



**CREDIT RISK MANAGEMENT AND ITS IMPACT ON FINANCIAL
PERFORMANCE OF ETHIOPIAN PRIVATE COMMERCIAL BANKS**

A Thesis Submitted to the Department of Accounting and Finance
in Partial Fulfillment of the Requirements for the Degree of
Masters of Science (M.Sc) in Accounting and Finance

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Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Declared by: Name: Tamrat Worku

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Date: June 2015

Certification

This is to certify that Ato Tamrat Worku has carried out his research work on the topic under the title of “Credit risk management and its impact on financial performance of Ethiopian private commercial banks” under my supervision. This work is original in nature and it is suitable for submission for the award of degree for Master of Science in Accounting and Finance.

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This is to certify that the thesis prepared by Tamrat Worku : under the title of “Credit risk management and its impact on financial performance of Ethiopian private commercial banks” submitted in partial fulfillments of the requirements for the Degree of Masters of Science in Accounting and Finance complies with the rules and regulations of the university and meets the expected standards with respect to originality and quality. Hence, all reference materials contained therein have been duly acknowledged.

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Acknowledgment

I would like to express my immense thankfulness to all those who gave me the opportunity to complete this thesis. Especially, I deeply indebted to my advisor Dr. Degefe Duressa (Addis Ababa University), for his guidance, constructive comments and critical remarks during the research and writing process of this paper.

My sister Sinafikish Worku, thanks for your endless love, financial support and incessant attention.

In addition, my most profound gratitude goes to my parents, friends and relatives for their unconditional love and steadfast support notably my wife Christina.

Above all, I thank the Almighty God for all his mercies.

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Acronyms

CBE = Commercial Bank of Ethiopia

NBE = National Bank of Ethiopia

EPRDF = Ethiopian People's Revolutionary Democratic Front

CRM = Credit Risk Management

BIS = Bank for International Settlements

CAR = Capital Adequacy Ratio

CLRM = Classical Linear Regression Model

OLS = Ordinary Least Square

DW = Derbin Watson

REM = Random Effect Model

FEM = Fixed Effect Model

FIs = Financial Institutions

TL = Total Loan

ROA= Return on Assets

ROE = Return on Equity

NPL = Nonperforming Loans

NPLTL = Nonperforming Loans to Total Loans

LPTA = Loan Provisions to Total Assets

LPTL = Loan Provisions to Total Loans

LPNPL=Loan provisions to Nonperforming Loans

ABSTRACT

This study has carry out an empirical investigation in to the quantitative effect of credit risk management on the financial performance of Ethiopian private commercial banks over the period of the years (2004-2013). The researcher has selected six private commercial banks using purposive sampling considering their seniority in the industry, availability of data and allotted time for the research. The traditional profit theory has employed to formulate profit measured by Return on Asset (ROA), as a function of the ratio of Non-performing loan to Total loans & Advances (NPL/LA), ratio of Loan provision to Total Asset (LP/TA), Loan Provision to Total Loans and Advances (LP/TL) and the ratio of Loan Provision to Non-performing loan (LP/NPL) as measures of credit risk. Using panel data from 2004-2013 which the researcher have collected from selected banks annual report, have examined the impact of credit risk management on performance of private banks. The collected data was analyzed using descriptive statistics and fixed effect panel regression model. The study summarizes that banks used different credit risk management tools, techniques and assessment models to manage their credit risk, the credit risk management and that they all have one main objective, i.e. to reduce the amount of loan default, which is a principal cause of bank failure. The banks management should have to implement appropriate strategy in identifying the real impact of nonperforming loans on the financial performance. Because the findings of the researcher indicate that the sampled have poor credit risk management practices; hence the high levels of the nonperforming loans in their loans portfolios. This is with a view to provide further empirical evidence on how credit risk management strategies affect banks' performance in Ethiopia.

Keywords: Credit Risk Management, Panel Data, Return on Asset, Nonperforming Loans, Loan provisions, Commercial Private Banks

CHAPTER-ONE

INTRODUCTION

This chapter presents a general overview of the study. It starts from the background of the study and followed by statement of the problem, objectives of the study, hypothesis of the study, significance of the study, scope of the study and limitations of the study. Finally, organization of the paper is presents.

1.1 Background of the Study

In Ethiopia, now a day's private commercial banks are playing intermediary role that resulted in improved financial support to the key productive sectors of the economy even if the government owned commercial bank of Ethiopia (CBE) is the leader in the banking industry. Various researches conducted about the banking industry in Ethiopia show that profitability of banks had improved by following more favorable economic environment in new regime of EPRDF (Girma,2011 and Tibebu,2011). Meantime, borrowers were struggling to repay loans leading to the problems of banks sitting on nonperforming loans. Commercial banks are the dominant financial institutions and play a critical role to emerging economies where most borrowers have no access to capital markets.

The traditional role of a bank is lending and loans make up the bulk of their assets. Same time interest on loans contributes significantly to interest income of commercial Banks. Therefore, Loans represent the majority of any commercial banks assets. Lending is not an easy task for banks because it creates a big problem, which is the main objective of this study called credit risk. Due to the nature of their business, commercial banks expose themselves to the risk of default from borrowers.

According to the National Bank of Ethiopia (NBE) directive, nonperforming loans are those loans, which are 90 days or more past due or no longer accruing interest. Nonperforming loans can also be defined as those loans which for a relatively long period of time do not generate income that is, the principal & or interest on these loans have been left unpaid for at least 90 days.

Credit risk is an investor's risk of loss arising from a borrower who does not make payments as promised. Such event is called a default. Another term for credit risk is default risk. Investor losses include lost principal and interest, decreased cash flow, and increased collection costs, which arise in a number of circumstances. Consumer does not make a payment due on a mortgage loan, credit card, line of credit, or other loan, a business does not make a payment due on a mortgage, credit card, line of credit, or other loan, a business or consumer does not pay a trade invoice when due. A business does not pay an employee's earned wages when due, a business or government bond issuer does not make a payment on a coupon or principal payment when due. An insolvent insurance company does not pay a policy obligation, an insolvent bank won't return funds to a depositor, and a government grant bankruptcy protection to an insolvent consumer or business (Cornett, Marcia Millon and Saunders, Anthony (2006)).

Adequately managing credit risk in financial institutions (FIs) is critical for the survival and growth of the FIs. In the case of banks, the issue of credit is of even greater concern because of the higher levels of perceived risks resulting from some of the characteristics of clients and business conditions that they find themselves in. They also provide loans, credit and payment services such as checking accounts, money orders and cashier's checks. Banks also may offer investment and insurance products and a wide whole range of other financial services, which they were once prohibited from selling. Credit creation is the main income generating activity for the banks. However, this activity involves huge risks to both the lender and the borrower. The risk of a trading partner not fulfilling his or her obligation as per the contract on due date or anytime thereafter can greatly jeopardize the smooth functioning of a bank's business. On the other hand, a bank with high credit risk has high bankruptcy risk that puts the depositors in jeopardy. Among the risk that face banks, credit risk is one of great concern to most bank authorities and over the past few years there have been an increased number of significant bank problems in Ethiopia. Studies in other countries show that most of bank failures have been caused by NPL (Brown bridge, 1998). The findings of some researcher show that in Indonesia, NPL represented about 75% of total loan assets, which led to the collapse of over sixty banks in 1997, while some countries such as Sweden, Norway, Finland, Australia & Spain do not seem to be exposed to NPL (less than 1%). Other countries like Egypt, Nigeria, Philippines, Morocco, Algeria & Tunisian (more than 15%) suffer severely from bad loans. (Bondrigh, 2009).

The problem of NPL is also common in Ethiopian private commercial banks. Fortunately, there are no banks that have been liquidated due to NPL.

Many of the bad debts in African banks were attributable to moral hazards the adverse incentives on bank owners to adopt imprudent lending strategies, in particular insider lending at high interest rates to borrowers in the most risky segments of the credit market. To the borrowers side they also tend to divert the funds to risky investment once they are granted the loans.

1.2 Statement of the problem

In the process of providing financial services, banks assume various kinds of financial risks. Over the last decade the place of commercial banks within the financial sector has improved substantially. These arguments will be neither reviewed nor enumerated here. Suffice it to say that market participants seek the services of these financial institutions because of their ability to provide market knowledge, transaction efficiency and funding capability.

In performing these roles, they generally act as a principal in the transaction. As such, they use their own balance sheet to facilitate the transaction and to absorb the risks associated with it.

The very nature of the banking business is so sensitive because more than 85% of their liability is deposits from depositors (Saunders, Cornett, 2007). Banks use these deposits to generate credit for their borrowers, which in fact is a revenue generating activity for most banks. This credit creation process exposes the banks to high default risk which might lead to financial distress including bankruptcy. All the same, beside other services, banks must create credit for their clients to make some money, grow and survive stiff competition at the market place.

As discussed under empirical studies in chapter two there are various studies conducted related to this topic, but the researcher couldn't find sufficient research specifically focused only on senior Ethiopian private banks those having more than fifteen years service.

The principal concern of this paper, therefore, is to assess to what extent banks can manage their credit risks, what tools or techniques they use to manage their credit risk and to what extent their performance can be affected by proper credit risk management policies and strategies.

1.3 Objective of the study

1.3.1 General objective of this study is to find out the impact of credit risk management on the financial performance of private banks.

1.3.2 Specific objectives of this study are

- To establish a relationship between the ratio of nonperforming loans to total loans and, return on assets.
- To find out the relationship between return on assets and, ratio of loan provision to total assets.
- To find out the relationship between ratio of loan provision to total loans and return on assets.
- To establish a relationship between ratio of loan provision to nonperforming loans and return on assets.

1.4 Hypothesis of the study

The researcher has expected that banks with a better credit risk management will result in high return on asset (ROA), less nonperforming loans (NPL) and loan provision (LP). Accordingly, with the help of empirical data on selected banks the study has formulated and tested the following hypothesis:

H₀:1 There is no relationship between the ratio of NPL to Total Loan (TL) and Return on Asset of Ethiopian private commercial banks.

H₁:1 There is a positive/negative relationship between the ratio of NPL to Total Loan (TL) and Return on Asset of Ethiopian private commercial banks.

H₀:2 There is no relationship between the ratio of LP to Total Asset (TA) and Return on Asset of Ethiopian private commercial banks.

H₁:2 There is a positive/negative relationship between the ratio of LP to Total Asset (TA) and Return on Asset of Ethiopian private commercial banks.

H₀:3 There is no relationship between the ratio of LP to TL and Return on Asset of Ethiopian private commercial banks.

H₁:3 There is a positive/negative relationship between the ratio of LP to TL and Return on Asset of Ethiopian private commercial banks.

H₀:4 There is no relationship between the ratio of LP to NPL and Return on Asset of Ethiopian private commercial banks.

H₁:4 There is a positive/negative relationship between the ratio of LP to NPL and Return on Asset of Ethiopian private commercial banks.

1.5 Significance of the study

The results of this study have a significant contribution to the shareholders, management bodies, and credit analysts of commercial banks as it provides information regarding banks financial performance in relation to their credit risk management mechanisms. Mean time it also provides detailed information on the impact of CRM on financial performance of private commercial banks.

In addition, the study may contribute to the existing body of knowledge regarding the impacts of CRM on financial performance of commercial banks and initiates other researchers to undertake further studies in the area.

1.6 Scope of the study

The study focused on those senior Ethiopian Private commercial banks, which are established before 2000. Which includes Awash International bank, Dashen bank, Bank of Abyssinia, Wegagen bank, Nib International bank & United Bank.

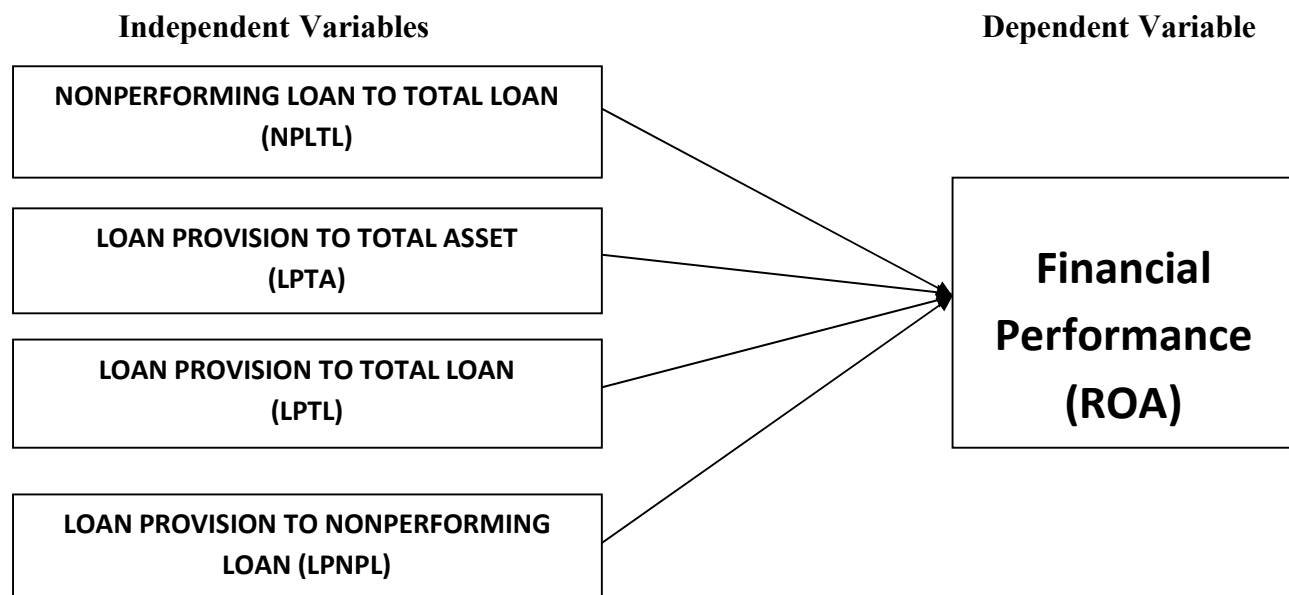
1.7 Limitations of the study

Lack of adequate information and unwillingness of the authorized bodies to provide accurate data about their NPL has forced the researcher to consider the banks provision to doubtful debts as a proxy to NPL. The study has restricted on six private commercial banks and taking only 10 years data for the period 2004-2013, even though most of them have more than 15 years performance in the industry. Therefore, conducting a more detailed study by collecting exact figures of more banksö NPL including the government owned is left for other interested researchers.

1.8 Organization of the paper

This paper is organized into five chapters. The first chapter deals with background of the study, statement of the problem, research objectives, hypothesis of the study, significance of the study, scope of the study, limitation of the study and organization of the research report. The second chapter is entirely devoted to the review of related literatures on impact of CRM on financial performance of banks internationally and in Ethiopian scenario. The third Chapter deals with the methodology used in the study. Discussion and analysis of the findings of the study is described in the fourth chapter. Finally, the conclusions drawn from the findings and recommendations are present in the fifth chapter.

1.9 Conceptual framework



The Return on Assets (ROA) indicator expresses the company's ability to generate profit as a result of efficient and effective control over the loans and advances not to classified as nonperforming loan and to reduce bad debt expenses due to having excess loan provision and of the efficient credit risk management, and it's used as a dependent variable in the assessment of financial performance. It is computed as a ratio of Net Income to Total Assets (Burja, 2010). Therefore, in this study the Return on Assets (ROA) of the selected private commercial banks is used as a dependent variable.

CHAPTER-TWO

REVIEW OF RELATED LITERATURE

2.1 Theoretical literatures

Risk is the fundamental element that drives financial behavior. Without risk, the financial system would be vastly simplified. However, risk is an all-pervading in the real world. Financial Institutions, therefore, should manage the risk efficiently to survive in this highly uncertain world. The future of banking will undoubtedly rest on risk management dynamics.

Only those banks that have efficient risk management system will survive in the market in the long run. The effective management of credit risk is a critical component of comprehensive risk management essential for long-term success of a banking institution. Credit risk is the oldest and biggest risk that bank, by virtue of its very nature of business, inherits. This has however, acquired a greater significance in the recent past for various reasons. Foremost among them is the wind of economic liberalization that is blowing across the globe (Rekha A., 2004).

2.1.1 Credit risk in banking

Credit in bank is a contractual agreement in which a borrower receives something of value now and agrees to repay the lender later. However, Credit risk is defined as the probability that some of a bank's assets, especially its loans, will decline in value and possibly become worthless. It arises from non-performance by a borrower, either inability or unwillingness to perform in the pre-committed contracted manner (Joan Selorm Tsorhe, 2010). As per (Raghavan, 2003) Credit risk is the potential that a bank borrower/counter party fails to meet the obligations on agreed terms. There is always scope for the borrower to default from his commitments for one or the other reason resulting in crystallization of credit risk to the bank.

2.1.2 Components of credit risk in banks:

As per (Santomero, 1997), the credit risk in a bank's loan portfolio consists of three components;

- (1) Transaction Risk
- (2) Intrinsic Risk
- (3) Concentration Risk

(1) Transaction Risk: Transaction risk focuses on the volatility in credit quality and earnings resulting from how the bank underwrites individual loan transactions. Transaction risk has three dimensions: selection, underwriting and operations.

(2) Intrinsic Risk: It focuses on the risk inherent in certain lines of business and loans to certain industries. Commercial real estate construction loans are inherently more risky than consumer loans. Intrinsic risk addresses the susceptibility to historic, predictive, and lending risk factors that characterize an industry or line of business. Historic elements address prior performance and stability of the industry or line of business. Predictive elements focus on characteristics that are subject to change and could positively or negatively affect future performance. Lending elements focus on how the collateral and terms offered in the industry or line of business affect the intrinsic risk.

(3) Concentration Risk: Concentration risk is the aggregation of transaction and intrinsic risk within the portfolio and may result from loans to one borrower or one industry, geographic area, or lines of business. Bank must define acceptable portfolio concentrations for each of these aggregations. Portfolio diversification achieves an important objective. It allows a bank to avoid disaster. Concentrations within a portfolio will determine the magnitude of problems a bank will experience under adverse conditions.

2.1.3 Risk and profitability

Risks are usually defined by the adverse impact on profitability of several distinct sources of uncertainty. As it was clearly explain before the main source of revenue or main sources of profit of banks came from lending money to their customers. Which means Risk-taking is an inherent element of banking and, indeed, profits are in part the reward for successful risk taking. In contrary, excessive, poorly managed risk can lead to distresses and failures of banks or resulting in poor performance. Risks are, therefore, warranted when they are understandable, measurable, controllable and within a bank's capacity to withstand adverse results (Guidelines for Commercial Banks & DFIs).

2.1.4 Credit risk management in banking industry

Banks make profit from the spread between the interest rate they charge to borrowers and the interest rate they pay to depositors. Lending has always been the primary functions of banks, and accurately assessing a borrower's credit worthiness has always been the only method of lending

successfully (Fight, 2004). To insure reasonable profit, banks attempt to make loans that will be fully repaid with interest on due date. Therefore, banks are directly concerned about borrowers repaying their loans on a timely basis so that the value of the banks can be maximized.

If banks don't manage credit risks effectively, they won't be profitable and won't be in business very long. Banks can reduce their exposure to credit risk on different loans by applying major credit risk management principles (as identified by Mishkin, 2004). These are:

1. Screening and monitoring: Adverse selection in loan market requires the lenders screen out the bad credit from the good ones so that loans are profitable to them. Once a loan has been made, the bank's has to monitor or follow up the borrowers' activities.

2. Long-term Customer Relationship: if the borrower has borrowed previously from the bank, the bank has a record of the loan payments. This reduces the costs of information collection and makes it easier to screen out bad credit risks. Long-term relationship enables banks to deal with even unanticipated moral hazard contingencies.

3. Collateral Requirements: is an important credit risk management tool. Collateral, which is properly promised to the lender as compensation if the borrower defaults, it lesser the lender's losses in the case of a loan default.

4. Credit Rationing: is one way of credit risk management that refers refusing to make loans even though borrowers are willing to pay the stated interest rate or even a higher rate. (Mishkin, 2004, pp 217-220)

As per (Vedpuriswar, 2009, pp1-2) Credit risk is the risk of financial loss owing to the failure of the counterparty to perform its contractual obligations. Lack of diversification of credit risk has been the primary reason for many bank failures. Banks have a comparative advantage in making loans to entities with which they have an ongoing relationship. This creates excessive concentrations in geographic or industrial sectors.

2.1.5 Impacts of credit risk management in bank

Knowing credit risk of a bank is important to the investor, if he has investments in any bank or is contemplating making one. The ratio of nonperforming loans to total loans should be on the decrease. This indicates that the bank is recovering most of its loans and as such is maximizing its assets to generate profits.

The goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between credit risk and other risks. The effective management of credit risk is a critical component of a comprehensive approach to risk management and essential to the long-term success of any banking organization.

Banks and financial institutions gave importance to the credit risk and considered as an essential factor in the financial sector that is needed to be managed. When banks recognized the credit risk, it means that there is a possibility that a borrower or counter party tends to fail in meeting the obligations in accordance with the agreed terms. Credit risk in banks or any financial institution deals with lending to corporate, individuals, and other banks or financial institutions.

Credit risk management needs to be a robust process that enables the banks to proactively manage the loan portfolios to minimize the losses and earn an acceptable level of return to its shareholders. The importance of the credit risk management is recognized by banks for it can establish the standards of process, segregation of duties and responsibilities such in policies and procedures endorsed by the banks (Focus Group, 2007).

2.1.6 Credit risk and performance measurement in Bank

The banking industry is not exempted from credit risks at all. Therefore, it is necessary to implement efficient credit risk measurement.

Efficient Credit risk measurement is very important in the industry of banking. In fact, if you would ask any person in the banking industry how important it is, he or she would tell you that this aspect has an impact on the overall success of the bank itself. Thus, banks and other financial institutions, especially the ones that are operating in the business of lending, should pay attention to this aspect. Risks come in any line of business. In the banking industry, you could

safely say that these institutions deal with risks every single workday. Moreover, just about all of these risks are financial in nature. Thus, there is a need to balance risks and returns of investments altogether. (Tags: banking performance, performance measurement, 2000)

With the many options of banks in today's market, for a bank to serve a large customer base, it should consider offering a lot of reasonable loan products. This means the loan products would be offered at low interest rates, right? Not necessarily. This is because pegging interest rates that are too low would also incur losses for the bank. After all, banks should have substantial capital in terms of reserves. There should be balance to this, actually. If a bank has too much capital in its reserves, then there is that risk that the bank might miss out on its investment revenue. On the other hand, if a bank has too little capital to begin with, this would only lead to financial instability. Moreover, there is also that risk of regulatory non-compliance that the bank would have to deal with as well. Striking a balance is then very important here. (Tags: banking performance, performance measurement, 2000).

By financial definition, credit risk management pertains to that process of assessing the risks that come with any investment. For the most part, risk comes in the form of investments and the allocation of capital. These risks should be assessed so that a reliable and sound investment decision would be achieved. Risk assessment is also an important factor to consider when you are aiming for a certain position in balancing risks and returns. (Tags: banking performance, performance measurement, 2000).

Banks constantly have to deal with the risk of a client defaulting payment of his loan. This is one risk that banks would have to expect, however unfortunate the case may be. And this is just one of the many risks that banks have to deal with each day. Thus, it is only logical for banks to keep a substantial portion of its capital in its reserves so as to maintain economic stability and protect its own solvency. We have to take into consideration the second Basel Accords, which states that the more risks the bank, is exposed to, the greater the amount of capital it should hold in its reserves. (Tags: banking performance, performance measurement, 2000)

The determination of the risks involved here entails several practices. For starters, banks need to come up with certain estimates as to the figures to keep and the ones to make available for loans. In addition, banks have to monitor their performance as well as evaluate it. Always remember that portfolio analyses and loan reviews are necessary when it comes to efficient credit risk measurement. (Tags: banking performance, performance measurement, 2000).

2.1.7 Credit risk management principles

1. While financial institutions have faced difficulties over the years for a multitude of reasons, the major cause of serious banking problems continues to be directly related to lax credit standards for borrowers and counterparties, poor portfolio risk management, or a lack of attention to changes in economic or other circumstances that can lead to a deterioration in the credit standing of a bank's counterparties. This experience is common in both G-10 and non-G-10 countries. . (Guidance for Managing Settlement Risk in Foreign Exchange Transactions, 2000).

2. Credit risk is most simply defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. The goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between credit risk and other risks. The effective management of credit risk is a critical component of a comprehensive approach to risk management and essential to the long-term success of any banking organization. . (Guidance for Managing Settlement Risk in Foreign Exchange Transactions, 2000).

3. For most banks, loans are the largest and most obvious source of credit risk; however, other sources of credit risk exist throughout the activities of a bank, including in the banking book and in the trading book, and both on and off the balance sheet. Banks are increasingly facing credit risk (or counterparty risk) in various financial instruments other than loans, including acceptances, interbank transactions, trade financing, foreign exchange transactions, financial futures, swaps, bonds, equities, options, and in the extension of commitments and guarantees, and the settlement of transactions. (Guidance for Managing Settlement Risk in Foreign Exchange Transactions, 2000).

4. Since exposure to credit risk continues to be the leading source of problems in banks worldwide, banks and their supervisors should be able to draw useful lessons from past experiences. Banks should now have a keen awareness of the need to identify, measure, monitor and control credit risk as well as to determine that they hold adequate capital against these risks and that they are adequately compensated for risks incurred. The Basel Committee has issued a document in

order to encourage banking supervisors globally to promote sound practices for managing credit risk. Although the principles contained in this paper are most clearly applicable to the business of lending, they should be applied to all activities where credit risk is present. . (Practices for Loan Accounting and Disclosure (July 1999)).

5. The sound practices set out in this document specifically address the following areas: (i) establishing an appropriate credit risk environment; (ii) operating under a sound credit-granting process; (iii) maintaining an appropriate credit administration, measurement and monitoring process; and (iv) ensuring adequate controls over credit risk. Although specific credit risk management practices may differ among banks depending upon the nature and complexity of their credit activities, a comprehensive credit risk management program will address these four areas. These practices should also be applied in conjunction with sound practices related to the assessment of asset quality, the adequacy of provisions and reserves, and the disclosure of credit risk, all of which have been addressed in other recent Basel Committee documents. (Practices for Loan Accounting and Disclosure (July 1999)).

6. While the exact approach chosen by individual supervisors will depend on a host of factors, including their on-site and off-site supervisory techniques and the degree to which external auditors are also used in the supervisory function, all members of the Basel Committee agree that the principles set out in this paper should be used in evaluating a bank's credit risk management system. Supervisory expectations for the credit risk management approach used by individual banks should be commensurate with the scope and sophistication of the bank's activities. For smaller or less sophisticated banks, supervisors need to determine that the credit risk management approach used is sufficient for their activities and that they have instilled sufficient risk-return discipline in their credit risk management processes. The Committee stipulates various principles for banking supervisory authorities to apply in assessing bank's credit risk management systems. In addition, the document provides an overview of credit problems commonly seen by supervisors. . (Practices for Loan Accounting and Disclosure (July 1999))

7. A further particular instance of credit risk relates to the process of settling financial transactions. If one side of a transaction is settled but the other fails, a loss may be incurred that is equal to the principal amount of the transaction. Even if one party is simply late in settling, then the other party may incur a loss relating to missed investment opportunities. Settlement risk

(i.e. the risk that the completion or settlement of a financial transaction will fail to take place as expected) thus includes elements of liquidity, market, operational and reputational risk as well as credit risk. The level of risk is determined by the particular arrangements for settlement.

Factors in such arrangements that have a bearing on credit risk include the timing of the exchange of value; payment/settlement finality; and the role of intermediaries and clearing houses (Guidance for Managing Settlement Risk in Foreign Exchange Transactions, 2000).

2.2 Empirical studies

2.2.1 Empirical studies in global scenario

There are many empirical studies conducted related to the impact of credit risk management on banks performance. Some of the empirical studies are the following:

Achou and Tenguh (2008), has tried to give a brief discussion that shows the existence of significant relationship between bank performance (in terms of return on asset) and credit risk management (in terms of loan performance). They conclude that better credit risk management results in better bank performance. Thus, it is of crucial importance that banks practice prudent credit risk management and safeguarding the assets of the banks and protect the investors's interests.

Sudhir C. (2010), who focused on credit risk management, has tried to provide directional guidelines to the banking sector that will improve the risk management culture, establish minimum standards for segregation of duties and responsibilities, and assist in the ongoing improvement of the banking sector in Bangladesh. Credit risk management is of utmost importance to banks, and as such, policies and procedures should be endorsed and strictly enforced by the CEO and the board of the bank.

Anthony M. (1997), The researcher covered a number of North American super-regional and quasi-money center institutions as well as several firms outside the U.S. The information obtained covered both the philosophy and practice of financial risk management. The paper outlines the results of the investigation. It reports the state of risk management techniques in the industry. It reports the standard of practice and evaluates how and why it is conducted in the

particular way chosen. In addition, critiques are offered where appropriate. The researcher discusses the problems, which the industry finds most difficult to address, shortcomings of the current methodology used to analyze risk, and the elements that are missing in the current procedures of risk management. This thesis analyze the commercial bank risk management process only, it doesn't focus on its impact on banks performance particularly on banks profit.

David H. (1997), This paper is conducted to discuss why risk management is needed. It outlines some of the theoretical underpinnings of contemporary bank risk management, with an emphasis on market and credit risk. This paper merely focuses on theory it doesn't get in to the practical aspects of the title.

Feng Z.,et.al (2004), who believed that study of profitability and risk of agricultural banks is very important in assessing the ability to adequately finance agricultural production and rural development. A recursive system of profitability and risk equations is estimated to compare the performance of agricultural with nonagricultural banks and to identify factors, which affect performance. A linear regression model, which measures risk-adjusted profitability, confirms the results from the recursive system. The finding of the researcher was agricultural banks perform better than nonagricultural counterparts on average do even after controlling for risks and other factors. Further, off-balance-sheet business is found to be negatively related to the risk-adjusted profitability of agricultural banks.

Shuhai L.,et.el. (2010), which focused on the China Aviation Oil Corporation Ltd has tried to point out lots of contributions of risk management and internal control systems. Risk management focuses on adopting a systematic and consistent approach to manage all of the risks confronting an organization. With the emergence of world as a globe village, companies are diversifying their activities; result in the increase of risks. Besides the business core activities, the increased use of derivative products by both financial and non-financial institutions and recent events or scandals continue to demonstrate the need for enhanced standards and processes of control over risk. This is of greatest interest for multinational companies, insurance organizations, banks, securities houses and non-financial institutions given the extent of their business activities in derivative products. The objective of this thesis is to identify the role and importance of internal control system in good risk management practice with a particular emphasis on management structure and reporting system and in general with principles of

corporate governance and risk management. It focuses on the China Aviation Oil Corporation Ltd., (CAOC) by drawing attention to the regulatory environment and recent regulatory and supervisory developments with respect to risk management practice. To be able to fulfill the purpose of study, qualitative research method was considered, using an inductive approach of a single case study of China Aviation Oil Corporation Ltd., with company related research literature, committee of sponsoring organization of the Tread way Commission and Fortis Bank as source of data.

Based on the analysis, a number of observations were put forward in the conclusion. To begin with the strategy in relation to management structure and reporting system of CAOC are employed after the company crisis for better control and reporting system. In addition, the role of information technology is considered in risk management. Meanwhile, the good governance and risk management according to Accounting Standards application in risk management system and corporate governance are included in the discussion. In attempt of entrepreneur risk management in the firm, they also discuss the role of Enterprise Risk Management on the organizational performance with different perspectives.

Rekha A. (2004), Banks are in the business of managing risk, not avoiding it. To the researcher, Risk is the fundamental element that drives financial behavior. Without risk, the financial system would be vastly simplified. However, risk is omnipresent in the real world. Financial Institutions, therefore, should manage the risk efficiently to survive in this highly uncertain world. The future of banking will undoubtedly rest on risk management dynamics. Only those banks that have efficient risk management system will survive in the market in the long run. The effective management of credit risk is a critical component of comprehensive risk management essential for long-term success of a banking institution. The researcher understood that Credit risk is the oldest and biggest risk that bank, by virtue of its very nature of business, inherits. This has however, acquired a greater significance in the recent past for various reasons. Foremost among them is the wind of economic liberalization that is blowing across the globe, India is no exception to this swing towards market driven economy. Better credit portfolio diversification enhances the prospects of the reduced concentration credit risk as empirically evidenced by direct relationship between concentration credit risk profile and NPLs of public sector banks. They conclude their paper by proverb which is, a bank's success lies in its ability to assume and aggregate risk within tolerable and manageable limit.

Yoonhee T., (2006), conducted a study on 'Role of Nonperforming loans (NPLs) and capital adequacy in banking structure', competition and analyses the impacts of the transition from price cap regulation (deposit / loan rate control) to rate of return regulation (ROA, NPLs, and /or 40 BIS ratio) on banking industry structure. By using multiple regression model and by taking dates of commercial banking sector in Korea between 1976 and 2003. He investigated that the banking structure with respect to changes in regulatory regimes and the associated NPLs and BIS ratios. His findings showed, level of nonperforming loan reduce over time especially after the rescue programmes were implemented in the post 1997 period. There are several limitations in the analysis. First of all, some of the conclusions are based on weak evidence due to the limited number of observations available, especially where NPLs and BIS ratios are used given the short time series available. Another limitation is that the restructuring process had a short history and long term effects have to be further studied. However, the researcher himself has discussed the short term impact of deregulation and changes in NPLs and BIS ratios on the structure of banking system.

He only compares and contrast the impact of nonperforming loan to changes in regulatory and watches the difference of nonperforming and capital adequacy ratio before and after regulation but not the profitability of the sector.

Bridgeforce.,(2008), Studied on comprehensive management of profitability and credit risk. He analyzed various documents to arrive at the following conclusion. Managing credit relationships that are based upon all available customer information and consistent throughout the credit life cycle greatly increases profitability and reduces surprises. It also requires a greater investment of management focus, analytical skills, and technology.

The first step before moving to a more integrated approach, therefore, is recognition of the size of the opportunity. This can be done fairly and quickly by examining your current processes and portfolio data. With that analysis and discussions among Executive Management, they believe that, they can help users to develop their own vision for the future, the roadmap to get there, and the business case to support the investment. Then the best part begins: making it happens, measuring the results, and continuing the cycle of success.

Mohammad M, (2008), Has conducted a research focused on nonperforming Loans of banks in Bangladesh by using two sources which were Banking Regulation and Policy Department,

Bangladesh bank and Bangladesh bank annual report of eleven years result from 1997 to 2007. Then he come to conclusion and says that, their banking sector was characterized by low profitability and inadequate capital base. The core of the problem lies in the accumulation of high percentage of nonperforming loans over a long period of time. As per him, unless NPL ratio of the county can be lowered substantially they will lose competitive edge in the wave of globalization of the banking service that is taking place throughout the world. Therefore, they have had a two-decade long experience in dealing with the NPLs problem and much is known about the causes and remedies of the problem. So, it is very important for the lenders, borrowers and policy makers to learn from the past experience and act accordingly. However, Mohammad Mohiuddin focuses only on nonperforming loan. He doesn't watch other factors like Capital adequacy which harm banking sector of Bangladesh and others. In addition, he cannot relate its impact to the performance of the sector.

Tobias M.et.al, (2009), Has conducted a study on "Credit Risk Securitization and Banking Stability Evidence from the Micro-Level for Europe" Using a unique sample of 743 cash and synthetic securitization transactions issued by 55 stock listed bank holdings in Western Europe plus Switzerland over the period from 1997 to 2007. and the paper provides empirical evidence that credit risk securitization has a negative impact on the banks' financial soundness as measured by the z-score technique while controlling for macroeconomic, bank-specific, regulatory and institutional factors. Moreover, as a result of further robustness checks they find a positive impact of credit risk securitization on the banks' leverage and return volatility as well as a negative relationship between securitization and the banks' profitability. They only focus on bank securitization but not on credit risk management, capital adequacy and other factors, which affect banks profitability negatively as well as positively.

Nelson M.et.al (2009), Has tried to dig out the causes and remedies of commercial banking crises in Kenya. The statement of the problem for the study is many financial institutions that collapsed in Kenya since 1986 failed due to nonperforming loans. This study investigated the causes of nonperforming loans, the actions that bank managers have taken to mitigate that problem and the level of success of such actions. Using a sample of 30 managers selected from the ten largest banks the study found that national economic downturn was perceived as the most important external factor. Customer failure to disclose vital information during the loan application process was considered to be the main customer specific factor. The study further

found that Lack of an aggressive debt collection policy was perceived as the main bank specific factor, contributing to the nonperforming debt problem in Kenya. This paper only searching for the reason and the action that bank managers have taken to alleviate the problem but not on the impacts of nonperforming towards profitability of commercial banks in Kenya.

Ara H. (2009), Has tried to show how commercial banks in Sweden can increase their profitability by applying a well-adjusted credit risk management strategy. As per the author, Credit risk management in banks has become more important not only because of the financial crisis that the world is experiencing nowadays but also because of the introduction of Basel II. Since granting credit is one of the main sources of income in commercial banks, the management of the risk related to that credit affects the profitability of the banks. They try to find out how the credit risk management affects the profitability in banks. The main purpose of this study is to describe the impact level of credit risk management on profitability in four commercial banks in Sweden. The study is limited to identifying the relationship of credit risk management and profitability of four commercial banks in Sweden. The results of the study are limited to banks in the sample and are not generalized for all commercial banks in Sweden. The quantitative method is used in order to fulfill the main purpose of the study. They have used regression model to do the empirical analysis. In the model, they have defined ROE as profitability indicator while NPLR and CAR as credit risk management indicators. The data was collected from the sample banks annual reports (2000-2008) and capital adequacy and risk management reports (2007-2008).

The findings and analysis reveal that credit risk management has effect on profitability in all four banks. Among the two credit risk management indicators, NPLR has a significant effect than CAR on profitability (ROE). The analysis on each bank level shows that the impact of credit risk management on profitability is not the same.

Valentina (2009), The researcher has concluded that bank profits are high in Sub-Saharan Africa (SSA) compared to other regions by evaluating various determinants of commercial bank profitability in the region. The paper uses a sample of 389 banks in 41 SSA countries to study the determinants of bank profitability. Moreover, it finds that apart from credit risk, higher returns on assets are associated with larger bank size, activity diversification, and private ownership. Bank returns are affected by macroeconomic variables, suggesting that macroeconomic policies that promote low inflation and stable output growth do boost credit expansion. The results also

indicate moderate persistence in profitability and it also gives some support to a policy of imposing higher capital requirements in the region in order to strengthen financial stability.

Abdelkader (2009), Conducted a research paper to show the impact of quality of supervision on banks nonperforming loans. The paper empirically analyses the cross-countries determinants of nonperforming loans and the potential impact of regulatory factors on credit risk exposure. It employs aggregate banking, financial, economic and legal environment data for a panel of 59 countries over the period 2002-2006. Empirical results indicate that higher capital adequacy ratio and prudent provisioning policy seem to reduce the level of problem loans. We also report a desirable impact of private ownership, foreign participation and bank concentration. Findings do not support the view that market discipline leads to better economic outcomes and to reduce the level of problem loans. In contrast, all regulatory devices either exert a counterproductive impact on bad loans or do not significantly enhance credit risk exposure for countries with weak institutions, corrupt business environment and little democracy. They believe that their results are interesting for regulators, bankers and investors as well. To reduce credit risk exposure, the effective way to do it is through enhancing the legal system, strengthening institutions and increasing transparency and democracy, rather than focusing only on regulatory and supervisory issues.

Danson.M (2011), Has tried to show the impact of credit risk management on the financial performance of Banks in Kenya for the period 2000 ñ 2006. Since risk management in general has very significant contributions to banks performance; the banks are advised to put more emphasis on risk management. In order to reduce risk on loans and achieve maximum performance the banks need to allocate more funds to default rate management and reduce spending on bad debt cost and cost per loan asset.

Joan.S.,et.al (2010), This study has focused on showing the relationship between corporate governance and banking risk management in Ghana. The impact of stakeholders of Ghanaian banks on the management of bank capital risk, credit risk and liquidity risk is investigated. Bank stakeholders include the board of directors, shareholders, depositors and regulators. It emphasizes the impact of the strength of the board of directors and constructed an indicator of board strength in a manner similar to Greuning and Bratanovic (2004). Other explanatory variables of bank financial risks include management efficiency, total assets, inflation and central

bank lending rate. Three fixed effects (least squares dummy variables) regression coefficients were estimated for each of the three risks, using an unbalanced panel of 23 banks covering 2005-2008. Estimation of the variance-covariance matrix was controlled for heteroscedasticity and autocorrelation of the residuals. Banks with board strength values higher than the industry median are labeled strong boards and those below are labeled weak boards. Statistical tests indicate that there is no difference between means and medians of bank capital, credit risk and liquidity risk indicators of banks with strong boards and banks with weak boards. In respect of capital risk management, the following explanatory variables were significant and positive at the 5% level: management efficiency and the logarithm of total assets and inflation. The central bank lending rate was also significant but negative. For credit risk, only bank-specific dummies and management efficiency variables were significant at the 1% level. Bank reserves and inflation do so at the 10% significance level. For liquidity risk, reserves and loan-to deposit ratio significantly impact liquidity risk (1%). The impact of the board index was moderately significant (10%).

After this all they conclude that there is no statistical difference between the strengths of bank boards in Ghana, and that board strength does not have significant impact on capital risk, credit risk nor liquidity risk. Depositor behavior appears to impact only liquidity management, while, shareholders do not appear to act in a manner that reduces the credit risk taking by banks. It also conclude that, more efficient the management, the less capital the bank is likely to hold, while bank total assets are important only in capital risk management, even though bank-specific approaches to credit risk management are significant. They are doing everything good but impacts of credit risk management towards profitability were not there issue.

Ugirase (2013), She has conducted a research to show the effect of credit risk management on the financial performance of commercial banks in Rwanda and has concluded that commercial banks in Rwanda needs to manage effectively the credit risk in order to ensure the financial performance and meeting its objectives, minimize cash loss and ensures the organization performs better by increasing the return on assets and helps the organization in attaining maximum financial returns.

In addition the study concluded that credit risk identification, credit scoring mechanism and credit analysis and assessment are good predictors of the model consequently those three indicators used of credit risk management have shown a positive relationship with the financial performance of commercial banks in Rwanda.

Ngare (2008), conducted a survey of Credit Risk Management Practices by commercial banks in Kenya. The specific area of research were geared forward identifying the source of credit risk exposures in banks and strategies that the banks have adopted to monitor and mitigate against the credit risk exposures inherent in the operations of their business. To facilitate the attainment of the objectives of this study, questions were administered to credit risk managers and credit managers. From the study, it was found that most banks use qualitative loan assessment methods to make credit-granting decisions while liquidity runs on the borrowers credit concentration and adverse trading by the borrowers were the main sources of credit risk among the banks in Kenya. In addition, most banks were found to use loan diversification, banks guarantees and bank covenants to mitigate against credit risk.

Nor H.A., (2004), Tried to identify the key factors influencing credit risk of Islamic bank in Malaysia. As per the authors, the rapid and dynamic changes in the global financial landscape pose various risks to banking institutions. Operating side by side with conventional banks, Islamic banks are equally vulnerable to risks. The future of Islamic financial institutions will depend to a large extent on how well they manage risks. Their ability could be enhanced if the factors affecting these risks are systematically identified. This paper examines the factors affecting credit risk, being the main risk faced by banking institutions and systematically identifies the key factors influencing credit risk formation in Islamic banking operations in Malaysia. A comparison of these factors between Islamic and conventional banking operations is highlighted. Several policy implications are addressed to promote risk management culture in Islamic banking industry. They only concentrated on how they could identify those factors affecting credit risk only but not on credit risk management effect on performance.

Kargi (2011), Evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were collected from the annual reports and accounts of sampled banks from 2004-2008 and analyzed using descriptive, correlation and regression techniques. The findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks. It concluded that banks profitability is inversely influenced by the levels of loans and advances, nonperforming loans and deposits thereby exposing them to great risk of illiquidity and distress.

Hassan, et.al. (2010) It is a comparative study on Handelsbanken and Swedbank evaluating how risk has been managed during the last decade. In this thesis, the authors strive to investigate the risk management phenomena in the banking sector by conducting a longitudinal comparative study in two different banks i.e. Handelsbanken and Swedbank. In a broader perspective to understand the phenomena the authors depart from theoretical framework that recognizes the social and cultural elements of risk. However, to be more specific the thesis narrows down its analysis to three main variables that come under the realm of this discussion which are; how banks organizing for risk, how they measure it and the role of IT and human judgment. This study contributes to the banking sector by providing a road map of how successful banks manage risk. It highlights that the risk question should be addressed strategically and deemed to be a continuous phenomenon.

2.2.2 Empirical Studies in Ethiopia

Girma, (2011) has examined the impact of credit risk management on performance of Ethiopian commercial banks by taking both primary and secondary data as input. The secondary data was collected from the financial statements of the selected sample banks and the primary data was obtained by questionnaire. He has distributed forty-two questionnaires to collect primary data and to examine the relationship between return on asset (ROA) which is performance indicators and loan losses (NPL/TL), loan provision to total loan (LP/TL), loan provision to nonperforming loan (LP/NPL), and loan provision to total asset (LP/TA) he has used 10 years financial statements of selected banks. The study also reveals that banks with good or sound credit risk management policies have lower loan default ratios (bad loans) and higher interest income (profitability). Finally, the study has shown that, there is an inverse relationship between return on asset (ROA) and the ratio of nonperforming loans to total loan (NPL/TL) and loan provision to total loan (LP/TL).

Tibebu,(2011) has examined the impact level of credit risk management towards the profitability of commercial banks in Ethiopia in general . It argues that credit risk management has significant impact on profitability of banks of our country. To examine its impact level the researcher uses multiple regression models by taking 10 years ROE (dependent variable), NPLR (Nonperforming loan ratio) and CAR (independent variables) from each bank and in addition to that, questioner was distributed to the authorized bodies in the risk management position of each

bank. The researcher took seven banks purposively that have ten year and above life span in Ethiopia, those are Commercial bank of Ethiopia ,Nib international bank ,Dashen bank, Awash international bank ,Banks of Abyssinia, Wegagen Bank and United Bank.

However, despite researches those are studied by many researchers from different views and in different parts of the World, little research is done in our country Ethiopia. To the best of researcher's knowledge and based on the available literature accessed within the time bound there was no satisfactory studies done focusing on financial performance of Ethiopian senior private commercial banks with respect to associated credit risks. In addition, most of the above studies described the contribution of credit risk management to financial performance of banks but did not establish a clear effect between credit risk management and the financial performance it only stated credit risk as a factor influencing financial performance. That is why the researcher was initiated to conduct the study by considering different variables which may well describe how financial performance of private banks are affected by credit risk management by taking data only from secondary sources.

CHAPTER-THREE

METHODOLOGY

This chapter has tried to give a brief discussion on the methodological tools used in achieving the research objectives. The chapter is arranged as follows: section 3.1 presents the research design adopted for the study. Section 3.2 discusses data type and sources while section 3.3 sample design. Sections 3.4 describes about data analysis techniques used in the study. Section 3.5 shows the model adopted for the study and lastly, section 3.6 provides descriptions and measurement of variables used in the study.

3.1 Research design

This research is totally quantitative and regression model was applied to analyze the data which was collected from the National Bank of Ethiopia (NBE) and from the six senior private commercial banks of the country. Those are Awash International Bank, Dashen Bank, Nib International Bank, Wegagen Bank, United Bank and Bank of Abyssinia, who submitted their annual report to NBE from 2004 to 2013.

Depending on the result of regression output, analysis was conducted. The researcher does have 60 observations in the regression analysis.

3.2 Data type and source

The secondary data from audited financial statements submitted to National bank of Ethiopia by selected banks for the period 2004-2013 are collected. In addition, to examine the relationship between return on asset (ROA) which is a performance indicator and loan losses (NPL/TL), loan provision to total loan (LP/TL), loan provision to nonperforming loan (LP/NPL), and loan provision to total asset (LP/TA) the researcher has analyzed the collected 10 years data.

3.3 Sample design

From currently operating sixteen private commercial banks in Ethiopia, the researcher purposively selected six of the most seniors in the industry due to their representativeness to the private banks for having more than fourteen years experience, the cost allocated for the research and availability of data.

3.4 Data analysis techniques

The study used descriptive statistics and regression analysis to analyze the collected data. Descriptive statistical tools like tables, figures and percentages were used to describe relevant aspects of observable facts and to provide detailed information about each relevant variable. Appropriate software was employed to analyze and interpret the regression model used by the researcher.

3.5 Model Specification

The model used in this study is similar to models of previous studies such as Ugirase (2013) and Danson M (2011), and Girma (2011). Pooled regression type of panel data analysis was used in this study and descriptive statistics was applied to establish a casual effect relating independent variables to the dependent variable. A linear regression of financial performance versus credit risk management was applied to establish the effect between variables. The model treats financial performance (ROA) of commercial banks as the dependent variable while the independent variables are (NPL/TL, LP/TA, LP/TL & LP/NPL)

To test the hypothesis, the following regression model is used.

$$Y = \hat{U} + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

Y= return on asset (ROA)

X1= nonperforming loan to total loan (NPL/TL)

X2= loan provision to total asset (LPTA)

X3= loan provision to total loan (LPTL)

X4= loan provision to nonperforming loan (LP/NPL)

ϵ = disturbance term

Also $\hat{U}$ is an intercept and β is the parameter of explanatory variable of dependent variable (return on asset)

3.6 Description of Variables

This study used one dependent variable and four independent variables. The independent variables (Asset quality standards) were - Nonperforming loan to total loan (NPL/TL), Loan provision to total asset (LP/TA), Loan provision to total loan (LP/TL) and Loan provision to nonperforming loan (LP/NPL) while the dependent variable was Return on asset (ROA).

CHAPTER-FOUR

DATA DISCUSSIONS AND ANALYSIS

The aim of this chapter is to investigate the impact of credit risk management on financial performance of private commercial banks in Ethiopia.

The chapter is sub divided in a manner that firstly, descriptive statistics of all variables were analyzed. Secondly, the study has analyzed the tests for the fulfillment of CLRM (classical linear regression model) assumptions. Thirdly, the selection for the best applicable model was described. Following this, fourthly, results of regression analysis were presented to measure the degree of association among explanatory variables and dependent variable and finally a hypothesis testing was made based on the results of the analysis.

4.1 Analysis of Descriptive statistics summary

Table 4.1 provides descriptive statistics of dependent and independent variables for selected senior Ethiopian private commercial banks for a period covering from 2004 ñ 2013. In order to measure mean, median, maximum values, minimum values and standard deviation of different variables, the summary data computed for each variable is shown on the table 4.1 given below.

Table 4.1 Descriptive Statistics of the Variables

Date: 01/01/15

Time: 10:49

Sample: 2004 2013

	ROA	NPLTL	LPTA	LPTL	LPNPL
Mean	0.028253	0.039759	0.004434	0.007756	0.180757
Median	0.029606	0.037568	0.002974	0.005710	0.162281
Maximum	0.040283	0.098273	0.033436	0.050679	0.600000
Minimum	0.003413	0.018589	0.000000	0.000000	0.000000
Std. Dev.	0.006928	0.017503	0.005481	0.008575	0.145337
Observations	60	60	60	60	60

Source: Eviews 6 output

The mean value of Return on Asset (ROA) is 2.83 percent of total assets with a standard deviation 0.69 percent imply that the value of ROA can deviate by 0.69 percent from its mean to both sides. The maximum value for the ROA is 4.03 percent for the banks in a year while the minimum is 0.34 percent, meaning the probability of incurring loss in Ethiopian banking industry is almost zero.

Most of the private banks NPL to the total loans and advances is 3.98 percent and standard deviation is 1.75 percent. The minimum and maximum ratio of NPL to the total loans and advances is 1.86 and 9.83 percent respectively.

Most private banks Loan Provision to the total assets ratio is 0.44 percent and standard deviation of 0.55 percent. Here, the minimum Loan Provision to total assets ratio is zero percent which means it is expected that all loans and advances has a 100 percent probability of on time collection, and the maximum loss incurred by not collecting the loans on time with respect to the total assets is 3.34 percent.

Ethiopian private banks have a 0.78 percent Loan Provision to the total loans and advances with a standard deviation of 0.86 percent. Here, the minimum ratio of Loan Provision to total loans and advances is zero percent, which means all loans and advances have a 100 percent probability of on time collection, and the maximum ratio of Loan Provision to total loans and advances is 5.07 percent.

Private banks in Ethiopia have an 18.1 percent ratio of Loan Provision to NPLs, which means 18.1 percent of private banks NPL is reported as an expense of the period having a standard deviation of 14.5 percent. Here, the minimum NPLs reported as an expense of the period is zero percent, which means there is a 100 percent probability of on time collection of loans and advances and the maximum is 60 percent, meaning all loans and advances categorized as non performing has a minimum of 40 percent probability of collection.

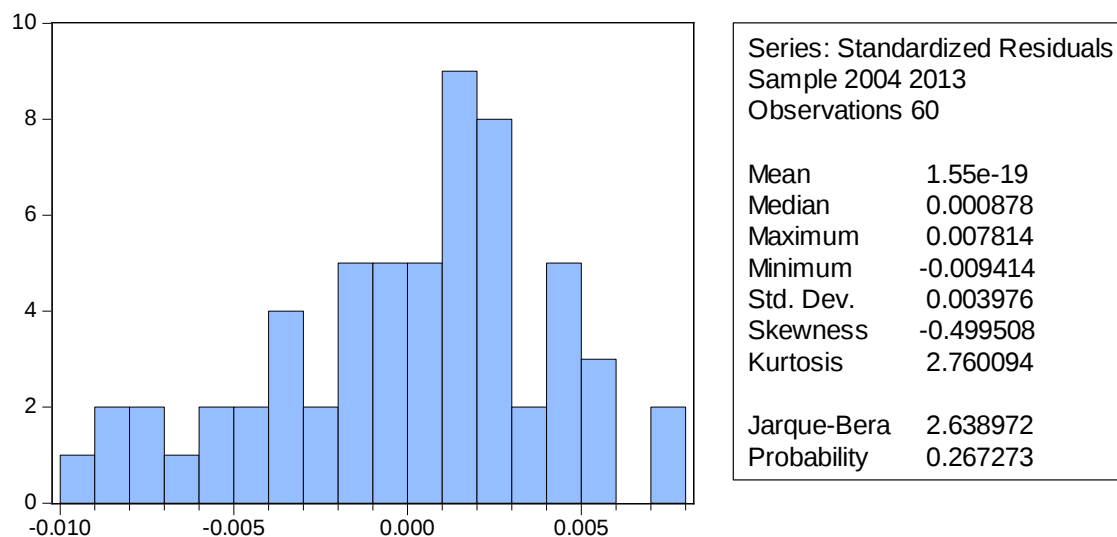
4.2 Testing of Assumptions of CLRM

In order to draw correct estimation, using regression model to analyze the data requires certain assumptions to be fulfilled. Under this subsection, the study presented five different results for the tests of CLRM such as tests of normality assumption, tests for multicollinearity, tests for the assumption that errors have zero mean, tests for homoscedasticity and tests for the absence of autocorrelation.

4.2.1 Normality test

Before using OLS regression analysis, normality test was carried out for all independent variables. Normality assumption of the regression model was tested with the Jarque- Bera measure. As the result depicted on figure 4.1 shows, histogram is bell shaped implying that the distribution is normal. Jarque-Bera statistic is 2.63897 with a p-value of 0.26727. Since the p-value is greater than 0.05, it supports the null hypothesis of presence of normal distribution. In addition, the histogram also signifies that skewness is nearer to zero and kurtosis is closer to 3 implying that the data fulfills normality assumption.

Figure 4.1 Histogram of normality test



4.2.2 Multicollinearity test

Multicollinearity is the existence of a perfect, or exact, linear relationship among some or all explanatory variables of a regression model. If the explanatory variables were correlated to one another, adding or removing a variable from a regression equation would cause the values of the coefficients on the other variables to change. If an independent variable is an exact linear combination of the other independent variables, then it says the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks, 2008).

According to Churchill and Iacobucci (2005), when there is multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases.

However, there is no clear and single convention about how much correlation causes multicollinearity. For example, Hair et al (2006) argued that correlation coefficient below 0.9 may not cause serious multicollinearity problem. On the other hand, Malhotra (2007) stated that multicollinearity problem exists when the correlation coefficient among variables is greater than 0.75. Kennedy (2008) suggested that the correlation coefficient above 0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results.

But According to Cameron and Trivedi (2009) Multicollinearity condition exists where there is high, but not perfect correlation between two or more explanatory variables. Meaning the correlation coefficients used in measuring the strength and magnitude or degree of linear relationship or association between two variables in the study the values of the correlation coefficient should always lies between -1 and +1, if the correlation coefficient is +1 it indicates that the linear relationship between the two variables are perfectly related in a positive linear sense; whereas a correlation coefficient of -1 indicates that the two variables are perfectly related but in a negative linear sense. A correlation coefficient of zero indicates that there is a little or no linear relationship between the two variables.

Therefore, in order to identify whether there is multicollinearity problem among the independent variables, Pearson correlation for the variables was calculated as shown on the table 4.2 below. The results in the correlation matrix show that the highest correlation of 0.986 which is between loan provision to total asset and loan provision to total loan. For the purpose of this study, as per Cameron and Trivedi (2009) there is no correlation outside the limit ± 1 . Hence, it is possible to conclude that there is no multicollinearity problem among the independent variables so that the results can be successfully estimated.

Table 4.2 Correlation matrix between explanatory variables

Covariance Analysis: Ordinary

Date: 01/01/15 Time: 10:57

Sample: 2004 2013

Included observations: 60

Correlation	NPLTL	LPTA	LPTL	LPNPL
NPLTL	1.000000			
LPTA	0.523902	1.000000		
LPTL	0.539432	0.986452	1.000000	
LPNPL	0.227646	0.841672	0.873110	1.000000

Source: Eviews 6 output

4.2.3 Test for the assumption “Errors have zero mean ($u_t = 0$)”

If a constant term is included in the regression equation, this assumption will never be violated (Brooks, 2008). Accordingly, a constant term is included in the regression result of study and this shows that the assumption is not violated.

4.2.4 Test for homoscedasticity (Constant variance of errors) ($\text{Var}(u_t) = \sigma^2 < \infty$)

The assumption of the CLRM states that the variance of the errors is constant or equal is known as homoscedasticity (i.e. it is assumed that $\text{var}(u_t) = \sigma^2$). If the variance of the errors is not constant, this would be known as heteroscedasticity (Gujarati, 2004). This study used white test to identify heteroscedasticity across the range of explanatory variables if any.

The result in table 4.3 shows, the F-, χ^2 , and scaled explained SS versions of the test statistic give the same conclusion that reveals the absence of heteroscedasticity as the p-values in all of the cases were above 0.05. Therefore, the null hypothesis of heteroscedasticity should be rejected.

Table 4.3 Heteroscedasticity test: White

Heteroskedasticity Test: White

F-statistic	2.027303	Prob. F(13,46)	0.0597
Obs*R-squared	21.85471	Prob. Chi-Square(13)	0.0577
Scaled explained SS	14.09935	Prob. Chi-Square(13)	0.3669

Source: Eviews 6 output

4.2.5 Test for absence of autocorrelation assumption

Durbin ñWatson test is used to prove the absence of autocorrelation. According to Brooks (2008), DW has two critical values: an upper critical value and a lower critical value, and there is an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. In this test, the null hypothesis is rejected and the existence of positive autocorrelation presumed if DW is less than the lower critical value; the null hypothesis is rejected and an existence of negative autocorrelation is presumed, if DW is greater than 4 minus the lower critical value; the null hypothesis is not rejected and no significant residual autocorrelation is presumed if DW is between the upper critical value and 4 minus the upper

limits; the null hypothesis is neither rejected nor not rejected if DW is between the lower and upper limits, and between 4 minus the upper and 4 minus the lower limit.

Figure 4.2 Rejection and Non-Rejection Regions for DW Test

Reject H0:		Do not reject H0:		Reject H0:	
Positive		No evidence of		Negative	
Autocorrelation		Autocorrelation		Autocorrelation	
	Inconclusive		Inconclusive		
0	dL	dU	2	$4-dU$	$4-dL$
					4

The DW test statistic value in the regression result was 1.571, which is closer to 2. There are a total of 60 observations and 4 regressors (excluding the intercept) in the regression. According to DW stat table, the relevant critical values for the test were $dL = 1.444$, $dU = 1.727$, so $4 - dU = 2.273$ and $4 - dL = 2.556$. This indicates that the test statistic is between the lower critical value (dL) and the upper critical value (dU). Meaning, the DW value of ROA lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. Therefore, there is no evidence for the presence of autocorrelation in this study.

4.3 Selection of Random effect (RE) versus Fixed effect (FE) Models

According to Gujarati (2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model/FEM and random effect model/REM. Hence, the choice here is based on computational convenience. Since the number of time series (i.e. 10 year) is greater than the number of cross-sectional units (i.e. 6 private banks), FEM is preferable in this study. According to Brooks (2008) and Wooldridge (2004), it is often said that the REM is more appropriate when the entities in the sample having been randomly selected from the population, but a FEM is more conceivable when the entities in the sample effectively constitute the entire population/sample frame. Hence, the sample for this study was not selected randomly and equals to the sample frame FEM is appropriate.

4.4 Results of the regression analysis

The main objective of this section was to examine the association between the dependent variable and explanatory variables. Accordingly, the result obtained by the fixed effect model that explains regression results between the dependent variable and explanatory variables is analyzed. The regression result on table 4.4 shows that dependent variable (ROA) is 67.1 percent explained by its independent variables, which is very large. Therefore, only 32.9 percent of change on dependent variables (ROA) was explained by other factors, which are not modeled in this study. From this result, it can be concluded that the regression model used for the study has highly explained the overall model signifying the study was not lost very important variables that affect the study's output. The regression F-statistic (11.31) and the p-value of zero attached to the test statistic reveal the null hypothesis that all of the coefficients are jointly zero should be rejected.

Regression result- Fixed Effect Model

$$ROA = \beta_0 + \beta_1 (NPLTL) + \beta_2 (LPTA) + \beta_3 (LPTL) + \beta_4 (LPNPL) + \varepsilon$$

$$ROA = 0.035350 - 0.116515NPLTL - 1.047308LPTA + 0.317993LPTL - 0.001590LPNPL + \tilde{U}$$

The regression result indicates that the coefficient of NPLTL is negative implies that the increase or decrease in the ratio of nonperforming loans to total loans will affect the performance of the banks in opposite direction. This means when banks have more loans, which are not collected within 90 days, consequently it will reduce their financial performance.

The regression result also shows that there is highly significant negative relationship between the ratio of nonperforming loans to total loans and financial performance of banks. The relationship is significant at 5%, and implies that the increase or decrease in the ratio of nonperforming loans to total loans significantly affects financial performance of banks in the opposite direction.

The negative relationship between the ratio of loan provision to total assets of the banks indicates that a bank having high financial performance needs to have very low or zero proportion of loans provision to total assets. Similarly, the ratio of loans provision to nonperforming loans of a bank has negative relationship with their financial performance having insignificant effect.

On the other hand, contrary to the theory, the positive relationship between the ratio of loan provision to total loans of banks is not significant to affect the financial performance of banks.

Table 4.4 Regression results- Fixed Effect Model

Dependent Variable: ROA

Method: Panel Least Squares

Date: 01/01/15 Time: 10:47

Sample: 2004 2013

Periods included: 10

Cross-sections included: 6

Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.035350	0.002305	15.33514	0.0000
NPLTL	-0.116515	0.055476	-2.100278	0.0408*
LPTA	-1.047308	0.688320	-1.521542	0.1344
LPTL	0.317993	0.538321	0.590713	0.5574
LPNPL	-0.001590	0.010759	-0.147780	0.8831
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.670599	Mean dependent var	0.028253	
Adjusted R-squared	0.611307	S.D. dependent var	0.006928	
S.E. of regression	0.004319	Akaike info criterion	-7.900515	
Sum squared resid	0.000933	Schwarz criterion	-7.551458	
Log likelihood	247.0155	Hannan-Quinn criter.	-7.763980	
F-statistic	11.31008	Durbin-Watson stat	1.571339	
Prob(F-statistic)	0.000000			

* indicates significance level at 5%.

Source: Eviews 6 output

4.5 Hypotheses testing

This section provides analysis for the results obtained from the regression result and compares it with the preset hypothesis. For hypothesis set in the study, the researcher concluded the following points:

Hypothesis 1:

H₀:1 There is no relationship between the ratio of NPL to Total Loan (TL) and Return on Asset of Ethiopian private commercial banks.

H_{1:1} There is a positive/negative relationship between the ratio of NPL to Total Loan (TL) and Return on Asset of Ethiopian private commercial banks.

The regression output concerning the first hypothesis revealed that a 1 percent increase in the ratio of nonperforming loans to total loans will result in 11.65 percent reduction in return on asset having a p-value of significance level at 5 percent. Therefore, the null hypothesis is rejected.

Hypothesis 2:

H_{0:2} There is no relationship between the ratio of LP to Total Asset (TA) and Return on Asset of Ethiopian private commercial banks.

H_{1:2} There is a positive/negative relationship between the ratio of LP to Total Asset (TA) and Return on Asset of Ethiopian private commercial banks.

The regression result of the second hypothesis revealed that there is a negative relationship between the ratio of loan provision to total asset and return on asset of banks. Meaning, a 1 percent increase in the value of loan provision to total assets will result in a 105 percent reduction in return on asset. Therefore, the researcher rejected the null hypothesis.

Hypothesis 3:

H_{0:3} There is no relationship between the ratio of LP to TL and Return on Asset of Ethiopian private commercial banks.

H_{1:3} There is a positive/negative relationship between the ratio of LP to TL and Return on Asset of Ethiopian private commercial banks.

The researcher rejected null hypothesis concerning the ratio of loan provision to total loan as coefficient of regression result shows that financial performance (ROA) will increase by 32 percent when the ratio of loan provision to total loan increased by 1 percent. Even though, the p-value in this regard is not significant as it revealed 55.7%.

Hypothesis 4:

H₀:4 There is no relationship between the ratio of LP to NPL and Return on Asset of Ethiopian private commercial banks.

H₁:4 There is a positive/negative relationship between the ratio of LP to NPL and Return on Asset of Ethiopian private commercial banks.

The researcher rejected the null hypothesis; that tells there is no relationship between the ratio of loan provision to nonperforming loan and return on asset, because the result of analysis shows that a 1 percent increase in the ratio of loan provision to nonperforming loans will result in a 0.16 percent decrease in the value of return on asset with a p-value of insignificance level showing 88%.

CHAPTER-FIVE

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to present summary of discussions and analysis in relation to impact of credit risk management on financial performance of Ethiopian private commercial banks, and provide possible recommendations based on those findings and conclusions. The chapter is divided in to two sub sections: section 5.1 that presents conclusions and section 5.2 which provides recommendations based on the results of the study.

5.1 Conclusions

The study was conducted focusing on purposively selected those six senior private commercial banks having more than fourteen years experience in the industry to examine the impact of credit risk management on financial performance. All the needed data was obtained from the financial statement of respective banks for the period 2004-2013 through the National Bank of Ethiopia.

The collected data was analyzed using descriptive statistics and fixed effect panel regression model. Firstly, descriptive statistics was used and the values for average, maximum, minimum, median and standard deviation was calculated by using Eviews 6 software package to evaluate how much the values of variables fluctuate with its maximum and minimum, how the variables are likely to deviate from the balancing point. The results of descriptive statistics indicated that the maximum ratio of nonperforming loans to total loan was 9.83 percent while the minimum was 1.86 percent. However, the average for this purpose showed 3.98 percent with a standard deviation of 1.75 percent. The maximum and minimum ratio of loan provision to total assets of the banks was 3.34 and zero percent respectively while the average was 0.44 percent with a standard deviation of 0.55 percent. The maximum and minimum ratio of loan provision to total loans of the banks was 5.07 and zero percent respectively while the average was 0.78 percent with a standard deviation of 0.86 percent. Similarly, the descriptive statistics indicated that the maximum ratio of loan provision to nonperforming loans was 60 percent while the minimum was zero percent having average ratio of 18.1 percent and a standard deviation of 14.5 percent. In addition, descriptive statistics for all variables was analyzed in the study. Secondly fixed effect

regression model was used to examine the relationship between dependent variable and independent variables. Before running regression, CLRM assumptions such as normality test, multicollinearity test, test for assumption of zero error mean, test for homoscedasticity and test for autocorrelation were made and all tests fulfilled the assumption.

The study summarizes that banks used different credit risk management tools, techniques and assessment models to manage their credit risk, the credit risk management and that they all have one main objective, i.e. to reduce the amount of loan default, which is a principal cause of bank failure. Similarly, this study shows that there is a significant relationship between bank performance (in terms of return on asset) and credit risk management (in terms of loan performance). Better credit risk management results in better bank performance. Thus, it is of crucial importance that banks practice prudent credit risk management and safeguarding its assets and protect the investors' interests. As per the results of the regression output, the ratio of nonperforming loans to total loans and advances is significant at 5%. The negative relationship between NPLTL and ROA indicated that banks having more nonperforming loans are suffered to get lesser return on their assets. Same time banks having higher ratios of LPTA and LPNPL are highly expected to generate lesser return on the invested assets. On the other hand, contrary to the theory LPTL showed positive and insignificant relationship.

To conclude the overall results showed above that credit risk management plays a key role in value creation and significantly affects financial performance (ROA) of Ethiopian private commercial banks. Despite the high levels of the NPLs, their profit levels keep rising as an indication of the transfer of the loan losses to other customers in the form of large interest margins or others.

5.2 Recommendations

Based on the results of findings, researcher provided the following possible recommendations:

- The negative relationship between the ratio of nonperforming loans to total loans and return on assets shows that as the ratio of nonperforming loans to total loans and advances increase, net income of the banks decreases due to high costs incurred to collect

those bad debts and losing those interest incomes and principals of NPL. Therefore, firms should adopt a policy that minimizes nonperforming loans.

- Banks can increase their return on assets by minimizing the ratio of loan provision to total assets as the negative relationship between the two suggests. Therefore, in order to increase the return on assets banks should minimize their loan provision by implementing applicable credit collection policy.
- The negative relationship between the ratio of loan provision to nonperforming loans and return on assets indicates that as loan provision level increases, return on assets of banks decreases. Therefore, in order to generate higher net income banks should implement a strategy that minimizes expenses for nonperforming loans.
- The positive relationship between the ratio of loan provision to total loans and return on assets of banks indicate that as loan provision level increases, return on assets of the banks also increases, which is not practical. Therefore, banks should investigate the causes for such results.
- The banks management should have to implement appropriate strategy in identifying the real impact of nonperforming loans on the financial performance. Because the findings of the researcher indicate that the sampled have poor credit risk management practices; hence the high levels of the nonperforming loans in their loans portfolios.

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Appendixes

Appendix I: Ratio Data

Year	ROA	NPLTL	LPTA	LPTL	LPNPL	COMPANY
2004	0.02807	0.03817	0.00642	0.01018	0.26667	NIB
2005	0.02656	0.04148	0.01039	0.01589	0.38298	NIB
2006	0.02812	0.03864	0.00444	0.0061	0.15789	NIB
2007	0.02915	0.03412	0.00192	0.00275	0.08065	NIB
2008	0.03096	0.03786	0.00521	0.00901	0.23786	NIB
2009	0.03204	0.04605	0.00487	0.01054	0.2288	NIB
2010	0.03367	0.039	0.00556	0.01304	0.33434	NIB
2011	0.03459	0.04124	0.00216	0.00554	0.13443	NIB
2012	0.03456	0.02712	0.00017	0.00038	0.01403	NIB
2013	0.03128	0.02502	0	0	0	NIB
2004	0.01039	0.03906	0.01335	0.02344	0.6	UB
2005	0.02889	0.03879	0.00652	0.0118	0.30435	UB
2006	0.02752	0.02888	0.00375	0.00598	0.2069	UB
2007	0.02932	0.03014	0.00596	0.00922	0.30588	UB
2008	0.02801	0.02676	0.00418	0.0073	0.273	UB
2009	0.02012	0.03088	0.00359	0.00776	0.25128	UB
2010	0.02959	0.03648	0.0049	0.01105	0.30287	UB
2011	0.03001	0.0277	0.00087	0.00205	0.07416	UB
2012	0.0339	0.02331	0.00065	0.00139	0.05954	UB
2013	0.02142	0.01859	0	0	0	UB
2004	0.02807	0.05827	0.01228	0.01897	0.32558	WB
2005	0.0297	0.0509	0.01176	0.01896	0.37255	WB
2006	0.03143	0.04834	0.01284	0.0182	0.37662	WB
2007	0.03218	0.04408	0.0092	0.01485	0.33684	WB
2008	0.03366	0.05917	0.01272	0.02236	0.37788	WB
2009	0.03529	0.06089	0.00057	0.00137	0.02255	WB
2010	0.0389	0.03971	0.00148	0.00345	0.08677	WB
2011	0.0401	0.04542	0.00501	0.01387	0.30536	WB
2012	0.04028	0.02432	4.7E-06	1.1E-05	0.00045	WB
2013	0.03303	0.02239	0.00032	0.00072	0.03204	WB
2004	0.02397	0.07588	0.00694	0.01143	0.15068	BOA
2005	0.02965	0.04943	0	0	0	BOA
2006	0.02999	0.03107	0.00141	0.00204	0.06557	BOA
2007	0.01973	0.04685	0.01384	0.02039	0.43519	BOA
2008	0.00341	0.08895	0.03344	0.05068	0.56977	BOA
2009	0.01834	0.09827	0.00419	0.00847	0.0862	BOA
2010	0.02239	0.07407	0	0	0	BOA
2011	0.02486	0.03332	0.00261	0.00573	0.17194	BOA

2012	0.02625	0.02568	0.00287	0.00606	0.23605	BOA
2013	0.02136	0.01989	0.00233	0.00503	0.25261	BOA
2004	0.01469	0.07717	0.01073	0.02008	0.26027	AIB
2005	0.01707	0.06202	0.00404	0.00698	0.1125	AIB
2006	0.0264	0.04915	0	0	0	AIB
2007	0.03734	0.04339	0	0	0	AIB
2008	0.02963	0.04637	0	0	0	AIB
2009	0.02226	0.05499	0.00452	0.01069	0.19447	AIB
2010	0.03116	0.04715	0.00225	0.00569	0.12069	AIB
2011	0.03565	0.03635	0.00052	0.00131	0.03597	AIB
2012	0.03304	0.02705	0.00094	0.00204	0.07554	AIB
2013	0.03416	0.02305	0.00376	0.00725	0.31469	AIB
2004	0.02092	0.03728	0.00598	0.00947	0.25397	DB
2005	0.02076	0.03226	0.00351	0.00538	0.16667	DB
2006	0.02926	0.02655	0.00308	0.00442	0.16667	DB
2007	0.03096	0.02482	0.00132	0.00201	0.08081	DB
2008	0.03054	0.02317	0.00233	0.00416	0.1797	DB
2009	0.02567	0.02297	0.00022	0.00049	0.02126	DB
2010	0.02623	0.02181	0.00092	0.00225	0.10318	DB
2011	0.03074	0.01989	0.00116	0.00274	0.13795	DB
2012	0.03722	0.02147	0.00111	0.00239	0.11151	DB
2013	0.03073	0.02246	0.0009	0.002	0.08925	DB

Appendix II: correlation result

Covariance Analysis: Ordinary

Date: 01/01/15 Time: 10:51

Sample: 2004 2013

Included observations: 60

Correlation	ROA	NPLTL	LPTA	LPTL	LPNPL
ROA	1.000000				
NPLTL	-0.433349	1.000000			
LPTA	-0.545719	0.523902	1.000000		
LPTL	-0.528030	0.539432	0.986452	1.000000	
LPNPL	-0.408235	0.227646	0.841672	0.873110	1.000000

Appendix III: regression result for dependent variables

Dependent Variable: ROA

Method: Panel Least Squares

Date: 01/01/15 Time: 10:47

Sample: 2004 2013

Periods included: 10

Cross-sections included: 6

Total panel (balanced) observations: 60

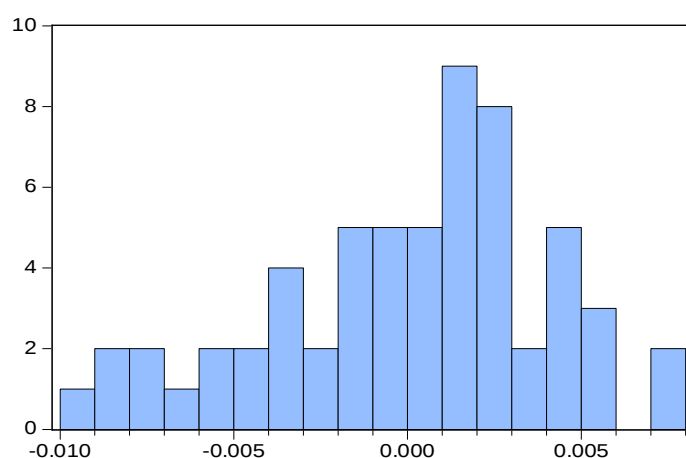
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.035350	0.002305	15.33514	0.0000
NPLTL	-0.116515	0.055476	-2.100278	0.0408*
LPTA	-1.047308	0.688320	-1.521542	0.1344
LPTL	0.317993	0.538321	0.590713	0.5574
LPNPL	-0.001590	0.010759	-0.147780	0.8831

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.670599	Mean dependent var	0.028253
Adjusted R-squared	0.611307	S.D. dependent var	0.006928
S.E. of regression	0.004319	Akaike info criterion	-7.900515
Sum squared resid	0.000933	Schwarz criterion	-7.551458
Log likelihood	247.0155	Hannan-Quinn criter.	-7.763980
F-statistic	11.31008	Durbin-Watson stat	1.571339
Prob(F-statistic)	0.000000		

Appendix IV: Normality Test



Series: Standardized Residuals
Sample 2004 2013
Observations 60

Mean 1.55e-19
Median 0.000878
Maximum 0.007814
Minimum -0.009414
Std. Dev. 0.003976
Skewness -0.499508
Kurtosis 2.760094

Jarque-Bera 2.638972
Probability 0.267273

Appendix V: heteroskedasticity Test Result

Heteroskedasticity Test: White

F-statistic	2.027303	Prob. F(13,46)	0.0597
Obs*R-squared	21.85471	Prob. Chi-Square(13)	0.0577
Scaled explained SS	14.09935	Prob. Chi-Square(13)	0.3669

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 01/01/15 Time: 11:05

Sample: 1 60

Included observations: 60

White Heteroskedasticity-Consistent Standard Errors & Covariance

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000103	8.95E-05	1.150658	0.2558
NPLTL	-0.003216	0.003823	-0.841165	0.4046
NPLTL^2	0.031075	0.037361	0.831756	0.4098
NPLTL*LPTL	-1.257961	0.908558	-1.384567	0.1729
NPLTL*LPTA	1.644329	1.156618	1.421669	0.1619
NPLTL*LPNPL	0.078316	0.064421	1.215698	0.2303
LPTL^2	5.660551	3.802287	1.488723	0.1434
LPTL*LPTA	-9.522672	7.986445	-1.192354	0.2392
LPTL*LPNPL	-0.259314	0.203600	-1.273646	0.2092
LPTA	-0.072542	0.053726	-1.350224	0.1836
LPTA^2	2.514113	4.910789	0.511957	0.6111
LPTA*LPNPL	0.265874	0.203714	1.305133	0.1983
LPNPL	-0.001136	0.001204	-0.943128	0.3505
LPNPL^2	0.003271	0.003102	1.054651	0.2971

R-squared	0.364245	Mean dependent var	3.12E-05
Adjusted R-squared	0.184575	S.D. dependent var	3.90E-05
S.E. of regression	3.52E-05	Akaike info criterion	-17.47096
Sum squared resid	5.69E-08	Schwarz criterion	-16.98227
Log likelihood	538.1287	Hannan-Quinn criter.	-17.27981
F-statistic	2.027303	Durbin-Watson stat	1.821367
Prob(F-statistic)	0.039657		

Appendix VI: Descriptive Statistics Result

Date: 01/01/15

Time: 10:49

Sample: 2004 2013

	ROA	NPLTL	LPTA	LPTL	LPNPL
Mean	0.028253	0.039759	0.004434	0.007756	0.180757
Median	0.029606	0.037568	0.002974	0.005710	0.162281
Maximum	0.040283	0.098273	0.033436	0.050679	0.600000
Minimum	0.003413	0.018589	0.000000	0.000000	0.000000
Std. Dev.	0.006928	0.017503	0.005481	0.008575	0.145337
Skewness	-1.055350	1.301932	2.812404	2.385257	0.699595
Kurtosis	4.836022	4.592396	14.27363	11.64800	3.082740
Jarque-Bera	19.56508	23.28959	396.8332	243.8641	4.911449
Probability	0.000056	0.000009	0.000000	0.000000	0.085801
Sum	1.695184	2.385565	0.266016	0.465374	10.84539
Sum Sq. Dev.	0.002832	0.018076	0.001773	0.004338	1.246248
Observations	60	60	60	60	60