the agriculture sector greatly affected and ultimately their debt servicing capacity reduced significantly. Furthermore, international competition in the global market also affects the loan repayment capacity of export-oriented Ethiopian firms. As per the interviewees, there was situation in which Ethiopia coffee exporters face difficulty in servicing their debt up on the maturity due to the high competition in international market from Brazilian coffee exporters.

Chapter six: Conclusions and Recommendations

The previous chapter presented the analysis of the findings obtained from different data sources.The purpose of this chapter is to discuss the conclusions and recommendations. Accordingly, the chapter is organized in two sections, the first section, 6.1 presents the conclusions of the study. And, the second section, 6.2 presents the recommendations that provided based on the findings of the study.

6.1. Conclusions

The broad objective of this research was to investigate bank specific and macroeconomic determinants of NPLs in ECBs. To achieve this broad objective, the study used mixed methods research approach. More specifically, quantitative research approach along with survey design (structured review of documents) was dominantly used. In addition, to have a better insight and to gain a richer understanding about the research problem, the quantitative method was supplemented with the qualitative method (unstructured interviews). To this end, the collected data from a sample size of eight Ethiopian commercial banks over the period of 2000 to 2011were analyzed using descriptive statistics, correlation matrix and multiple linear regression analysis. The analyses were made in line with the stated hypotheses and specific research questions formulated in the study. In doing so, previous studies on determinants of bank‟s NPLs have been reviewed and as per the literature NPLs of banks‟ usually expressed as a function of internal and external determinants. The internal determinants refer to those factors which characterized individual banks and usually associated with the specific policy choices of a particular bank such as loan growth, performance, the quality of the loan

portfolio and operational efficiency. On the other hand, the external determinants are variables that are not related to bank management but reflect the economic , legal and the surrounding natural environment that can affect the loan quality of banks. The macroeconomic factors which the literature proposes as important determinants of NPLs are: annual growth in GDP, the annual inflation rate, real interest rate, real effective exchange rate (REER), annual unemployment rate, broad money supply (M2) and GDP per capital. Accordingly, in this study, six bank specific variables (i.e., loan growth, ownership structure, size, income diversification, financial performance, operational efficiency of banks) and four macroeconomic variables (i.e., real GDP growth, annual inflation rate, real interest rate and effective exchange rate) were included. Consequently, the empirical findings of this particular study suggested the following conclusions:

First, among bank specific variables, loan growth (LG), financial performance measured in terms of return on asset (ROA) and ownership structures of banks were found to be a major determinant of NPLs in ECBs with 1% significance level. Particularly, the ROA of banks had a negative relationship with the volume of NPLs reported by ECBs suggesting that as the profitability of banks increases, the likelihood that managers engaged in risky lending activity decreases and ultimately reduce NPLs. The findings also suggested a negative relationship among loan growth of a bank and NPLs of ECBs which was inconsistent with the prior expectation. On the other hand, the ownership structure of Ethiopian banks measured by a dummy variable (1=state owned banks and 0= privately owned banks) had a positive association with NPLs of Ethiopian commercial banks. This implies state ownership increase the probability of NPLs and thus the volume

of NPLs tends be higher in state owned Ethiopian banks than privately owned banks. Size of a bank had also a positive association with NPLs of ECBs. This indicates the larger banks of Ethiopian have relatively higher volume of NPLs than smaller banks. The operational efficiency of banks had a negative association with NPLs of ECBs which was in favor of „skimping" hypothesis that banks which allocate adequate budget to screening loans, appraising collateral, and monitoring and controlling borrowers after loans disbursement resulted with lower volume of NPLs as compared to banks which seem to cost efficient but, do not have adequate budget to ensure higher loan quality. However, the magnitude of the coefficient estimate and the level of significance was not strong as compared to other variables. Hence, operational efficiency of a bank found to be the modest determinants of NPLs in ECBs.

Second, with respect the macroeconomic variables, real GDP growth, annual inflation rate and effective exchange rate were found to be statistically significant determinants of NPLs in ECBs. In particular, inflation rate had a negative association with the levels of NPLs reported by Ethiopian banks suggesting that the absence of adjustment on the lending rate of ECBs (to compensate the inflation rate) enhanced the debt servicing capacity of borrowers by reducing the real value of the outstanding loans. The findings also suggested a significant inverse relationship among real GDP growth and NPLs of ECBs which indicates whenever there was a strong positive economic growth, the volume of cash held for either businesses or households was increasing. These conditions contributed to decrease the likelihood that borrowers delay their financial obligations. In addition, the effective exchange rate had also a negative association with NPLs of Ethiopian commercial banks. This implies the depreciation of Ethiopian birr in terms of

dollar reduced the volume of NPLs reported by Ethiopian banks through increasing the competitiveness of export-oriented Ethiopian firms in international market and it can also increase the monopolistic power of large importers of the country by getting out of market those small and medium importers. Hence, this conditions increase the debt servicing capacity of borrowers (both import and export-oriented).

Third, as the interview suggested, other internal factors such as absence of adequate man power, lack of comprehensive studies on the credit applicants, lack of follow-up on the borrower's activities or failure to follow up the collateral provided by the borrowers were also the major internal determinants of NPLs in ECBs. In addition, factors related to the borrowers such as providing false information to the bank, using the loan for other purposes that are undesirable from the banks' point of view (fund diversion), willful default and operational losses of borrower were also the determinants of NPLs in ECBs. Moreover, external variables such as the international conditions (competition), absence of credit rating Agencies Company in the country, government regulation, and the surrounding natural environment were also affect the NPLs of ECBs.

Lastly, the result of average lending rate and income diversification of Ethiopian banks did not support an important association with NPLs reported by Ethiopian banks. In fact, the result of income diversification and the average lending rate of Ethiopian banks showed a positive relationship with NPLs. However, the association was statistically insignificant since the p-values for both IDV and RIR are in excess of 10%. Hence, both income diversification and average lending rate of Ethiopian banks were not found to be important determinants of NPLs in Ethiopia commercial banks.

6.2 Recommendations

Based on the findings of the study the following possible recommendations were forwarded:

Loan growth, financial performance, operational efficiency, GDP growth rate, effective exchange rate and inflation rate were the significant drivers of NPLs in Ethiopian commercials banks. Hence, focusing and reengineering the institutions alongside these indicators could reduce the probability of nonperforming loans in Ethiopian commercial banks. Specifically, commercial banks need to consider the performance of the real economy when extending loans given the reality that NPLs are likely to be lower during the periods of economic growth.

As per the interviewees, borrowers related factors (such as fund diversion, willful default and providing false information) and internal factors (such as lack of comprehensive studies on the credit applicants and lack of follow-up on the borrower's activities) were quite important determinants of NPLs in Ethiopian commercial banks. Thus, Ethiopian commercial Banks that were considered in this study should put in place a vibrant credit process that would encompass issues of proper customer selection, robust credit analysis, authentic sanctioning process, proactive monitoring and follow up and clear recovery strategies for sick loans.

Currently, Ethiopian commercial banks that were sampled in this study were considering collateral as prime factor for assessing loan application in all conditions and hence, providing appropriate focus for factors such as repayment capacity of the client, the

feasibility of the project and the experience of the management of the company in credit approval process could improve the quality of their loan portfolios.

Finally, the study sought to investigate the determinants of NPLs in Ethiopian commercial banks. However, the variables used in the econometrics model did not include all factors that can affect NPLs of Ethiopian commercial banks. Thus, future research could incorporate external factors such as regulatory environment (capital adequacy ratio and loan loss provisions) and corporate governance.

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APPENDICES

Appendices

Appendix –I: Tests for the aoutocorrelation: Breusch-Godfrey

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.233575	Prob. F(2,83)	0.2965
Obs*R-squared	2.771198	Prob. Chi-Square(2)	0.2502

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 02/15/13 Time: 01:36
Sample: 1 96
Included observations: 96
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.031108	0.172057	0.180799	0.8570
CIR	-0.001362	0.019511	-0.069784	0.9445
LG	0.006521	0.042203	0.154524	0.8776
ID	-0.143472	0.733991	-0.195468	0.8455
ROA	0.012209	0.706521	0.017280	0.9863
SIZE	-0.000790	0.006765	-0.116783	0.9073
STATEDUMMY	-0.000949	0.014535	-0.065268	0.9481
GDP	-0.005649	0.141251	-0.039992	0.9682
INFL	0.010455	0.050995	0.205014	0.8381
RIR	-0.228160	0.730141	-0.312488	0.7555
EFEX	0.156564	0.341711	0.458178	0.6480
RESID(-1)	0.185050	0.117844	1.570303	0.1201
RESID(-2)	-0.019007	0.113780	-0.167053	0.8677

R-squared	0.028867	Mean dependent var	-2.23E-16
Adjusted R-squared	-0.111538	S.D. dependent var	0.046298
S.E. of regression	0.048812	Akaike info criterion	-3.076363
Sum squared resid	0.197755	Schwarz criterion	-2.729108
Log likelihood	160.6654	Hannan-Quinn criter.	-2.935997
F-statistic	0.205596	Durbin-Watson stat	1.903684
Prob(F-statistic)	0.997872		

Appendix –II: Tests for the Heteroskedasticity Test: White

Heteroskedasticity Test: White

F-statistic	1.158071	Prob. F(61,34)	0.3264
Obs*R-squared	64.80804	Prob. Chi-Square(61)	0.3453
Scaled explained SS	75.79256	Prob. Chi-Square(61)	0.0962

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/15/13 Time: 01:13
Sample: 1 96
Included observations: 96
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.081998	5.249821	-0.015619	0.9876
CIR	-0.216974	0.177828	-1.220134	0.2308
CIR^2	-0.000902	0.012268	-0.073555	0.9418
CIR*LG	0.037154	0.050004	0.743011	0.4626
CIR*ID	-0.463469	0.420205	-1.102960	0.2778
CIR*ROA	-0.841825	0.599648	-1.403865	0.1694
CIR*SIZE	0.012972	0.007740	1.675916	0.1029
CIR*STATEDUM				
MY	0.025340	0.011094	2.284094	0.0287
CIR*GDP	0.015130	0.091014	0.166234	0.8690
CIR*INFL	-0.088356	0.044010	-2.007611	0.0527
CIR*RIR	-0.091677	0.514953	-0.178030	0.8598
CIR*EFEX	-0.386919	0.589408	-0.656453	0.5160
LG	-0.321334	0.262406	-1.224569	0.2292
LG^2	0.016161	0.040317	0.400859	0.6910
LG*ID	1.640400	0.992069	1.653514	0.1074
LG*ROA	0.512312	1.349198	0.379716	0.7065
LG*SIZE	0.015387	0.009058	1.698639	0.0985
LG*STATEDUMM				
Y	0.022076	0.018054	1.222756	0.2298
LG*GDP	-0.206667	0.297696	-0.694219	0.4923
LG*INFL	-0.009974	0.087654	-0.113782	0.9101
LG*RIR	-1.182032	1.015904	-1.163527	0.2527
LG*EFEX	0.201281	0.429190	0.468977	0.6421
ID	-0.505114	3.977695	-0.126987	0.8997
ID^2	-3.084123	11.25713	-0.273971	0.7858
ID*ROA	-20.80727	16.89299	-1.231710	0.2265
ID*SIZE	0.005023	0.184332	0.027247	0.9784

ID*STATEDUMM				
Y	-0.661671	0.473897	-1.396234	0.1717
ID*GDP	3.678380	3.519159	1.045244	0.3033
ID*INFL	0.745566	1.224251	0.608997	0.5466
ID*RIR	5.659607	12.93265	0.437622	0.6644
ID*EFEX	8.122443	9.448506	0.859654	0.3960
ROA	2.107042	3.631732	0.580175	0.5656
ROA^2	6.357651	7.615921	0.834784	0.4097
ROA*SIZE	-0.113633	0.164720	-0.689858	0.4950
ROA*STATEDUM				
MY	0.299745	0.332729	0.900868	0.3740
ROA*GDP	-2.440514	3.688351	-0.661682	0.5126
ROA*INFL	-0.650741	1.270417	-0.512226	0.6118
ROA*RIR	9.376420	14.01040	0.669247	0.5079
ROA*EFEX	-0.589308	13.96522	-0.042198	0.9666
SIZE	-0.092798	0.081666	-1.136309	0.2638
SIZE^2	0.002348	0.001702	1.379269	0.1768
SIZE*STATEDUM				
MY	0.001932	0.004547	0.424924	0.6736
SIZE*GDP	-0.003828	0.036719	-0.104250	0.9176
SIZE*INFL	-0.000849	0.010114	-0.083949	0.9336
SIZE*RIR	-0.071241	0.150453	-0.473511	0.6389
SIZE*EFEX	-0.099335	0.094669	-1.049283	0.3014
STATEDUMMY	-0.012563	0.107042	-0.117363	0.9073
STATEDUMMY*G				
DP	0.033020	0.123671	0.266996	0.7911
STATEDUMMY*I				
NFL	0.025655	0.018345	1.398449	0.1710
STATEDUMMY*R				
IR	-0.188681	0.399440	-0.472363	0.6397
STATEDUMMY*E				
FEX	-0.168046	0.117000	-1.436296	0.1601
GDP	-0.444518	2.977339	-0.149300	0.8822
GDP^2	-1.548889	5.194729	-0.298166	0.7674
GDP*INFL	-2.693790	6.594780	-0.408473	0.6855
GDP*RIR	-10.09996	33.91999	-0.297758	0.7677
GDP*EFEX	22.52461	25.94786	0.868072	0.3914
INFL	1.027623	3.903842	0.263234	0.7940
INFL^2	0.747729	2.043598	0.365888	0.7167
INFL*RIR	-8.037512	40.85276	-0.196743	0.8452
INFL*EFEX	-0.127917	8.168093	-0.015661	0.9876
RIR	20.90294	87.25894	0.239551	0.8121
RIR^2	-80.86015	385.0919	-0.209976	0.8349

R-squared	0.675084	Mean dependent var	0.002121
Adjusted R-squared	0.092146	S.D. dependent var	0.003683
S.E. of regression	0.003509	Akaike info criterion	-8.213097

Sum squared resid	0.000419	Schwarz criterion	-6.556955
Log likelihood	456.2286	Hannan-Quinn criter.	-7.543657
F-statistic	1.158071	Durbin-Watson stat	2.178226
Prob(F-statistic)	0.326376		

Appendix –III: First Step (General) Regression Results

Dependent Variable: NPL
Method: Panel Least Squares
Date: 02/15/13 Time: 05:14
Sample: 2000 2011
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.638789	0.106497	5.998165	0.0000
CIR	-0.117419	0.022499	-5.218795	0.0000
LG	-0.381990	0.048616	-7.857319	0.0000
ID	1.212022	0.850997	1.424237	0.1580
SIZE	-0.012154	0.007644	-1.590032	0.1155
ROA	-3.796408	0.827198	-4.589477	0.0000
STATEDUMMY	0.075765	0.016900	4.483234	0.0000
GDP	-0.505052	0.165705	-3.047894	0.0031
INFL	-0.226959	0.058767	-3.862012	0.0002
EFEX	-1.368306	0.386677	-3.538631	0.0007
RIR	0.000931	0.008417	0.110629	0.9122

R-squared	0.789352	Mean dependent var	0.133325
Adjusted R-squared	0.764570	S.D. dependent var	0.118078
S.E. of regression	0.057293	Akaike info criterion	-2.773812
Sum squared resid	0.279010	Schwarz criterion	-2.479980
Log likelihood	144.1430	Hannan-Quinn criter.	-2.655041
F-statistic	31.85167	Durbin-Watson stat	1.422553
Prob(F-statistic)	0.000000		

Appendix –IV: second step regression results

Dependent Variable: NPL
Method: Panel Least Squares
Date: 05/24/13 Time: 19:02
Sample: 2000 2011
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.275838	0.098027	2.813900	0.0061
LG	-0.293679	0.036521	-8.041285	0.0000
ROA	-2.523769	0.598648	-4.215785	0.0001
CIR	-0.025478	0.015142	-1.682544	0.0960
SIZE	0.009189	0.004528	2.029289	0.0455
STATEDUMMY	0.073909	0.012794	5.776680	0.0000
GDP	-0.445923	0.134830	-3.307285	0.0014
INFL	-0.234712	0.047214	-4.971184	0.0000
EFEX	-1.434699	0.248540	-5.772513	0.0000

R-squared	0.835550	Mean dependent var	0.133403
Adjusted R-squared	0.820429	S.D. dependent var	0.110131
S.E. of regression	0.046669	Akaike info criterion	-3.202418
Sum squared resid	0.189485	Schwarz criterion	-2.962010
Log likelihood	162.7161	Hannan-Quinn criter.	-3.105241
F-statistic	55.25469	Durbin-Watson stat	1.365317
Prob(F-statistic)	0.000000		

Appendix- V: Ratio Data

year	**bank**	**NPL**	**LG**	**CIR**	**ID**	**size**	**ROA**	**INFL**	GDP	**EFEX**	RIR
2000	AIB	0.30270	0.154362	0.62963	0.018445	20.447512	0.0303	0.054	0.059	0.0831	0.12
2001	AIB	0.20500	0.203209	1	0.020948	20.625653	0.019846	-0.003	0.074	0.0879	0.1275
2002	AIB	0.34020	0.119309	1.166667	0.017986	20.829426	0.017086	-0.106	0.016	0.0868	0.1075
2003	AIB	0.25130	0.20375	0.785714	0.030692	21.060452	0.012848	0.109	-0.021	0.087091	0.105
2004	AIB	0.18390	0.154334	0.740741	0.031638	21.294245	0.019774	0.073	0.117	0.086751	0.105
2005	AIB	0.12020	0.266667	0.796875	0.024708	21.523472	0.024708	0.061	0.126	0.08711	0.105
2006	AIB	0.09560	0.310897	0.621622	0.030806	21.806426	0.037576	0.106	0.115	0.090258	0.105

2007	AIB	0.07360	0.254777	0.377451	0.033681	22.066131	0.053264	0.158	0.118	0.08957	0.105
2008	AIB	0.08660	0.082542	0.553922	0.035685	22.296040	0.042324	0.253	0.112	0.095569	0.115
2009	AIB	0.05780	-0.00921	0.545455	0.031294	22.583151	0.031449	0.364	0.099	0.118102	0.1225
2010	AIB	0.05470	0.137635	0.441734	0.048206	22.795809	0.044179	0.028	0.104	0.136806	0.1225
2011	AIB	0.14002	0.210829	0.407255	0.052689	23.037384	0.049921	0.181	0.114	0.165292	0.1188
2000	BOA	0.04210	0.509579	0.76	0.029248	20.391980	0.02925	0.054	0.059	0.0831	0.12
2001	BOA	0.03200	0.240175	0.485714	0.018973	20.613451	0.039063	-0.003	0.074	0.0879	0.1275
2002	BOA	0.37950	-0.02691	0.642857	0.013135	20.856047	0.007005	-0.106	0.016	0.0868	0.1075
2003	BOA	0.28430	0.173053	0.6875	0.014254	21.010698	0.006002	0.109	-0.021	0.087091	0.105
2004	BOA	0.17510	0.159044	0.446154	0.016404	21.183850	0.034069	0.073	0.117	0.086751	0.105
2005	BOA	0.12400	0.220421	0.45122	0.022849	21.444514	0.039864	0.061	0.126	0.08711	0.105
2006	BOA	0.04940	0.37137	0.420635	0.019407	21.764955	0.043049	0.106	0.115	0.090258	0.105
2007	BOA	0.10540	0.148373	0.457746	0.01914	21.945864	0.027974	0.158	0.118	0.08957	0.105
2008	BOA	0.12870	0.181797	0.542628	0.022253	22.174866	0.005131	0.253	0.112	0.095569	0.115
2009	BOA	0.14750	-0.03994	0.737904	0.02354	22.423754	0.027574	0.364	0.099	0.118102	0.1225
2010	BOA	0.06980	0.140831	0.739796	0.032962	22.560636	0.03121	0.028	0.104	0.136806	0.1225
2011	BOA	0.03970	0.049066	0.639013	0.0338	22.708122	0.035449	0.181	0.114	0.165292	0.1188
2000	CBB	0.23560	0.004902	2.222222	0.010267	20.696922	0.00308	0.054	0.059	0.0831	0.12
2001	CBB	0.344391	-0.00617	1.133333	0.009298	20.690743	0.007231	-0.003	0.074	0.0879	0.1275
2002	CBB	0.41550	-0.12483	2	0.012526	20.680358	0.008351	-0.106	0.016	0.0868	0.1075
2003	CBB	0.40090	-0.0198	0.772727	0.016985	20.663516	0.014862	0.109	-0.021	0.087091	0.105
2004	CBB	0.35470	0.035471	1.391304	0.033113	20.778701	0.006623	0.073	0.117	0.086751	0.105
2005	CBB	0.27760	0.144691	0.913043	0.034389	21.328674	0.014192	0.061	0.126	0.08711	0.105
2006	CBB	0.19420	0.273113	0.288462	0.037841	21.309384	0.043962	0.106	0.115	0.090258	0.105
2007	CBB	0.17060	0.112867	0.404412	0.05135	21.359313	0.04288	0.158	0.118	0.08957	0.105
2008	CBB	0.15560	0.041817	0.422764	0.034699	21.595396	0.048077	0.253	0.112	0.095569	0.115

2009	CBB	0.11450	0.118245	0.551724	0.035494	21.675696	0.040895	0.364	0.099	0.118102	0.1225
2010	CBB	0.06560	0.100629	0.564885	0.033207	21.874471	0.041429	0.028	0.104	0.136806	0.1225
2011	CBB	0.17720	-0.13131	0.796748	0.036805	21.977456	0.035093	0.181	0.114	0.165292	0.1188
2000	CBE	0.26440	0.123707	0.292011	0.016139	23.710361	0.03127	0.054	0.059	0.0831	0.12
2001	CBE	0.33770	0.02918	0.302425	0.016474	23.790807	0.009912	-0.003	0.074	0.0879	0.1275
2002	CBE	0.419734	-0.09302	0.431217	0.018875	23.820923	0.022894	-0.106	0.016	0.0868	0.1075
2003	CBE	0.400023	-0.14007	0.315327	0.02595	23.909618	0.029587	-0.109	0.021	0.087091	0.105
2004	CBE	0.37680	-0.02739	0.430615	0.021019	24.054577	0.017408	0.073	0.117	0.086751	0.105
2005	CBE	0.27520	0.12882	0.387833	0.02231	24.224882	0.023787	0.061	0.126	0.08711	0.105
2006	CBE	0.22450	-0.02797	0.333929	0.027086	24.302582	0.031242	0.106	0.115	0.090258	0.105
2007	CBE	0.14520	0.047443	0.625641	0.028005	24.495015	0.026924	0.158	0.118	0.08957	0.105
2008	CBE	0.05330	0.437165	0.305139	0.028384	24.643574	0.037052	0.253	0.112	0.095569	0.115
2009	CBE	0.03660	0.170621	0.190722	0.02508	24.807745	0.045715	0.364	0.099	0.118102	0.1225
2010	CBE	0.14842	0.129533	0.33357	0.023603	25.029855	0.03785	0.028	0.104	0.136806	0.1225
2011	CBE	0.00860	0.315735	0.236196	0.025493	25.461786	0.037089	0.181	0.114	0.165292	0.1188
2000	DB	0.15950	0.435272	1.136364	0.021965	20.578240	0.02081	0.054	0.059	0.0831	0.12
2001	DB	0.10920	0.253501	1.111111	0.033636	20.818576	0.032727	-0.003	0.074	0.0879	0.1275
2002	DB	0.14220	0.181193	0.837209	0.025572	21.119354	0.026245	-0.106	0.016	0.0868	0.1075
2003	DB	0.08890	0.31176	0.733333	0.026118	21.411903	0.018584	-0.109	0.021	0.087091	0.105
2004	DB	0.07440	0.250296	0.606383	0.028016	21.707963	0.029137	0.073	0.117	0.086751	0.105
2005	DB	0.06720	0.242832	0.669725	0.021053	21.952906	0.028363	0.061	0.126	0.08711	0.105
2006	DB	0.06210	0.294564	0.507538	0.027497	22.237514	0.040695	0.106	0.115	0.090258	0.105
2007	DB	0.05950	0.20662	0.473684	0.027313	22.521835	0.042708	0.158	0.118	0.08957	0.105
2008	DB	0.05890	0.089913	0.446023	0.031933	22.781101	0.042534	0.253	0.112	0.095569	0.115
2009	DB	0.07390	0.015723	0.570621	0.032981	22.998788	0.036166	0.364	0.099	0.118102	0.1225
2010	DB	0.03000	0.118241	0.526652	0.039019	23.237165	0.037076	0.028	0.104	0.136806	0.1225

2011	DB	0.03380	0.187942	0.479134	0.046317	23.408389	0.042974	0.181	0.114	0.165292	0.1188
2000	NIB	0.01900	0	3	0.012658	18.878106	0.00633	0.054	0.059	0.0831	0.12
2001	NIB	0.01900	0.719048	0.421053	0.032828	19.796925	0.045455	-0.003	0.074	0.0879	0.1275
2002	NIB	0.08640	0.351852	0.4	0.029963	20.095906	0.041199	-0.106	0.016	0.0868	0.1075
2003	NIB	0.12340	0.410909	0.410256	0.032768	20.601098	0.021469	0.109	-0.021	0.087091	0.105
2004	NIB	0.08770	0.300254	0.368421	0.029671	20.944007	0.039294	0.073	0.117	0.086751	0.105
2005	NIB	0.11220	0.306267	0.321429	0.030023	21.272543	0.038106	0.061	0.126	0.08711	0.105
2006	NIB	0.08470	0.231864	0.422222	0.02664	21.429823	0.039961	0.106	0.115	0.090258	0.105
2007	NIB	0.05560	0.188222	0.495495	0.023399	21.681466	0.04066	0.158	0.118	0.08957	0.105
2008	NIB	0.06730	0.140492	0.432584	0.029315	22.017993	0.043562	0.253	0.112	0.095569	0.115
2009	NIB	0.11160	0.047748	0.450413	0.035781	22.293339	0.045559	0.364	0.099	0.118102	0.1225
2010	NIB	0.07370	0.128044	0.468553	0.048568	22.510180	0.047731	0.028	0.104	0.136806	0.1225
2011	NIB	0.05040	0.07987	0.495822	0.045557	22.685049	0.048369	0.181	0.114	0.165292	0.1188
2000	UB	0.07950	0.579545	1	0.041958	18.778355	0.03497	0.054	0.059	0.0831	0.12
2001	UB	0.07750	0.343284	1	0.042056	19.181487	0.037383	-0.003	0.074	0.0879	0.1275
2002	UB	0.15950	0.177914	1.25	0.022293	19.564904	0.022293	-0.106	0.016	0.0868	0.1075
2003	UB	0.09930	0.437931	1.083333	0.025586	19.966113	0.014925	0.109	-0.021	0.087091	0.105
2004	UB	0.09900	0.244792	0.842105	0.02819	20.328741	0.014837	0.073	0.117	0.086751	0.105
2005	UB	0.08450	0.352445	0.48	0.041938	20.793724	0.040075	0.061	0.126	0.08711	0.105
2006	UB	0.04180	0.409363	0.469697	0.034396	21.192644	0.037523	0.106	0.115	0.090258	0.105
2007	UB	0.04590	0.287943	0.52	0.032066	21.503966	0.039853	0.158	0.118	0.08957	0.105
2008	UB	0.03980	0.241935	0.55	0.033538	21.901921	0.038769	0.253	0.112	0.095569	0.115
2009	UB	0.04620	0.135688	0.708609	0.02902	22.260563	0.028805	0.364	0.099	0.118102	0.1225
2010	UB	0.03760	0.176741	0.469314	0.044098	22.497540	0.042062	0.028	0.104	0.136806	0.1225
2011	UB	0.03350	0.202319	0.472727	0.037799	22.767728	0.041812	0.181	0.114	0.165292	0.1188
2000	WB	0.19100	0.251908	1.818182	0.036965	20.057734	0.01362	0.054	0.059	0.0831	0.12

2001	WB	0.13660	0.238372	0.954545	0.037736	20.183698	0.024014	-0.003	0.074	0.0879	0.1275
2002	WB	0.12940	0.152709	1.470588	0.03096	20.286310	0.018576	-0.106	0.016	0.0868	0.1075
2003	WB	0.10860	0.288967	1.173913	0.028121	20.605608	0.016873	0.109	-0.021	0.087091	0.105
2004	WB	0.12240	0.226287	0.559322	0.038596	20.854294	0.039474	0.073	0.117	0.086751	0.105
2005	WB	0.08410	0.263473	0.560976	0.043317	21.203220	0.038985	0.061	0.126	0.08711	0.105
2006	WB	0.04850	0.370998	0.504065	0.044267	21.538188	0.041611	0.106	0.115	0.090258	0.105
2007	WB	0.05250	0.260789	0.432432	0.038793	21.970298	0.043966	0.158	0.118	0.08957	0.105
2008	WB	0.08390	0.081807	0.409091	0.046545	22.140332	0.046061	0.253	0.112	0.095569	0.115
2009	WB	0.07700	-0.11127	0.501931	0.046698	22.356030	0.05002	0.364	0.099	0.118102	0.1225
2010	WB	0.03470	0.146322	0.498471	0.055381	22.471073	0.055381	0.028	0.104	0.136806	0.1225
2011	WB	0.03510	0.149828	0.434706	0.062027	22.810303	0.056817	0.181	0.114	0.165292	0.1188