ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ACCOUNTING AND FINANCE

DETERMINANTS OF COST OF FINANCIAL INTERMEDIATION: EMPIRICAL STUDY ON COMMERCIAL BANKS IN ETHIOPIA

BY

BELAY GETACHEW

ADDIS ABABA, ETHIOPIA

JUNE, 2015

DETERMINANTS OF COST OF FINANCIAL INTERMEDIATION: EMPIRICAL STUDY ON COMMERCIAL BANKS IN ETHIOPIA

BY

BELAY GETACHEW

A THESIS SUBMITTED TO

THE DEPARTMENT OF ACCOUNTING AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN ACCOUNTING AND FINANCE

ADDIS ABABA UNIVERSITY

ADDIS ABABA, ETHIOPIA

JUNE, 2015

ADDIS ABABA UNIVERSITY

DEPARTMENT OF ACCOUNTING AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

STATEMENT OF DECLARATION

I declare that the thesis entitled: *Determinants of Cost of Financial Intermediation: Empirical Study on Commercial Banks in Ethiopia,* hereby submitted by me in partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance at the Addis Ababa University, is my original work and has not been submitted for any degree in any other university. I have undertaken it independently with the advice of my advisor, Asmare Emerie (PhD). In performing the thesis I have used different sources and material which have been acknowledged.

Name: Belay Getachew Tadesse

Signature: _____

Date: _____

ADDIS ABABA UNIVERSITY

DEPARTMENT OF ACCOUNTING AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

STATEMENT OF CERTIFICATION

This is to certify that Belay Getachew Tadesse has carried out his research work on the topic entitled "*Determinants of Cost of Financial Intermediation: Empirical Study on Commercial Banks in Ethiopia*". The work is original in nature and is suitable for submission for the award of the Degree of Master of Science in Accounting and Finance at the Addis Ababa University.

Advisor:

Name: Asmare Emerie (PhD)

Signature: _____

Date: _____

ADDIS ABABA UNIVERSITY

DEPARTMENT OF ACCOUNTING AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

DECLARATION

This is to certify that the thesis prepared by Belay Getachew, entitled: **Determinants of Cost of Financial Intermediation: Empirical Study on Commercial Banks in Ethiopia** and submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Approved by:

Internal examiner: Abebaw Kassie (PhD) Signature _____Date _____

External examiner: Samiel Kifle (PhD) Signature_____Date _____

Advisor: Asmare Emerie (PhD) Signature_____Date_____

Chair of Department or Graduate Program Coordinator

ABSTRACT

This paper investigates the determinants of cost of financial intermediation (CFI) of Ethiopian commercial banking sector during the period from 2000 to 2013. The study was based on the hypothesis that cost of financial intermediation in Ethiopian banks" is determined by bank, industry and macro-economic related factors. Several theories and empirical outcomes were propounded to explain the determinants of cost of financial intermediation proxied by net interest margin. The variables were chosen based on findings from both empirical and theoretical literature. A quantitative research approach and explanatory design were adopted in carrying out this research. Secondary data were collected from selected eight commercial banks out of nineteen banks using purposive sampling technique. Based mainly on the Seminal Ho and Saunders, 1981 dealership model and extensions thereto, the study employed panel data estimation techniques to analyze the influence of bank, industry and macroeconomic factors on CFI. The fixed effect regression technique was used to estimate the model using the econometric package EViews 8. The results obtained indicated that bank intermediation margin are high in Ethiopia and it is generally driven by banks, industry and macro-economic factors. And specifically the estimation results show that operating costs, capital of banks, market concentration, market share, economic growth and inflation have a positive and significant effect on CFI. Credit risk, asset size, liquidity risk, and opportunity cost of reserve have a negative and significant effect on CFI. Profitability is not significant in determining CFI. The study recommends banks to improve operational efficiency, NBE to instill competition with in banks and policy makers to promote favourable economic situation. Further studies were recommended in the areas by considering additional variables and considering newly emerging banks.

Keywords: Ethiopian Banking Sector, Net Interest Margin (NIM), Cost of Financial Intermediation (CFI).

ACKNOWLEDGEMENT

I would like to thank all the people who have lent me their continuous support, encouragements and guidance throughout the period of doing this thesis. First, I am grateful to my advisor, Dr Asmare Emire for his support, supervision and valuable guidance in writing my thesis. Secondly, am grateful to my family for their continuous support, encouragement and committing their resources towards my education this far. Their sacrifices and opportunities accorded to me have enabled me come this far.

Finally, I salute the entire Addis Ababa University for giving me the conducive environment to thrive academically and for providing me with the resources I need to see me through my graduate degree. My acknowledgements also go to my friend Chernet Ayalew for his moral and spiritual supports throughout my career.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF TABLES:

LIST OF FIGURES:

ACRONYMS

CAR:	Capital Adequacy Ratio
CFI:	Cost of Financial Intermediation
FEM:	Fixed Effect Model
GDP:	Gross Domestic Product
HHI:	Herfindahl-Hirschman Index
INF:	Inflation
IRS:	Interest Rate Spread
JB:	Jarque-Bera
LIQR:	Liquidity Ratio
LLP:	Loan Loss Provision
MoFED:	Ministry of Finance and Economic Development
MSD:	Market Share of Deposit
NBE:	National Bank of Ethiopia
NIM:	Net Interest Margin
NPL:	Non Performing Loans
OCR:	Opportunity Cost of Reserve
OE:	Operating Expense
OLS:	Ordinary Least Square
REM:	Random Effect Model
ROA:	Return on Assets

CHAPTER ONE
INTRODUCTION

1.1. Introduction

This chapter lays the foundation as the precedent chapter and it outlines, defines and addresses the basic concepts of the research. It gives a brief overview of the study and introduces the thrust for the research by identifying its main areas and the likely subjects and the beneficiaries of the study. The chapter also outlines the problem statement, states the objectives of the study and the hypothesis statement. The chapter also provides the significance of the study, limitations of the study as well as definition of terms. In short, it is the foundation upon which the rest of the research is going to lay on and acts as the compass, which guides the researcher in carrying out the research. The chapter concludes by summarizing the chapter and introducing the next chapter.

1.2. Background of the Study

Commercial banks play a fundamental role in the economy by undertaking intermediation functions (Daniel et al., 2012). Banking business involves receiving funds from the public by accepting demand, time and saving deposits or borrowing from the public or other banks, and using such funds in whole or in part for granting loans, advances and credit facilities and for investing funds by other means (Chirwa, 2001). This process of accepting deposits and lending takes place at a cost in the form of interest to the depositor as well as to the borrower. The interest paid to the depositor and the interest charged on the borrower creates a spread called interest rate margin on the banks because ideally banks pay lower interest to the depositors and charge higher interest to the borrowers.

One of the key variables in financial system is the spread between lending and deposits interest rates. When it is too large, it is generally regarded as a considerable impediment to the expansion and development of financial intermediation, as it discourages potential savers with low returns on deposits and limits financing for potential borrowers, thus reducing feasible investment opportunities and therefore the growth potential of the economy. Banks, in their role as financial intermediaries, face substantial uncertainty which can add to spreads. This uncertainty is due to the indeterminate timing of loan

demand and the supply of deposits. Uncertainty can be exacerbated by macroeconomic instability, owing to the limited contractual redress available to banks in the event of default. Consequently, even in a world of highly competitive banking markets, positive spreads (above and beyond what is needed to generate normal profits) would still exist as long as transaction uncertainty is present.

Theoretically, there are two methods for measuring financial intermediation cost: ante and ex-post (Suzana, 1999). According to the first one, net interest margin is calculated as the difference between the contractual interest rates for deposits and loans. These are the rates that the public can easily see and compare. As for the second method, the variable can be measured as the difference between banks‟ interest income and interest expenses for the period taken into consideration, data that may be extracted from the financial statements (Sibusiso et al., 2011). The difference between these two measures is the amount of loan defaults. Studies of bank interest rate spreads have generally relied on the net interest margin as the measure of cost of financial intermediation. However, the availability of more disaggregated data through the bank‟s income statements has recently allowed researchers to explore other form of spreads. In the same manner, in this study the net interest margins (NIMs) is calculated from the selected banks‟ balance sheet and income statement.

In this research the research uses ex-post measurement because the ex-ante measures of spread are biased to the extent that differences in perceived risks are reflected in the ex-ante yields. Since bearing of risk is an important dimension of banking services, any differences in the risks faced by bankers will tend to distort spread comparisons. An additional problem with using ex-ante spread measures is that data are generally available at the aggregate industry level and are put together from a variety of different sources and thus are not completely consistent.

As per the Pan African bank report Dec 30, 2014, the Ethiopian banking system constitutes the most important element of the Ethiopian financial sector because its assets account for nearly 80 per cent of the financial sector asset. Banks act as the main players in channeling funds from lenders to borrowers, and for this reason it is important that their intermediary role is carried out with the lowest possible costs in order to achieve higher social welfare. After financial sector reform NBE impose control over deposit

rates in order to keep the lending rates low i.e. set the minimum saving and time deposit interest rate and leaving lending rate to commercial banks with the aim of improving efficiency in the intermediation process by reducing the interest rate margin. However, this seems not to have been realized in Ethiopia since 2002 (Kozo et al., 2007). Therefore, interest rate spread in Ethiopia is also not yet set based on demand and supply forces (Sime et al., 2013)

Therefore, generally, the main purpose of this study is to analyze the financial data of the fiscal year from 2000 to 2013 using ex-post measurement technique in order to investigate the determinants of financial intermediation cost in Ethiopian banking sector by categorizing the factors into bank specific factors, industry specific factors, and macroeconomic specific factors.

1.3. Statement of the Problem

A competitive banking system foster greater efficiency which is reflected in lower net interest margins (Rudra & Ghost, 2004). High margins create impediments for the deepening of financial intermediation in the country, as lower deposit rates discourage savings, and high loan rates reduce the investment opportunities of banks (Zuzana & Tigran, 2008). Consequently, banks are expected to carry out intermediation function at the lowest cost possible in order to promote overall economic growth. In developing economies where capital market is underdeveloped and where most firms and individuals rely on commercial banks for financing, banking institutions play a crucial role in economic growth (Martinez & Mody, 2004).

It is, therefore, important that commercial banks provide these services at the lowest possible cost. In addition to the above with regard to interest rate margin level, (Brock & Rojas-Suarez, 2000) among others, argue that high interest margins are in fact unfavorable because they lead to a "disintermediation". They state that low deposit rates represent unattractive returns for maintaining deposit accounts, which discourage savings. Additionally, high lending rates make the cost of funds increasingly prohibitive to potential borrowers and therefore, restrain investments. Nevertheless, they state that very low margins cannot be considered always positive, mainly in liberalized systems with inadequate regulation, where the mechanisms that ensure the intervention in (or even the

closure of) poorly capitalized or unstable banks are absent. Conversely, (Saunders & Schumacher, 2000) argue that while high interest margins are usually associated with inefficiency, they may also contribute in strengthening a country‟s banking system, when profits earned from high spreads are channeled by banks to their capital bases.

The empirical studies suggest that financial intermediation cost determinants are numerous and vary across countries and regions (Hassan, 2012). For instance, some of those studies argue that the main determinants of financial intermediation cost are bank-specific factors, whereas others claim that the industry-specific factors are more important. On the other hand, others believe that the macroeconomic factors are the most important factors that explain the level of intermediation cost particularly in developing countries like Ethiopia. Therefore, there is a continuous debate on the key determinants of cost of financial intermediation in a country.

Prior to financial reforms of the 1994‟s, the Ethiopian financial sector was heavily controlled under the regime of administrative controls; the financial system remained under-developed and repressed. Since 1994, following the financial reforms in Ethiopia, researchers were examining existence of interest rate spread and its causes using aggregate average deposit and lending rates. (Kozo et al., 2007) under the paper title "The case for financial sector liberalization in Ethiopia" analyzed interest rate spread between state-owned and private banks from 1998-2006 using ex-ante measurement and found that the spreads increased from 1998 to 2002 for both state-owned and private banks. The research also found that starting from 2003 interest rate spread of private banks has declined and since 2002 with the new entry of private banks, lending rates have constantly decreased, it did not contribute to the decline in interest rate spread. Similarly by analyzing interest rate spread from 2000 to 2008, (Sime et al., 2013) found that interest rate spread is not yet set based on demand and supply forces over the review period.

Therefore, in generally, the main purpose of this study is to analyze the financial data of Ethiopian commercial banks for the fiscal year from 2000 to 2013 using ex-post measurement methods in order to investigate the determinants of cost of financial intermediation (CFI) proxied by net interest margin (NIMs) and analyze their significance and impact on intermediation margin by categorizing the factors into bank specific, industry specific, and macroeconomic specific factors since previous researchers

identified existence of interest rate spread using ex-ante measurement method instead of its determinates no research has so far identified the factors using ex-post measurement method.

More specifically, the current study seeks for finding answers to questions of the following kinds in relation to factors determining cost of financial intermediation: why some commercial banks are more efficient and successful than the others? Why some commercial banks are able to give lower lending rates or higher deposit rates even though they operate under the same economic environment and subject to the same regulatory environment? To what extent does bank specific factors which can be under control of bank management affect interest rate margin? To what extent does economic and industry variables affect interest rate margins? These shall become the interest of this paper to investigate what are the determinants of cost of financial intermediation of commercial banks in Ethiopia empirically.

1.4. Objectives of the Study

1.4.1. General Objective

The overall objective of this study is to analyze the behavior and the factors that determine cost of financial intermediation (CFI) of commercial banks in Ethiopia using variables that have been studied by previous researcher.

1.4.2. Specific Objectives

The study has three specific objectives as outlined below:-

i. To identify, examine, and analyze the determinants of cost of financial intermediation (CFI) of commercial bank operating in Ethiopia by categorizing the factors into bank specific factors, industry specific factors, and macroeconomic factors.

ii. To examine the trends of cost of financial intermediation (CFI) proxied by net interest margin of commercial banks sector in Ethiopia.

iii. To provide policy options that would help to narrow the interest rate margin in Ethiopian banking sector so as to enhance the efficiency of the banking sector and hence economic growth and development.

1.5. Research Questions

The research questions this research aims for answering are:

1) What are the factors (bank related, industry related, and macro-economic related) that influence interest margin or cost of financial intermediation in Ethiopian banking sector?

2) What can be recommended as a policy for Ethiopia banking sector in order to maintain a narrow interest rate spread/margin that would promote economic growth and development?

1.6. Research Hypothesis

The following eleven research hypothesis about the determinants of cost of financial intermediation proxied by interest rate margin are identified based on theories and past empirical studies related to determinants of cost of financial intermediation.

H1: Operating expenses positively influence net interest margin of commercial banks of Ethiopia.

H2: Loan loss provision/credit risk positively influence net interest margin of commercial banks of Ethiopia.

H3: Capital of the bank positively influence net interest margin of commercial banks of Ethiopia.

H4: Profitability of the bank positively influence net interest margin of commercial banks of Ethiopia.

H5: Bank size/growth of asset negatively influence net interest margin of commercial banks of Ethiopia.

H6: Liquidity risk negatively influence net interest margin of commercial banks of Ethiopia.

H7: Opportunity cost of obligatory reserve positively influence net interest rate margin of commercial banks of Ethiopia.

H8: Market concentration positively influences net interest of commercial banks of Ethiopia.

H9: Market share of deposit positively influence net interest margin of commercial banks of Ethiopia.

H10: Economic growth negatively influence net interest margin of commercial banks of Ethiopia and

H11: Inflation rate positively influence net interest margin of commercial banks of Ethiopia.

1.7. Significance of Study

Since the study is designed to investigate the significance of all types of intermediation margin determinate‟s in Ethiopian commercial banking sector, the following are identified as practical contribution of the study;

- Based on empirical data, the research has identified the factors that influence net interest margin or cost of financial intermediation of banks. As such, it contributes to research through providing additional empirical evidence;

- The results of the research also suggest for bank managers the important bank related, industry related, and macro-economic related factors that they shall consider in relation to management of net interest margin;

- The results of the research also suggest for the regulatory (NBE) the important bank related, industry related, and macro-economic related factors that they shall consider for safety of the public resource and sustainable economic development by reducing intermediation margin; and

- Based on the implication of the research findings, the research also recommended areas for future research.

1.8. Scope and Limitation of the study

1.8.1. Scope of the Study

This research is adjusted to fit its objectives of investigating the determinants of CFI of commercial banks in Ethiopia within the limits of specified time and possibility. The researcher decided to limit this study to the commercial banks found in Ethiopia namely Commercial Bank of Ethiopia, Construction and Business Bank S.C, Awash International Bank S.C, Dashen Bank S.C, Abyssinia Bank S.C, Nib International Bank S.C, United Bank S.C and Wegagen Bank S.C. that were registered by NBE before 1999/00. The researcher has chosen the sample because these banks play a major role in determination of interest rate margin in the entire research period.

To this end, this study covers a panel data of these banks over the period 2000 to 2013. Thus, this study is limited to bank specific, industry specific and macroeconomic determinants of CFI of commercial banks in Ethiopia between the above mentioned periods. Bank-specific and industry-specific data were sourced from annual reports and statement of accounts of the selected banks. However, data on macroeconomic variable (GDP growth and inflation were sourced from annual report bulletins published by the National Bank of Ethiopia (NBE) and Ministry of Finance and Economic Development (MoFED)).

1.8.2. Limitation of the Study

A study of the determinants of cost of finical intermediation in Ethiopia needs wider coverage in terms of countrywide examination of all factors deemed necessary. The study

uses quantitative approach and secondary data. Consequently, the study lacks rich qualitative data that triangulate and further explain the quantitative findings. Furthermore, the sample includes only a few banks only in Ethiopia. It would be difficult, therefore, to generalize unless this kind of study is undertaken in some more developing countries like Ethiopia. Despite the limitations, compressive study was conducted leading to the achievement of the research objectives.

1.9. Definition of Terms

Interest Rates Spread- a proxy for measuring intermediary efficiency computed as the difference between contractual lending and deposit interest rates.

Ex-ante Spreads- spreads that show the difference between the actual interest rate paid on loans and the actual interest rate paid on deposits that is they use the actual data or rates quoted on loan products or savings products when calculated.

Ex-post Spreads– defined as the difference between the interest revenues and interest expense receive from loans and paid to deposits respectively.

Net Interest Margin (NIM)/Narrow Interest Margin (NAIM)- a proxy for measuring intermediary efficiency computed as the ratio of interest income on loan to total loan minus interest expense on deposits to total deposit.

Financial Intermediation– refers to the provision of financial products and services, notably credit and savings. Intermediation involves the "matching" of lenders with savings to borrowers who need money by an agent or third party, such as a bank. If this matching is successful, the lender obtains a positive rate of return, the borrower receives a return for risk taking and entrepreneurship and the banker receives a marginal return for making the successful match.

1.10. Organization of the Study

This study is organized in five chapters. The first chapter is dedicated to the background to the study, statement of the problem, research objectives, significance of the study, scope and limitation of the study and organization of the study. Chapter 2 provides the literature review which has composed of theoretical and empirical research. Chapter 3,

which is about methodology of the research, presents the research design employed, the sampling, data collection methods, and the data analysis method and technique. Chapter 4 presents analysis results and findings of the study. Lastly, Chapter 5 deduces the implications of the findings, concludes the investigation and suggests areas for future research.

CHAPTER TWO
REVIEW of RELATED LITERATURE

2.1. Introduction

This chapter discusses theoretical and empirical literature on cost of financial intermediation and factors that determine interest rate margin/spread. It summarizes the information from other researchers that have carried out their research in the same field of the study and it specifies objective, methodology and findings of other researchers. The chapter also focuses on points of divergence and convergence among various authors. At the end of the chapter, it summarizes theoretical and empirical relationship and the gap to be researched.

2.2. Overview of Bank Interest Margin

The difference between lending and deposit interest rates, known as the interest rate spread (IRS), is an important determinant of the efficacy of the financial system in a country like Ethiopia. The efficiency of bank intermediation can be measured by both ex ante and ex post spreads (Grenade, 2007). Ex ante spreads are calculated from the contractual rates charged on loans and rates paid on deposits. Ex post spreads consist of the difference between banks‟ interest revenues and their actual interest expenses (Grenade, 2007). There are, also, alternative ways of measuring interest rate spread in the literature, such as the difference between interest income received and interest paid by a bank as a ratio of total assets or difference between the ratio of interest received and all interest bearing assets and the ratio of interest paid and all interest earning liabilities.

A high interest rate spread acts as an impediment to the expansion of financial intermediation necessary for growth and development of an economy. It is often argued that the higher the interest rate spread, the higher would be the cost of credit to the borrowers for any given deposit rate. Alternatively, a high interest rate spread could mean unusually low deposit rates discouraging savings and limiting resources available to finance bank credit.

In a country like Ethiopia, a high interest rate spread raises the cost of credit restricting the access of potential borrowers to credit markets thus reducing investments and limiting growth potential of the economy. Moreover, problems become more acute for small businesses, household enterprises and rural industries which are vital to promoting equitable growth and reducing poverty in a country. From the perspective of the banks, interest rate spread shows the additional cost of borrowing that the banks take on to perform intermediation activities between borrowers and fund lenders. The interest rate margin is also a premium for the risk that the banks undertake; it compensates for loan defaults and for risk related to cost of funding. As such, interest rate spread as a measure of bank efficiency and determinant of intermediation cost of the banks has drawn increasing attention of researchers.

The size of the interest margin reflects the efficiency of the banks as it reflects the intermediation costs the banks incur in channeling the fund from the surplus unit to the deficit unit. According to (Bernanke, 1998), interest margin plays a fundamental role because it reflects the efficiency of the credit allocation process. The researcher says the disruption of the 1930s financial crisis of the United States high raises the interest margin between lenders and borrowers, which results the aggregate output to decline. High interest margins are often associated with inefficiency in the banking systems especially in developing countries (Fry, 1995; Barajas et al., 1999 and Randall, 1998) because the costs resulting from inefficiency are often passed to the customer by charging a higher lending rate or by paying a lower deposit rate. Hence, interest margin can be considered an appropriate indicator of banking efficiency.

2.3. Approaches of Interest Margin Determinants

(Bernanke, 1998), has defined the cost of intermediation as the difference between the gross costs paid by a borrower and the net return received by a saver although there is not a unique definition of the interest margin in the empirical literature, the one that predominates is the net interest margin, calculated as the ratio between net interest income and earning assets. This indicator may also be calculated in proportion to total assets and the differences may not be significant if earning assets constitute an important share of total assets.

There are two methods for measuring net interest margin: ante and ex-post (Grenade, 2007). According to the first one, net interest margin is calculated as the difference between the contractual interest rates for deposits and loans. These are the rates that the public can easily see and compare. As for the second method, the variable can be measured as the difference between banks‟ interest income and interest expenses for the period taken into consideration, data that may be extracted from the financial statements. The difference between these two measures is the amount of loan defaults. The post method is more useful as it originates more accurate results. It is often noticed that the data used for the ex-ante analyses may be inconsistent, because they rely on different sources. On the other hand the ex-post method may have its shortcomings, as the interest income and loan loss provisioning tend to materialize in different time periods (Demirgüç-kunt & Huizinga, 1998).

Two approaches may be used for the identification and analysis of the factors that determine the financial intermediation cost or interest margin in the banking system, the first one is the accounting decomposition approach which will be treated in the following section, while the second is related to the theoretical model.

2.3.1. Accounting Decomposition Approach

For analyzing the interest margins some kinds of analyses may be carried out, one of which is the accounting decomposition first developed by (Hanson & Rocha, 1998). The decomposition of the interest margin based on the methodology proposed in (Randall, 1998). The consolidated income statement of the banks defines profit before taxes (P) as interest income (II), plus non-interest income (NII), minus interest expense (IP), minus operating costs (OC), and minus provision for loans (Prov). After rearranging this identity, the net interest revenue can be expressed as:-

$$II - IP = OC + Prov + P - NII$$

Dividing this expression by the interest rate bearing liability (D), and using average interest bearing asset (L) and total asset (A), we obtain the following expression:

$$\frac{II}{L} - \frac{L}{D} - \frac{IP}{D} = \frac{OC}{D} + \frac{Prov}{D} + \frac{P}{A}\frac{A}{D} - \frac{NII}{D}$$

Assuming that banks invest one minus reserve requirement ratio (ρ) part of their interest bearing liability into interest bearing asset, and defining interest margin as the difference between implicit deposit rate (II/L) and implicit deposit rate (IP/D), the above expression can be written as:

$$i_l - i_b = \rho * i_l + \frac{OC}{D} + \frac{Prov}{D} + ROA * \frac{A}{D} - \frac{NII}{D} + \epsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where ROA=P/A denotes bank profitability, and the error term ϵ results from combining flow (income statement) and stock (balance sheet) data, as well as making the simplifying assumption about reserve requirement holding by banks. The above expressions decompose the margin in to the following cost and profit components:

- **Reserve Requirement Cost**: $\delta * i_l$. High reserve requirement impose additional costs on banks, since they have to pay a market interest rate to depositors but have to hold a fraction of these deposit in the central bank either at zero rate (non-remunerated reserves) or at a rate lower than the market rate (remunerated reserves). Banks normally prefer to pass these additional costs on their customers by widening the margin.

- **Operating Costs**: OC/D: This determinant measures the impact of bank efficiency on the margin. More efficient banks are able to maintain lower operational costs relative to their less efficient counterparts. Therefore, they can operate at lower margins and still secure the same level of profitability as their less efficient peers.

- **Loan Loss Provision Costs/Credit Risk**: Prov/D. This determinants proxies the impact of credit risk on the margin. Banks with riskier lending profitable are required to transfer a larger amount of funds to maintain adequate loan loss provision reserves, which weighs on the margin.

- **Profitability**: ROA*A/D. This factor defines part of margin that banks add up to their costs to maintain an adequate level of profitability. In banking industries featuring low degree of computation, banks have the power to demand profitability rate that exceed the normal level by widening the margin.

- **Non-Interest Income**: NII/D (with negative sign). Banks earning funds from non-traditional banking activities (such as, fee-based activities, licensing, insurance, etc.) may maintain an adequate level of profitability while operating at lower margins. This explains why this factor enters the above decomposition with a negative sign.

2.3.2. Theoretical Approach

Another approach of net interest margin determinants is the theoretical one. It is developed first by (Ho & Saunders, 1981) and is called the dealer model-the most influential theoretical model of interest margins. The way it works can be briefly explained as follows: the banks are considered as risk-averse agents that accept deposits and make loans, which arrive randomly and the probability of arrival depends on the margins that banks fix and on the elasticity of loan demand/deposit supply. The random nature of loan demand and deposit supply exposes the bank to interest rate risk. Let‟s suppose that a new deposit reaches the bank and owing to the lack of the simultaneously demand for loan, this latter shall be invested in the money market. In such a case, the bank encounters the re-investment risk at the end of the maturity period when it should re-invest this amount. On the other side, if a new loan demand is financed in the money market, the bank will encounter the re-financing risk as at the end of the maturity period, it has to provide funds once again. In this case, in addition to interest rate risk, the bank will encounter the credit risk too. Hence, a risk-averse financial intermediary shall request as recompense a higher margin.

(Ho & Saunders, 1981), argue that the mark up the banks put over the market interest rates for deposits and loans, theoretically depends on four factors: (i) risk aversion; (ii) banking market structure; (iii) the average size of bank transactions and (iv) interest rate volatility. According to these authors, the margins will continue to be positive, even if banks operate in markets of high competitive structure. This means that the interest rate

margins will exist, because of the uncertainty that accompanies the transactions. The margin caused by the uncertainty is called "pure" margin.

The above model goes through two stages. In the first stage, it realizes the estimation of the "pure" margin, pointing out the effects of explanatory variables which are not explicitly introduced in the theoretical model. After that, the relationship between the "pure" margin and the variables presented in the theoretical model is analyzed. According to (Ho & Saunders, 1981), the banks are considered as intermediaries that accept deposits and make loans in a passive way. This means that the prices of loans and deposits (P_L and P_D) are set by the bank while their quantity is defined exogenously. So,

$$P_L = p - b \; and \; P_D = p + a,$$

Where p- is the bank"s opinion of the "true" price of the deposit or loan, while a and b-are fees for the provision of service immediacy. P_L and P_D -are prices, so they are inversely related to the interest rates of deposits and loans. Thus, we can write the above equations as $r_D = r - a \; and \; r_L = r + b$, where r_D and r_L are the deposit and loan interest rates that the bank sets, while r is the market interest rate. Thereby, interest margin (s) may be measure as: $s = r_L - r_D = a + b$

From (Ho & Saunders, 1981)- dealer model, after some transformations of this question, will result that,

$$s = r_I - r_D = \frac{\alpha}{\beta} + \frac{1}{2} * R\delta_L^2 Q$$

Where, α/β shows the risk neutral spread, or α and β itself express respectively the intercept and the slope of symmetric function of the deposits and credits. Thus, this ratio measures somewhat the level of bank"s market power. The other part of the formula encompasses the elements of a risk premium. R stands for the coefficient of risk aversion, δ_L^2 for the interest rates variance and Q for the size of bank"s transactions.

- **Market Power:** The competitive structure of the banking industry is determined by the extent to which (the likelihood of) loan demand and deposit supply are inelastic with respect to the intermediation fees charged, represented by the factor

β. With an increasing ratio of α/β,elasticity decreases and banks gain market power that translates into higher fees:

- **Risk Component:** The risk component consists of the product of the bank‟s risk aversion and the banks‟ overall risk exposure from the balance sheet side perspective the transaction is related to. Given positive risk exposure, banks facing higher levels of absolute risk aversion (charge higher fees). Fees increase with the total risk exposure of the balance sheet side the initiated transaction belongs to, and decrease with the hedging ability of the opposite balance sheet side. For a given risk exposure, the change in risk exposure due to the new transactions is more pronounced when the volume gap of financing loans by accepting deposits is large.

2.4. Theories of Interest Rates Determination

In addition to the most influential theoretical model of interest margins by (Ho & Saunders, 1981) as discussed in the above section so many theories have been propounded to explain determination of interest rates and interest rate spreads and the following are some of the theories that the researcher has identified as relevant to the area of research under his consideration.

2.4.1. The Classical Theory of Interest Rates

Interest, in real terms, is the reward for the productive use of capital, which is equal to the marginal productivity of physical capital. In a money economy, however, as physical capital is purchased with monetary funds, the rate of interest is taken to be the annual rate of return over money capital invested in physical capital assets.

According to Keynes, true classical theory of interest rate is the savings investment theory. Basically, the theory holds the proposition based on the general equilibrium theory that the rate of interest is determined by the intersection of the demand for and supply of capital. (Caplan, 2000) argued that an equilibrium rate of interest is determined at a point at which the demand for capital equals its supply.

Demand for capital stems from investment decisions of the entrepreneur class. Investment demand schedule, thus, reflects the demand for capital, while the supply of capital results from savings in the community. Savings schedule, thus, represents the supply of capital. It follows that savings and investment are the two real factors determining the rate of interest (Friedman & Kuttner, 1991).

The implication of the theory, different banks have different liquidate, if what stated in the theory is true high liquid bank should charge low interest rate on funds lend in order to attract more borrowers and interest rate on savings should be low in order to discourage savings or if it charges the same rate as other banks on money borrowed then interest rate on saving should remain very low. If that is true interest rate spread on highly liquid banks should be comparatively more than low liquid banks. Financial performance on comparatively high liquid bank should be better than low liquid bank (Rochon & Vernengo, 2001).

2.4.2. The Loanable Funds Theory of Interest Rates

This theory, assumes that interest rates are determined by supply of loanable funds and demand for credit. The loanable funds theory is an attempt to improve upon the classical theory of interest. Rates of return are measured with regard to real purchasing power and the theory of loanable funds propounds the determination of real interest rates based on the above condition. The theory is derived from the fact that the savers have to consider between current or future consumption prior to saving, therefore implying that the funds available from savings are determined by the need for future or present consumption. The more savers intend to have current consumption the less the funds available for investment and this affects or reduces the future. Thus, there is an existence of a tradeoff between present consumption and future consumption. Based on the assumption that people always prefer current consumption there exists an apparent need to pay an attractive incentive to persuade them to forgo this present consumption and prefer a much deferred consumption date. Therefore, the real interest rate is the rate needed to persuade people to forgo present consumption and it is sometimes referred to as the reward for waiting. This implies that the savings level will be positively related to the rate of interest paid on the savings.

However, according to the theory real investment is a negative function of the interest rate since the interest rate reflects the productivity of investment projects (McConnel & Bruce, 1995). The lower the rate of interest the more investment projects become profitable and the more willing investors will be to borrow in order to invest. Thus, the real interest rate is determined by the willingness to forgo present consumption - sometimes referred to as thrift and the demand for investment. This all assumes that present income and the rates of return on investment projects are known, allowing people to make a rational choice between goods now and goods in the future.

The major drawback of the above mentioned approach is that the available interest rates that are quoted every day are expressed in nominal terms and not in real terms. These rates only provide information on the money return on savings and investment whilst the effects of inflation are not adjusted in the nominal rates therefore giving rise to the need to provide more comprehensive information based on the real interest rate, which is adjusted for inflation. This is based on the argument that a saver wanting a real rate of return will take into account the rate of inflation over the period of the loan he is making (Kroeger, 2000). Actually, the nominal rate of interest should equal the real rate of interest plus the expected rate of inflation. Due to the fact that savers don‟t know the rate of inflation that will prevail in the future real interest rates are always different from what savers want.

2.4.3. Keynesian Liquidity Preference Theory of Interest Rates

As the Loanable funds theory tries to marry the rates of return to future inflation adjusted income so as to strike the balance in having to make informed decisions on whether to prefer present or future consumption, potential investors must have considerable knowledge of the expected productivity of the future periods. This, however, in the practical world, is difficult to determine with certainty and also the provision of only nominal rates makes it also difficult for the laymen saver or investor to predict real rates of return in the future implying that the loanable funds theory exists in equilibrium which is rarely achieved in the practical world.

The liquidity preference theory considers the fact that in as much as interest rates have an impact on savings levels the likely amount of savings is likely to be derived from the

prevailing change in income levels. This shows that most people make saving plans based on the expected level of income adjusted to the prevailing expected rate of inflation (as in the loanable funds model) but these plans are often not fulfilled because their expectations, especially about the level of income, are frequently wrong according to (Friedman, 1957). Under these circumstances, the most pressing question does not concern current and future consumption but is about the way in which to hold the existing level of wealth. In an uncertain world, people seek a degree of liquidity and it is this demand for liquidity that is a major element in the determination of interest rates. This gives us the model with the rate of interest being determined by the demand for money (liquidity preference) and the supply of money.

It is theoretically possible to bring the two theories together by suggesting that liquidity preference is a short-run or disequilibrium theory while loanable funds provides a long-run theory. In other words, loanable funds theory operates in equilibrium when people's expectations are correct. Under these circumstances, we are back in a world of certainty and people are able to make plans about the future and can assume that these plans will be fulfilled. However, bringing the theories together in this way is artificial since the proponents of liquidity preference theory do not believe that the world is ever in long-run equilibrium. In their view, people make decisions in a constantly changing series of short-run situations in which they are always uncertain about the future and cannot depend on their plans being fulfilled.

Equally, the supporters of loanable funds theory argue that the short-run in Keynesian economics is unimportant. The basis of economics, they argue, is the allocation of scarce resources-a real decision. Concentrating on the short run, they would say, is simply confusing real decisions with temporary factors. In the short-run people might act irrationally. They might suffer from money illusion (confusing monetary values with real values) but this does not mean that economic decisions should be based on the short run (Modigoliani, 1986). To do so is likely to lead to an inefficient use of resources in the economy.

This is a very old battle. Keynes, who first stated the liquidity preference theory of interest rates in a fully developed way, argued that 'in the long run we are all dead'. What he meant was that economic analysis and economic policy should be based on the world

as it is rather than on some theoretical model of a world in equilibrium that does not exist. People live in the short run. Thus, to attempt to combine the two interest rate theories is to misunderstand the reason for the distinction between them. In practice, one can of course adopt some sort of half-way position suggesting that people try to take account of the trade-off between present and future consumption and the productivity of investment but that interest rates vary quite a lot from the rates that would equate the rate of time preference with the marginal productivity of investment because of the factors that enter into the liquidity preference model.

2.4.4. The Rational Expectations Theory of Interest Rates

This is based on the idea that people formulate expectations based on all the information that is available in the market. Rational expectation theory holds that the best estimation for future interest rates is the current spot rate and that changes in interest rates are primarily due to unexpected information or changes in economic factors. The rational expectations theory can be incorporated with the loanable funds theory in order to better consider the available information within the economy. The limiting factors of rational expectation theory are mostly related to the difficulty in gathering information and understanding how the public uses its information to form its expectations (Caplan, 2000) argued. If expectation of the people is that interest will rise many people will avoid borrowing this in return will affect bank performance due to reduced earning on interest rate, but people expect interest rate to drop people would be willing to borrow and this will improve banks performance due to increase in interest rate earning (Bekaert, 1998).

2.5. Borrowing and Lending Rate Relationship

The lending and borrowing rates are the main determinants of the interest rate spread of the banking system which primarily but not wholly represents the profit of the bank in carrying out its traditional roles of accepting deposits and provision of credit. This is clearly articulated by (Robinson, 2002) who defines the banking spread as a reflector or indicator of the costs that banks incur in intermediation, inclusive of their normal profits.

Interest rate spread is often affected or defined by market micro structure characteristics of the banking sector and the policy environment (Ngugi, 2000). Risk-averse banks operate with a smaller spread than risk-neutral banks since risk aversion raises the bank‟s

optimal interest rate and reduces the amount of credit supplied. Actual spread, which incorporates the pure spread, is in addition influenced by macroeconomic variables including monetary and fiscal policy activities (Emmanuelle, 2003).

The understanding that spreads incorporate cost and a profit element has implications for the growth and or development of national and international economies, as numerous authors suggest that there is a link between the efficiency of bank intermediation efficiency of bank intermediation is revealed by the spread. High spreads show inefficiency whilst low spreads show efficiency and economic growth. The nature and efficiency of the financial sectors have been found to be the major reasons behind differences in spread in countries across the world. In economies with weak financial sectors, the intermediation costs which are involved in deposit mobilization and channeling them into productive uses, are much larger (Jayaraman & Sharma, 2003).

(Quadan, 2004), for example, argues that a more efficient banking system benefits the real economy by allowing "higher expected returns for savers with a financial surplus, and lower borrowing costs for investing in new projects that need external finance." This results in a sound financial system that will be friendly to both savers and borrowers. The reverse is also true in that if the banking sector‟s interest rate spread is large, according to (Ndung‟u & Ngugi, 2000) it discourages potential savers due to low returns on deposits and thus limits financing for potential borrowers. The existence of savings from surplus units creates the base of lending as one of the bank‟s functions is pooling of resources and surplus funds and the creation of credit to deficit units in the economy.

(Valverde M. , 2004), elucidate by noting that because of the costs of intermediating between savers and borrowers, only a fraction of the savings mobilized by banks can be finally channeled into investments as some of the savings will be absorbed by costs. An increase in the inefficiency of banks increases these intermediation costs, and thereby increases the fraction of savings that is „lost‟ in the process of intermediation. Inefficient intermediation will ultimately result in the reduction of funds available for lending and investment and therefore will impact negatively on economic growth. These implications of banking sector inefficiency have spurred numerous debates in developing countries about the causes of wide interest rate spreads, with some suggesting that the spreads are imposed by the macroeconomic, regulatory and institutional environment in which banks

operate. With the above understanding it is imperative to analyze the factors or the possible causes of wide interest rate spreads. Different authors have brought forward or identified significant causes of interest rate disparity that result in wide or increasing spreads. It has been presented in the next section**.**

2.6. Net Interest Margin Determinants

In general, empirical studies that examine the determination of bank interest rate spreads use variables that basically fall three categories: (i) individual bank-specific factors such as in operating or administrative costs, non-performing loans, return on assets, structure of the balance sheet, non-interest income or non-core revenues, bank size, bank liquidity, among others; (ii) factors specific to the banking sector/industry such as the degree of competition or market concentration, regulatory requirements such as statutory reserve requirements or regulated minimum deposit rates and, (iii) macroeconomic indicators which include real gross domestic product (GDP) growth rate and inflation.

The empirical research is organized in two sections in the first section the researcher compiles the empirical researches by variables which determine financial intermediation cost by taking empirical research both from developed and developing countries and followed by the researchers‟ argument. Under the second section the research summarize empirical outputs conducted in middle African country‟s that have similar economic and financial environment with Ethiopia.

2.6.1. Bank-Specific Determinants of Interest Rate Margin

2.6.1.1. Operating Expense and Interest Rate Margin

Theory indicates that variation in operating expense is reflected in variation in bank interest margins, as banks pass on their operating costs to their depositors and lenders. Several studies show that there is a positive relationship between operating expenses and net interest margin of commercial banks (Claessens et al., 2001; Abreu & Mendes, 2003; Carbo & Rodriguez, 2007 and Maria & Agoraki 2010). This is because banks bearing higher average operating expenses may resort to charge higher margins to offset higher operating costs (Maudos & Guevara, 2004 and Peria & Mody, 2004).

On the other hand, higher operational efficiency may induce banks to pass the lower costs onto their customers in the form of lower loan rates and/or higher deposit rates, thereby lowering interest margin (Claeys & Vennet, 2007). (Abreu & Mendes, 2003) supported a positive relationship between operating expense and interest margins on their cross-country study of Portugal, Spain, France, and Germany. Such a positive relation between operating expense and net interest margin has been supported by (Valverde & Fernandez, 2007) in a study of seven EU countries, and (Maria & Agoraki, 2010) of South Eastern Europe countries. (Samy, 2003) found a positive relationship between overhead cost and net interest margin of Tunisia banks. (Ahmet & Hakan, 2010) indicated a positive relationship between operating expense and interest margins on Turkey banks. Using bank level and country level data in Latin America, (Gelos, 2006) find that net interest margin is as a result of less efficient banks. The researcher argue that operating costs and interest margins is positively related because banks that incur high costs will work with higher margins to enable them cover the high costs.

2.6.1.2. Credit Risk and Interest Rate Margin

Credit risk is the risk to earnings and capital arising from an obligor‟s failure to meet the terms of any contract with the bank or if an obligor otherwise fails to perform as agreed (NBE, 2002). Credit risk is peroxide as loan loss provisions over total assets. (Brock & Rojas-Suarez, 2000) explained that an increase in this ratio may affect interest margins in a two-fold manner: firstly, it may increase the spread in order to cover expected losses, but secondly, if the bank is weak it may decrease the spread in order to obtain funds to cover for these expected losses. Lack of proper credit control to invest in risky assets to maintain larger market shares often lead to increased risks. This may reduce the quality of assets which in turn may result in a higher proportion of non-performing loans and provision for doubtful debts. Banks tend to offsets the cost of monitoring the bad loans or the forgone interest revenue by charging higher lending rates (Barajas et al., 1999) and hence are more likely to widen the spread between lending and deposit rates.

(Angbazo, 1997) indicated that default risk is positively associated with bank interest margin in US banks. (Demirguc-Kunt & Huizinga, 1999) find credit risk measured based on loan to total asset ratio to have positive effect on interest margins on 80 developed and

developing countries. (Abreu & Mendes, 2003) found out a positive relationship between loan to total asset ratio and interest margins on their cross-country study of Portugal, Spain, France, and Germany. (Valverde & Fer-nandez, 2007) showed that credit risk is positively related with net interest margins of seven EU countries extant literature indicates that banks that make risky loans may be obliged to hold a higher amount of provisions. In turn, this may force them to charge higher margins in order to compensate for the higher risk of default, leading naturally to a positive relationship (see also Drakos, 2002; Maudos & Guevara, 2004). (Randall, 1998) also finds support for the positive and significant association between spreads and provision for doubtful debts in the Caribbean countries. (Brock & Rojas-Suarez, 2000 and Barajas et al., 1999) further confirm that the cost of poor-quality assets is shifted to bank customers through higher spreads in the Colombian financial system. However, (Brock & Rojas-Suarez, 2000) find a significant negative relationship in the cases of Argentina and Peru and attribute this to poor provisioning for loan losses and deficiencies in supervisory practices. Empirical evidences show that credit risk affects net interest rate margins positively and so the researcher argue that coefficients of credit risk are expected to be positive because a high proportion of bad loans may cause banks to increase their interest margins with risk premium to compensate for possible default risk.

2.6.1.3. Capital and Interest Rate Margin

Banks often hold more capital above the regulatory minimum capital requirement for additional credit risk exposure, and the costs of such high capital ratio may be covered by widening the spread between lending and deposit rates. The capital that the banks hold to cushion themselves against expected and unexpected risks may lead to high margins (Saunders & Schumacher, 2000). Capital adequacy ratio is a proxy of bank solvency; it represents a premium on bank margins (Valverde & Fer-nandez, 2007). A positive relationship with NIM is expected as net interest rate margins should increase the capital base as the exposure to risk increases (Ho & Saunders, 1981). However, high capital adequacy may reflect greater banking stability and contribute to lower interest rate margins (Horvath, 2009 and Hawtrey & Liang, 2008).

(Saunders & Schumacher, 2000) provide evidence in developed countries of the positive and significant relationship between spread and capital ratio. For developing countries, where there are often inadequate rules and regulations governing the functioning of the

financial system, (Brock & Rojas-Suarez, 2000) argue that capital to asset ratios mean very little due to inadequate accounting standards and inappropriate classification of the business of the loans. However, for Malaysia, study by (Doliente, 2003) shows risk positive relationship between capital and interest margin**.**

2.6.1.4. Bank Size and Interest Rate Margin

Bank size is measured as the log of total bank‟s assets. Theoretically one would expect bigger banks to be associated with lower interest rate spreads, arguably because of large economies of scale and ability to invest in technology that would enhance efficiency. However, to the extent that bank size connotes control of the market in the deposit and loan markets, a positive relationship between interest rate spreads and bank size should not be surprising. The log of bank size is included in most study to account for cost differences related to bank size, and for the greater ability of large banks to diversify. The cost differences would expect to have positive relationship with net interest margin and therefore profitability if there are significant economies of scale. However, the ability of diversification would have a negative coefficient when diversification leads to lower risk and thereby lower the required return.

The size of the bank is peroxide by the logarithm of assets of each bank. Authors suggest a positive relationship between the size of a bank and NIMs; however, the literature presents contrasting results. (Fungacova & Poghosyan, 2009) argue that due to increased economies to scale, banks that provide more credit should benefit from their size and have lower margins. However, the larger the average size of the operations, the larger the risks concentrated in single customers and the higher the NIMs (Liebeg & Schwaiger, 2006 and Maudos & Guevara, 2004). (Genay, 1999) also considered bank size in their profitability model to take into account the possibility of greater loan and product diversification and accessibility of larger banks to capital markets, which are not available for small banks.

2.6.1.5. Liquidity and Interest Rate Margin

Liquidity is measured by the ratio of liquid assets to total assets. More liquid banks are expected to have higher margins in order to compensate for the opportunity costs of holding extra liquidity. Liquidity risk is computed as the ratio of bank‟s liquid assets to

total assets. The degree to which banks are exposed to liquidity risk varies across banks. A bank with higher liquidity faces lower liquidity risk hence is likely to be associated with lower spreads due to a lower liquidity premium charged on loans. Banks with high risk tend to borrow emergency funds at high costs and thus charge liquidity premium leading to higher spreads (Ahokpossi, 2013). Bank liquidity is expected to be negatively related to interest spread. An increase in liquidity reduces the bank liquidity risk, which reduces the interest spread due to a lower liquidity.

2.6.1.6. Profitability and Interest Rate Margin

Return on average assets: Computed as net income divided by average total assets. This is generally considered as a good indicator to evaluate the profitability of the assets of a firm in comparison to other firms in the same industry. A positive relationship with interest rate spreads is hypothesized. Net interest income as a ratio of total income-banks that traditionally rely on interest income from loans and advances relative to non-interest income assets are likely to be associated with higher spreads since they may not be willing to forego interest income traditionally generated from higher spreads.

2.6.2. Market-Specific Determinants of Interest Rate Margin

2.6.2.1. Opportunity Cost of Reserves and Interest Rate Margin

Commercial banks are required to maintain a certain percentage of total deposits and other similar liabilities to which reserve ratios are made applicable. Reserve requirements are used as monetary policy instruments to ensure the safety and soundness of the banking system, these non-interest bearing reserves in essence impose an implicit financial tax on banks thereby reducing commercial banks revenues. Banks can either pass on this loss of revenue to depositors, who will receive lower interest rates on deposits, or they can pass it on to borrowers who will face higher interest rates on loans, thereby increasing the spread between the two rates. (Chirwa & Mlachila, 2004) explained by noting that, “the opportunity cost of holding reserves at the central bank, where they earn no or little interest, increases the economic cost of funds above the recorded interest expenses that banks tend to shift to customers.” They further argue that the large pool of resources created by high reserve requirements allow for the financing of high fiscal deficits, and thereby creates an environment of high inflation and persistently

high intermediation margins. The variable to be used is the ratio of required reserves to deposits, and is calculated as the banking sector‟s required reserves divided by its total deposits.

The opportunity cost of reserves is proxied by the level of cash in a bank in terms of its total assets. According to (Maudos & Solis, 2009) this measure represents an opportunity cost to the banks of not maintaining high-yielding assets, transferring this cost to consumers as high levels of NIM (Ho & Saunders, 1981; Angbazo, 1997; Saunders & Schumacher, 2000 and Maudos & Guevara, 2004).

2.6.2.2. Market Concentration and Interest Rate Margins

Market concentration could measures the degree of competition each bank faces in the market. Theoretically, competitive pressures lead to competitive pricing, thus leading to higher efficiency of intermediation process and lower spreads. On the other hand, higher market concentration implies more market power and less competition and hence is likely to be associated with higher interest rate spreads. There are contrasting views concerning the relationship between bank concentration and net interest margin. On the one hand, concentrated banks may enhance market power and so increase the interest margins (Porter, 1979). Following this view, banks in highly concentrated markets charge higher interest rates on loans, and pay lower rates on deposits (Naceur, 2003) thereby widening interest rate margins. On the other hand, it is easier to monitor a few banks in a concentrated banking system than it is to monitor banks in a diffused banking system and so the interest margins in such markets may not be large (De Haan & Poghosyan, 2012).

The Herfindahl-Hirschman index (HH index) is viewed in the literature as a measure of concentration the extent to which a few banks dominate market shares in respect of total assets, loans, or deposits. The HH index is a standard measure of consolidation in any industry and it is defined as the sum of the squared deposit, asset, or loan shares of all the banks in the market. By construction, the HH index has an upper value of 10,000 in the case of a monopolistic firm with a 100 percent share of the market; the index tends to zero in the case of a large number of firms with very small market shares.

Consistent with this perspective, (Demirgüç-kunt & Huizinga, 1998) found that high concentration of banks positively affects interest margins on 80 developed and developing countries. Following the traditional structure-conduct hypotheses, banks in concentrated markets characterized by non-competitive behavior, tend to collude in setting their interest margins and so increase the margin. Similarly, banks with large market share are able to exercise market power in pricing and consequently earn higher margins. Some studies find narrower interest rate spreads in concentrated banking industry (Samy, 2003) while others by (Valverde & Fer-nandez, 2007) and (Maria & Agoraki, 2010) found insignificant effect of market concentration on interest rate margins. Based on the literature, we argue that highly concentrated market in which few large banks controls the market collude in setting the margins and a result, widens the interest margins.

2.6.2.3. Bank Market Share and Interest Rate Margin

According to the relative-market power hypothesis, firms with large market shares are able to exercise market power in setting prices to earn higher net interest margin. Conversely, the efficient-structure hypothesis asserts that a bank that enjoys a superior degree of efficiency can deliver well-differentiated products, and operate at a lower cost. That is, it can follow one of two alternatives. First, it can maximize its profits by preserving the current level of prices and firm size. Second, it can maximize its profits by expanding its size through reducing prices. If the second alternative is adopted, the most efficient firms will gain more market share. In both case, it is expected that market share positively affects the net interest margin. Market share is measured as the total deposits of bank as a percentage of all banks‟ total deposits. This ratio may be calculated using total assets or loan. However, since both deposits and loans can be considered as bank output, there is a need to make a choice between a deposit or asset measure of market share. In view of the fact that the asset components may include investment in securities and subsidiaries, which certainly would not be homogenous across firms, the deposit measure of market share is considered a more suitable measure of market share for commercial banks.

Market size has an impact on banking sector IRS, as studies on small island developing states suggest that diseconomies of scale may increase per unit costs in commercial

banks, thus keeping it is expected to be spreads high according to (Tennant & Folawewo, 2007) negatively correlated with IRS, as banking sectors in countries with larger markets are more likely to benefit from economies of scale, thereby enabling them to keep their costs and spreads down. Ideally, the measure of economies of scale should reflect the market size of individual banks and not the entire economy.

2.6.3. Macroeconomic-Specific Determinants of Interest Rate Margin

2.6.3.1. Inflation and Interest Rate Margin

Researchers have paid little attention on the impact of inflation on net interest margin (Rasiah, 2010). This notwithstanding, theory predicts a relationship between inflation and bank interest rate margins. For example, (Perry, 1992) argues that the effects of inflation on bank interest depend on whether inflation is anticipated or unanticipated. If inflation is anticipated, then the banks adjust interest rate accordingly, thereby increasing the interest rate margins. On the other hand, if inflation is not anticipated, then banks may be slow in adjusting their interest rates and so may affect the interest margin negatively because of increased costs occasion by inflation. Whichever case, inflation affects net interest margin.

(Demirgüç-Kunt & Huizinga, 1999) found a positive relationship between inflation and net interest margin in a study of 80 developed and developing countries. These results are consistent with other studies such as (Claessens et al., 2001) in a study of 80 countries; and (Drakos, 2002) in a study of Greek banks. However, (Abreu & Mendes, 2002) found negative relationship between inflation and interest margins on a cross-country study of Portugal, Spain, France, and Germany. (Maria & Agoraki, 2010) also found a negative relationship between inflation and net interest margin on South Eastern Europe countries. (Martinez & Mody, 2004) showed that inflation has a negative impact in Latin-American banks‟ margins. (Samy, 2003) indicated a negative relation between inflation and interest margin of Tunisia banks. Although there is no empirical consensus on the effects of inflation on interest rate margins, we argue that high inflation rates are generally associated with high interest rates and, therefore, higher interest margins. Even if inflation is not anticipated by banks, in the short term interest rates may not reflect the increased inflation, but in the medium and long term, banks will adjust their interest rates to compensate for the inflation premium and in so doing increase the interest rate margins.

2.6.3.2. Economic Growth and Interest Rate Margins

This factor captures the market conditions that certainly have an impact on interest rate spread. During periods of good economic condition, loan demand tends to be higher, allowing banks to provide more loans. Further, the improved economic condition may positively affect bank margin that is because fewer loan defaults normally occur during these periods. Economic growth is an important variable in the determination of interest margin because it affects demand and supply of bank services such as deposits and loans.

There is no consensus on how economic growth affects interest margins. Some studies argue that economic growth has a positive effect on interest margins (Claessens et al., 2001), others do not find any effect in cross country studies of European countries (Abreu & Mendes, 2003 and Maria & Agoraki, 2010), while a majority find a negative effect (Demirgüç-Kunt & Huizinga, 1999; Demirgüç-Kunt et al., 2004 and Carbo & Rodriguez, 2007).

2.7. Empirical Studies on NIM/ IRS in African country's

Under this section the research compiles empirical studies on the determinants of interest rate spreads in Middle African country having similar economic and financial environment with Ethiopia like Kenya, Ugandan, Nigeria, and Ghana in the next section the researcher address evolution of interest rate spread and empirical researches in connection with Ethiopian Banking sector.

(Crowley, 2007) conducted a study of bank spreads in developing African states using a large set of countries in Africa. The study made use of a pool of 18 English speaking African nations and the sample period was 1974 to 2004. The study made use of a pooled estimation technique to run a regression on a large set of micro and macro-economic variables. The results of the study showed that higher spreads were attributable to factors such as high inflation rates, the concentration of publicly owned banks and finally the greater number of banks. Also other factors such as poor corporate governance, poor regulatory structures and higher financial taxes through increased reserve required ratios were identified as other drivers of spreads. The need to strengthen the regulatory

framework was sighted as the best measure to drive the interest rates to lower levels that is necessary to foster economic growth.

Using dynamic panel data model, (Tennant & Folawewo, 2007) study determinants of interest rate spread in 33 SSA countries the focusing on macroeconomic variables. Their results show that interest rate spread is influenced by the extent of the crowding out effect of government borrowing, public sector deficits, discount rate, inflation, level of money supply, reserve requirement level of economic development and population size. A more recent study on determinants of bank interest margins in SSA by (Ahokpossi, 2013) using a sample of 456 banks in 41 SSA is countries. The results show that whereas bank-specific factors such as credit risk, liquidity risk and bank equity are important, interest margins are not sensitive to economic growth.

In Kenya, studies exist that examine the determinants of rate spreads. (Beck et al., 2010) examine developments interest in Kenya‟s financial sector with a specific focus on stability, efficiency and outreach, and use interest rate spreads as a proxy for the efficiency of financial intermediation. They base their analysis on ex post constructed spreads and decompose the spreads into different components based on a set of factors such overhead costs, loan loss provisions and taxes. Among the most cited studies on factors explaining the interest rate spread in Kenya is (Ndung‟u & Ngugi, 2000 and Ngugi, 2001). (Ndung‟u & Ngugi, 2000) derived factors likely to explain the spread and empirically estimated an interest rate spread equation using monthly time series data for the period April 1993 to June 1999, while (Ngugi, 2001) extended the monthly time series to December 1999. The factors considered by the former are data deposits, loans, Treasury bill rate and interbank rate. They found that the spread was positively related with deposits but negatively to related loans. In addition to the factors above, (Ngugi, 2001) incorporated excess liquidity and non-performing loans ratio as variables and found that a rise in non-performing explanatory loans ratio leads to a rise in spreads while excess liquidity is negatively related with spreads. The study by, (Were & Wambua, 2014) empirically investigates the determinants of interest rate spread in Kenya‟s banking sector based on panel data analysis. The findings show that bank-specific factors play a significant role in the determination of interest rate spreads. These include bank size, credit risk as measured by non-performing loans to total loans ratio, return on average assets and operating costs, all of which positively influence interest rate spreads. On the

other hand, higher bank liquidity ratio has a negative effect on the spreads. On average, big banks have higher spreads compared to small banks. The impact of macroeconomic factors such as real economic growth is insignificant. The effect of the monetary policy rate is positive but not highly significant. The results largely reflect the structure of the banking industry, in which a few big banks control a significant share of the market.

(Beck & Hesse, 2009) used bank-level dataset on the Ugandan banking system to examine the factors behind the consistently high interest rate spreads and margins. While foreign banks have lower interest rate spreads, there is no robust and economically significant relationship between interest spread and privatization, foreign bank entry, market structure and banking efficiency. Similarly, macroeconomic variables explain little of the over-time variation in bank spreads. Bank-level characteristics, on the other hand, such as bank size, operating costs, and composition of loan portfolio, explain a large proportion of cross bank, cross-time variation in spreads and margins. However, time-invariant bank-level fixed effects explain the largest part of bank variation in spreads and margins. Further, the study finds evidence that banks targeting the low end of the market incurred higher costs and therefore had higher margins. (Nampewo,2013) was also studied the determinants of the interest rate spread of the banking sector in Uganda using time series data for the period 1995 2010. The study applies the Engle and Granger two-step procedure to test for co-integration between the bank rate, Treasury bill rate, exchange rate volatilities, the ratio of money supply to gross domestic product (M2/GDP) and the proportion of non-performing loans to total private sector credit. Results show that the interest rate spread in Uganda is positively affected by the bank rate, the Treasury bill rate and non-performing loans. On the other hand, M2/GDP ratio and real GDP have a negative influence on the spread. However the analysis is undertaken at macro level hence concealing micro and bank-specific characteristics.

The study by (Hesse, 2007) used unique bank-by-bank balance sheet and income statement information to investigate the intermediation efficiency in the Nigerian pre-consolidated banking sector during 2000-2005. The author analyzed whether the Central Bank of Nigeria‟s policy of recent banking consolidation can be justified and rationalized by looking at the determinants of spreads. Indeed, spreads decomposition and panel estimations showed that the reform of the banking sector could be the first step to raise the intermediation efficiency of the Nigerian banking sector. The study found that larger

banks enjoyed lower overhead costs and that increased concentration in the banking sector was not detrimental to spreads. The results equally showed that increased holdings of liquidity and capital positively impacted spreads in 2005, while stable macroeconomic environment enhanced more efficient channeling of savings to productive investments. Likewise, (Enendu, 2003) provided empirical evidence on the determinants of interest rate spreads in a liberalized financial system for the period 1989-2000, using selected banks in Nigeria. Ex-ante interest rate spreads equations were estimated using bank balance sheet and income statement as well as macroeconomic data. The results showed that macroeconomic and monetary policy/financial regulation factors were more important determinants of commercial banks‟ interest spreads than bank level factors. Inflation rate, GDP, financial deepening, cash reserve requirement, risk premium, Treasure bill rate, loan asset quality, liquidity risk and non-interest expenses were the most important factors that affected commercial banks‟ interest rate spreads during the period. The study by (Akinlo & Babatunde, 2012) examines the determinants of interest rate spreads in Nigeria using a panel of 12 commercial banks for the period 1986-2007. The results suggest that cash reserve requirements, average loans to average total deposits, remuneration to total assets and gross domestic product have positive effect on interest rate spreads. However, non-interest income to average total assets, treasury certificate and development stocks have negative relationship with interest rate spreads. In general, the findings that suggest a reduction in cash reserve ratio, high bank overhead costs amongst others will help to moderate the high interest rate spreads in Nigeria.

(Sandi, 2009) in the study of the Price- Concentration relationship in the Commercial Bank deposit markets in Zambia found that there exists an equilibrium relationship among consumer weighted deposit interest rates (i.e. prices) and concentration ratio, per capita income and deposits held by commercial banks. He found that per capita income, market share, concentration ratio and the growth of deposits play a significant role in determining changes in deposit interest rates in Zambia. The low per capita income of Zambia compared to other Sub- Saharan countries was found to be the reason as to why few people hold bank accounts with commercial banks. Zambian commercial banks therefore have a tendency of offering low interest on deposit accounts as opposed to the interest rate they charge on loans in order to make profits. Commercial banks concentration was also Tanzania found to be the major contributors to low deposit interest rates. This was attributed to the banking system collapse in the 1990s and the dominance

of the sector by a few banks which were Barclays Bank, ZANACO and Standard Bank. These banks were leading in all portfolios included in the study such as loans and advances, deposits and total assets among others. It was concluded that Zambia‟s highly concentrated banking market is “bad” for depositors. The study however looked at the determination of deposit rates but this study investigates the determinants of banking sector interest rate spreads in Zambia.

The study by (Ransford et al., 2014) examines the determinants of the bank interest margin in Ghana. This study examines the determinants of banking sector interest rate spreads in Ghana. Based on the availability of data, the study focused on some banking industry-specific and macroeconomic determinants of (IR) spread. The study found that factors affecting the determination of interest rate spread in Ghana are GDP, Exchange Rate, Prime Rate, Treasury Bill Rate, Liquidity, Overhead Costs, Loan Loss Provisioning and Profit Margin. The research by (Mahamudu et al., 2005) also examines the determination of interest rate spreads in Ghana using two approaches based on an income statement and balance sheet analysis and an econometric model. The study concludes that the existence of major structural impediments, such as the market concentration, and the degree of contestability among banking institutions, among others, prevent the financial system from reaching its full level of efficiency. The market share variable is very influential in explaining spreads in Ghana and reflects the lack price competition in the banking industry. The results also show the effect of cross-subsidization between interest and non-interest income. High operating cost, non-performing loans and the existence of liquidity reserves, also contribute to the wide spreads, even though the influence of the latter is not as large as that of operating costs and market share.

2.8. Ethiopian Banking Sector NIM/IRS

2.8.1. Evolution of Interest Rate Spread

Table 1 shows the evolution of interest rate spread in Ethiopia Banking Sector during the period 2004 to 2013. Because of the unavailability of a long-term series on interest rate spread, an attempt has been made to construct one based on information available on the overall banking sector's deposit rates (average of saving and time deposit) and lending rates. An overall weighted deposit rate was obtained by averaging deposit rates (mid-rates) of different maturities weighted by the total amount of deposits in each maturity

(column 1). Similarly an overall weighted average lending rate was constructed by averaging lending rates (mid-rates) to various sectors weighted by the total amount of credit allocated to the respective sectors (column 2). A spread was then constructed as reported in column 3. Column 4 displays the spread compiled by the "Index Mund" however; these figures do not seem very realistic.

Table 1-Interest Rate Spread (Percentage Points)

As at June	Weighted Average Deposit Rate (%)(Estimated)	Weighted Average Lending Rate (%)(Estimated)	Estimated Spread	Spread (Source: Index Mund)[1]
	-1	-2	(3)=(2)-(1)	-4
2004	3.35%	10.50%	7.15%	3.60%
2005	3.53%	10.50%	6.98%	3.50%
2006	3.53%	10.50%	6.98%	3.40%
2007	3.58%	10.50%	6.92%	3.40%
2008	4.62%	11.50%	6.88%	3.30%
2009	4.47%	12.25%	7.78%	
2010	4.65%	12.25%	7.61%	
2011	5.45%	11.88%	6.44%	
2012	5.57%	11.88%	6.32%	
2013	5.52%	11.88%	6.36%	
Average	**4.42%**	**11.36%**	**6.94%**	

1

Source: National Bank of Ethiopia, Annual Report, 2012/33 (and various years) and www.indexmundi.com

2.8.2. Ex-ante measuring of Net Interest Rate Spread in Ethiopia

Prior to financial reforms of the 1994"s, the Ethiopia financial sector was heavily controlled under the regime of administrative controls, the financial system remained under-developed and repressed since 1994, following the financial reforms in researchers identified existence of interest rate spread and its causes using aggregate weighted average deposit and lending rates. Most researchers have identified interest rate spread in Ethiopia using ex-ante measurement technique.

[1] Interest rate spread is the interest rate charged by banks on loans to private sector customers minus the interest rate paid by commercial or similar banks for demand, time, or savings deposits. It is accessed from the website of http://www.indexmundi.com/facts/indicators/FR.INR.LNDP/compare#country=er:et on January 28, 2015 for comparison purpose.

(Kozo et al. 2007) under the paper title "The case for financial sector liberalization in Ethiopia" analyzed interest rate spread between state-owned and private banks from 1998-2006 using ante-post measurement and three findings were identified, first spreads were increased from 1998 to 2006 for both state-owned and private banks, though it should be noted that since 2003, interest rate spreads of private banks have declined, suggesting that competition has increased. Second, private banks have higher interest-rate spreads than state-owned banks. Third, the deposit rate is the same for state-owned and private banks, implying that the differences in interest-rate spreads reflect differences in lending rates between banks. It may be noted that with the new entry of private banks, lending rates have consistently decreased since 2002. Deposit rates were still fixed by the National Bank of Ethiopia through 2005, and were therefore the same for state-owned and private banks. Although the entry of new banks contributed to the decline in the lending rate, it did not contribute to the decline in the interest-rate spreads. Combined with the fact that there are only 19 banks in Ethiopia, the results suggest accordingly that the banking sector reflects a non-competitive market structure, especially among private banks, although the market share of private banks is still small.

Similarly, using the same measurement technique by (Sime et al. 2013) under the paper titled "Competition in Ethiopian Banking Industry" analysis interest rate spread from 2000 to 2008 and found that, narrow and declining interest rate spread over 2002-2006 would imply the prevalence of competition. In Ethiopian banking industry, the interest rate structure, and hence the spread, remains more or less constant over time with few exceptions. Since 2002, the saving rate (the major component of total deposit in magnitude) was declined by half and remains intact till 2007. However, the average rate of time deposit has been steadily rising since 2002. Interest rate on demand deposit (by few banks) was commenced in 2002 which had been nonexistence before. Due to marginal changes in time and demand deposits since 2002, the spread has displayed a slightly declining trend in Ethiopian Banking system. The spread between the nominal lending and deposit rates in the industry is low, while real lending and deposit rates are currently negative. However, the commencement of interest rate on demand deposits, the differentiated interest rates on saving and time deposits, the increasing trend in interest rate of average time deposits since 2002, and the concomitant marginal decline in the interest rate spread somewhat indicate improvements in competition, though not intense, among commercial banks, especially in mobilizing deposits to avail adequate funds for

the growing demand for loans. It may seem a truism to deduce that there is no vigorous price competition in the Ethiopian banking industry. Price is not yet set based on demand and supply forces over the review period.

As per Pan African Bank research paper on Dec 30, 2014, the Ethiopia‟s monetary policy allows the government to control interest rates which have mainly been stable irrespective of change in key macroeconomic indicators such as inflation; resulting in negative real interest rates in some years .This situation is adversely affecting the banking sector, average lending rates have remained rigid in Ethiopia, raising marginally from 11.5% in 2007 to 11.9% in 2013, which results in an average lending-deposit rate spread of 6.3% over the period (2007-2013) however, inflation peak at 36% in Dec ember 2011 and this resulted in a negative return on 24% in the loan book of the banking sector. It is clear that the interest rate control regime is negatively affecting the profitability of the banking sector, especially in years when the economy experiences higher inflation pressure.

2.8.3. Ex-post Measuring of Net Interest Rate Margin in Ethiopia

Using the fact that interest income is equivalent to the average lending rate times the average volume of loans and that interest expense is equivalent to the average deposit rate times average deposits as well as the fact that the ratio of loans to deposits is equal to one minus the required reserve ratio, an expression for the interest rate spread is obtained as given by equation 1.

$$i_L - i_D = \delta * i_l + \frac{OC}{D} + \frac{Pro}{D} + ROA * \frac{A}{D} - \frac{NII}{D} + \frac{\epsilon}{D} - - - - - - - \quad (1)$$

Where, δ = Required Reserve Ratio, ROA = Return on assets, i_l =Interest Income on Loans / Total Loans, i_D =Interest Expense on Deposits /Total Deposits, L/D =$(1-\delta)$, and e= residual.

The residual ϵ reflects errors that result from combining data from the income statements (flow data) and stock data from the consolidated balance sheet as well as the assumption that loanable funds are comprised of deposits net of required reserves. Table 2 gives the decomposition of the banking sector's interest rate spread into its various components according to equation 1, for the period 2009 to 2013.

From the Table 2, it is found that interest rate spread ranges between 8.67 and 10.71 percentage points with an average value of 9.31 percentage points. On average, approximately 9.31 percentage points of the spread are attributable to various costs namely reserve costs, operational costs and provision for loan losses. Reserve requirement increase from 5 (SBB/37/2004) to 10 per cent starting July 2007 (NBE directive no SBB/42/2007) and as per Directive No"s SBB/44/08 and SBB/45/08, the reserve and liquidity requirements are increased from 10 Percent to 15 Percent and from 15 Percent to 25 Percent (20 percent in the form of primary reserve and 5 percent secondary reserve), respectively starting from 7th day of April 2008. Operating costs and costs borne towards provision for loan losses have remained more or less constant over the period under review.

Table 2-Anatomy of Interest Rate Spread

	2009	2010	2011	2012	2013	Average
i_L	10.60%	10.44%	10.93%	11.13%	12.66%	11.15%
i_D	1.81%	1.77%	1.77%	1.93%	1.96%	1.85%
Spread	**8.78%**	**8.67%**	**9.16%**	**9.20%**	**10.71%**	9.31%
$\delta * i_L$	0.32%	0.31%	0.33%	0.33%	0.38%	0.33%
OC/D	1.96%	2.31%	2.40%	2.32%	2.46%	2.29%
Prov/D	0.15%	0.14%	0.08%	0.05%	0.10%	0.11%
ROA*A/D	3.86%	3.66%	3.63%	4.53%	10.43%	5.22%
NII/D	3.84%	3.38%	3.30%	4.21%	4.47%	3.84%
Residual	-1.35%	-1.13%	-0.58%	-2.25%	-7.14%	-2.49%

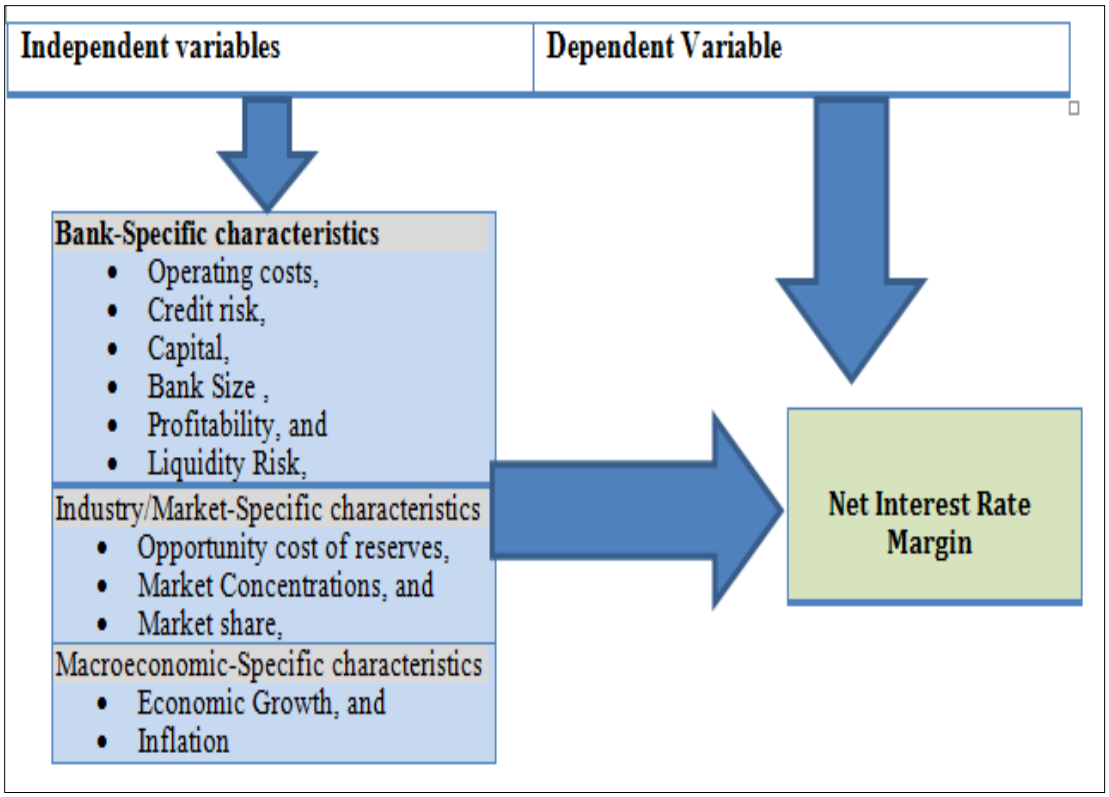
Source: Compiled from Annual Report of all banks operated with in the period

2.9. Conceptual Framework

The overall objective of this study is to analyze the behavior and the factors that determine cost of financial intermediation of commercial banks proxy by Interest rate spread/margin in Ethiopia using variables that have been studied by previous researcher. Based on the above-mentioned interest margin determinants, the current research proposed a conceptual framework. The framework is constructed mainly in reference the studies done by (Demirgüç-Kunt & Huizinga, 1999; Brock & Rojas-Suarez, 2000; Barajas et al., 1999; Saunders & Schumacher, 2000; Angbazo, 1997 and Doliente, 2003).

The research investigates the bank, industry and economic factors. The bank specific factors include operating costs, credit risk, management risk aversion, capital, bank size and profitability. The industry/market specific factors included opportunity cost of reserve, market concentration, and market share. And the macro related factors included inflation, and growth in gross domestic Product. Thus, Figure 1 which is the conceptual model summarizes the main focus and scope of this study in terms of variables included.

Figure 1- Conceptual models of determinants of cost of financial intermediation



Source: Self-extracted

2.10. Summary and Knowledge Gap

In general, empirical studies that examine the determinants of bank interest rate margin use variables that basically fall in three categories: (i) individual bank-specific factors such as operating or administrative costs, non-performing loans, return on assets, capital of the banks, bank size, bank liquidity, among others; (ii) factors specific to the banking sector/industry such as the degree of competition or market concentration, regulatory requirements such as obligatory reserve requirements and market share and, (iii) macroeconomic indicators which include real gross domestic product (GDP) growth

rate and inflation. However, most of the empirical studies focus only on one category of factors while a few others consider two or all the three categories of factors.

The empirical studies also suggest that financial intermediation cost determinants vary across countries and regions. For instance, some of those studies argue that the main determinants of net interest margins are bank-specific factors, whereas others claim that the industry-specific factors are more important. On the other hand, others believe that the macroeconomic factors are the most important factors that explain the level of interest rate margins particularly in developing countries like Ethiopia. Therefore, there is a continuous debate on the key determinants of interest rate margins in a country.

In Ethiopia, banks act as the main players in channeling funds from lenders to borrowers, and for this reason it is important that their intermediary role is carried out with the lowest possible costs in order to achieve higher social welfare. After financial sector reform NBE impose control over deposit rates in order to keep the lending rates low i.e. set the minimum saving & time deposit interest rate and leaving lending rate to commercial banks with the aim of improving efficiency in the intermediation process by reducing the interest margins. However, this seems not to have been realized in Ethiopia until 2002 (Kozo et al., 2007). Therefore, interest rate spread in Ethiopia is also not yet set based on demand and supply forces (Sime et al., 2013).

The present study is initiated as the result of the following gaps: review of literature shows that considerable work has been done on determinants of cost of financial intermediation in other countries. There is no any comprehensive work that has been carried out in Ethiopian context. However, knowledge of determinants of cost of financial intermediation is very important to achieve the objectives of stability and growth of the banking sector, financial system and to the economy. Thus, the justification for undertaking this study which investigates the factors that determine cost of financial intermediation or net interest rate margins

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Introduction

This chapter gives a detailed account of the methodology used to carry out the study. The chapter discusses about model specification, the variables used and diagnostic tests to be conducted. The chapter also presents the data presentation and analysis plan. A summary of the main points is also provided at the end of the chapter.

3.2. Methodology of the Study

3.2.1. Research Design and Approach

The choice of research design depends on objectives that the researchers want to achieve (Admas et al., 2007). Since this study was designed to examine the relationships between cost of financial intermediation and its determinants, a logical reasoning either deductive or inductive is required. Deductive reasoning starts from laws or principles and generalizes to particular instance whereas inductive reasoning starts from observed data and develops a generalization from facts to theory.

Besides, deductive reasoning is applicable for quantitative research whereas inductive reasoning is for qualitative research (Admas et al., 2007). Thus, due to quantitative nature of data, the researcher used deductive reasoning to examine the cause and effect relationships between cost of financial intermediation and its determinants in this study.

As noted by (Kothari, 2004) explanatory research design examines the cause and effect relationships between dependent and independent variables. Therefore, since this study was examined the cause and effect relationships between cost of financial intermediation and its determinant, it is an explanatory research. The objective to be achieved in the study is a base for determining the research approach for the study. In case, if the problem identified is factors affecting the outcome having numeric value, it is quantitative approach (Creswell, 2003).

Therefore, the researcher employed quantitative research approach and explanatory research design to see the regression result analysis with respective empirical literatures on the determinants of cost of financial intermediation.

3.2.2. Population Size and Sampling Techniques

As to Dec of 2014, there are nineteen banks in Ethiopia. These are Commercial bank of Ethiopia, Construction and Business Bank S.C, Awash International Bank S.C, Bank of Abyssinia S.C, Wegagen Bank S.C, United Bank S.C, Nib International Bank S.C, Dashen Bank S.C, Development Bank of Ethiopia, Cooperative Bank of Oromia S.C, Lion International Bank S.C, Zemen Bank S.C, Oromia International Bank S.C, Buna International Bank S.C, Berhan International Bank S.C, Abay Bank S.C, Addis International Bank S.C, Debub Global Bank,S.C, and Enat Banks S.C. However, from all the above listed banks, Development Bank of Ethiopia is not Commercial bank (www.nbe.et).

As noted by (Kothari, 2004) good sample design must be viable in the context of time and funds available for the research study. Besides, purposive sampling offers the researcher to deliberately select items for the sample concerning the choice of items as supreme based on the selection criteria set by the researcher. Accordingly, this study employed purposive sampling technique to select the required sample of banks from the above listed banks since it is viable in line with time and funds available for this study. This sampling method is a form of non-probability sampling in which decision concerning the individual source of data to be included in the sample is taken by the researcher, based upon a variety of criteria.

The selection criteria set by the researcher was first, the required banks are only commercial banks in Ethiopia. Second, those commercial banks should operate after 1999/00 and before 2013/14 having financial statements for consecutive fourteen years. Third, the researcher chose this sample because they play a major role in determination of interest rate margin in the entire research period. Based on such criteria, eight commercial banks out of nineteen banks operating at 2000 G.C are selected. These banks included Commercial Bank of Ethiopia, Construction & Business Bank S.C, Awash International

Bank S.C, Dashen Bank S.C, Bank of Abyssinia S.C, Wegagen Bank S.C, United Bank S.C and NIB International Bank S.C.

To this end, the sample size for this study is not less than specified sample size required for ones‟ study since the accuracy and validity of the works never guaranteed by increasing the sample size beyond specified limit. This is due to the fact that increasing the number of sample size beyond the specified sample size required for ones‟ study never add value to the accuracy of the study rather it made information unmanageable due to redundancy (Eshete, 2011). That is why this study used eight experienced commercial bank in Ethiopia for fourteen years. The cut date for the sample size is based on the fact that private commercial banks starts computation with state owned banks starting from 2000 (Sime et al., 2013)

3.2.3. Nature, Source of Data, Collection Methods & Instruments

This study used secondary panel data set for Ethiopian commercial banks between 2000 and 2013, for fourteen years. Eight banks operating in Ethiopia during the period under the study were included in the panel data set. The researcher prefers to use panel data since panel data can take heterogeneity among different units into account over time by allowing for individual-specific variables. Besides, by combining time series and cross-section observations, it gives more informative data. Furthermore, panel data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data (Gujarati, 2004) and panel data models provide much more insights than time series models or cross section data models because it is theoretically possible to isolate the effects of specific effects and actions (Hsiao, 2003).

Accordingly, the researcher used secondary sources of data that is panel in nature. A secondary source of data was preferred by the researcher since it is less expensive in terms of time and money while collecting. And also, it affords an opportunity to collect high quality data (Saunders et al., 2007) cited in (Gadise, 2014).

Accordingly, secondary data was obtained from the audited annual financial statements of the concerned commercial banks in Ethiopia. These data includes both bank specific, industry specific and macroeconomic factors. Bank-specific and industry-specific data

were sourced from annual reports and statement of accounts of the selected banks. However, data on macroeconomic variable (GDP growth and inflation were sourced from annual report bulletins published by the National Bank of Ethiopia (NBE) and Ministry of Finance and Economic Development (MoFED)).

3.2.4. Data Analysis and Regression Methodology

As noted by (Kothari, 2004), data has to be analyzed in line with the purpose of the research plan after data collection. Accordingly, secondary data collected from annual financial statements of the concerned commercial banks in Ethiopia and MoFED were analyzed to determine its suitability, reliability, adequacy and accuracy. Thus, this study utilized both descriptive and econometric analysis based on a panel data from 2000-2013 to examine the relationship between the cost of financial intermediation cost and its determinant factors in commercial banks found in Ethiopia.

The study conducts its data analysis based on commercial banks operating in Ethiopia over the period from 2000-2013, resulting 112 bank year observations. In examining the determinants of cost of financial intermediation in Ethiopia the researcher has adopted ex-post measurement method of financial intermediation efficiency using the financial statements of the sampled banks. The study employs panel data procedures since the sample contains data across banks and over time. To this end, the researcher used panel data methodology to examine the effect of each explanatory variable on cost of financial intermediation of commercial bank in Ethiopia.

The use of panel data regression methodology in this study is based on four fundamental justifications:-

i. The data that were collected has time and cross sectional attributes and this will enable the researcher to study executive compensation over time (time series) as well as across the sampled banks (cross-section)

ii. Panel data regression provide better results since it increases sample size and reduces the problem of degree of freedom, more informative data, and more efficiency.

iii. The use of panel data would increase more variability of data and such can avoid the problem of multicollinearity, aggregation bias, and endogeneity.

iv. Panel data are better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data. For instance, individual banking characteristics changes could be missed with non-panel data analysis.

In panel data regression methodology three estimation models were adopted, namely, pooled OLS, fixed-effects and random effects. The selection between fixed effect and random effect panel estimation method was based on compatibility of the model base on number of cross-section, number of observations and nature of omitted variables. The panel regression results were presented in a tabular form evaluated using individual statistical significance test (T-test) and overall statistical significance test (F-test). The goodness of fit of the model would be tested using the coefficient of determination (R-squared). In conducting all our data analysis, the study used EViews 8 software.

3.3. Model Specification and Justification of Variables

Panel data model enables regression analysis to be undertaken to empirically investigate factors determining cost of financial intermediation cost. According to (Hsiao, 2003) panel data models provide superior insights than time series models or cross section data models because it is theoretically possible to isolate the effects of specific variables and other actions. In the model interest rate margin are hypothesized to be a function of bank specific factors, industry specific factors as well macroeconomic factors, which is in line with other studies in the literature like (Demirgüç-Kunt and Huizinga, 1999).

3.3.1. Model Specification

The best-known theoretical model to analyze the determination of bank interest margins as measurement of financial intermediation cost is “dealership model” developed by Ho and Saunders in 1981. Under this model, the banks are considered as “a dealer” essentially a demander of one type of deposit and supplier of one type of loan. In undertaking this function banks face a major type of uncertainty and, hence, cost. This cost occurs because of the stochastic behavior of deposit suppliers and loan demanders. In effect, deposit suppliers and loan demanders tend to arrive at different times resulting in

the bank having to hold either a long or short position in the short-term money market. The bank will therefore demand positive interest spread as the price of providing intermediary (depository and/or loan) service in face of the uncertainty generated by asynchronous deposit supplies and loan demands. The dealership model is developed from the literature on bid-ask prices for security market dealers. A bank is viewed as paying for funds (deposits) at one price (a "bid" price) and lending funds at another (the "ask" price). Consequently, the banks have to deal with the demands for loans, and offers of deposits in an uncertain environment characterized by interest rate fluctuations in the money market (Maudos and Guevara, 2004) and for this reason; banks set their interest rate as a margin relative to the interest rate of the money market.

The dealer model (Ho & Saunders, 1981) consists in the estimation of net interest margin determinants following a two-stage process, but it requires long data series. Later on, other researchers (Mcshane & Sharpe, 1985), (Angbazo, 1997) and (Maudos & Guevara, 2004) have applied a one-stage model for identifying the factors that affect the net interest margin. Since the Ethiopia data series are short 2000 to 2013, it is impossible to apply the first model. So, the single-stage model is the one that the current study has used.

Therefore, this paper follows the modeling set out in (Demirgüç-Kunt & Huizinga, 1999, Abreu & Mendes, 2002, and Athanasoglou et al., 2005) to estimate the impact of the factors that may be important in explaining net interest margins in Ethiopia. The general model to be estimated is of the following linear form:-

$$NIM_{it} = C + \sum_{k+1}^{k} \beta_k X_{it}^k + \epsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (1)$$

Where NIM_{it} is the net interest margin of bank i at time t, with i=1,…,N; t = 1,…, T, C is a constant term, X_{it}s are explanatory variables and ϵ_{it} is the error term. The explanatory variables are grouped in to bank-specific factors, industry-specific factors and macroeconomic specific-variables.

The general specification of model (1) is as follows:-

$$NIM_{it} = C + \sum_{j=1}^{J} \beta_j X_{it}^j + \sum_{l=1}^{L} \beta_l X_{it}^l + \sum_{m=1}^{M} \beta_m X_{it}^m + \epsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2)$$

Where the $X_{it}s$ with superscripts j, l, and m denote bank-specific variables, industry–specific variables and macroeconomic factors respectively. In this study, the bank specific variables are operating expenses, credit risk, capital, bank size, profitability, liquidity risk, the industry variables includes opportunity cost of reserve, market concentration and market share and macroeconomic variables includes inflation and economic growth.

To further decompose the model into its actual variables to be estimated, the equation can be presented as below:-

$$NIM_{it} = \alpha_i + \beta_1 * OER_{it} + \beta_2 * LLP_{it} + \beta_3 * CAR_{it} + \beta_4 * ROA_{it} + \beta_5 * LNSIZE_{it} + \beta_6 * LIQR_{it} + \beta_7 * OCR_{it} + \beta_8 * HHI_{it} + \beta_9 * MSD_{it} + \beta_{10} * GDP_t + \beta_{11} * INF_t + \epsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where:

I=1, 2… N is the i-bank; t=1,2,…., T corresponds to the year t

$\alpha_i, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, and\ \beta_{11}$ is a vector of parameters and α_i represents fixed effect.

NIM_{it}: Net Interest Margin (NIM) of bank i at time t is calculated as Interest Incomes on loan to total Loans minus Interest Expense on Deposit to total Deposits;

OER_{it}: Operating Expense ratio (OER) of bank i at time t is calculated as Non- Interest expense to total earning assets ratio;

LLP_{it}: Loan loss Provisions (LLP) of bank i at time t is measured by the proportion of total outstanding loans to total asset;

CAR_{it}: Capital Adequacy Ratio (CAR) of bank i at time t is measured as total capital to total asset;

ROA_{it}: Return on Asset (ROA) of bank i at time t is measured as net income to average total asset;

$LNSIZE_{it}$: Growth of bank assets on yearly basis of banks i at time t is measured as logarithm of asset growth;

$LIQR_{it}$: Liquidity risk (LIR) of bank i at time t is measured as liquid asset to total asset;

OCR_{it}: Opportunity Cost Reserve (OCR) of bank i at time t is measured as obligatory reserve at NBE to total asset;

HHI_{it}: The concentration herfindahl-hirschman index (HHI) of bank i at time t is measured market concentration in total asset terms;

MSD_{it}: Market share in terms of deposit of bank i at time t is measure market share in total deposit terms

GDP_t: Economic growth (GDP) measured as change in the real domestic product/GDP growth of Ethiopia on the year t. The proxy will be change in growth rate of real GDP.

INF_{it}: Inflation measured as percentage change in consumer price index in Ethiopia on the year t. and

ϵ_{it} : Is the error term

3.3.2. Justification of Variables

3.3.2.1. Dependent Variable

Net Interest Margin proxy of measurement of cost of financial intermediation is calculated as the ratio of interest income on loan to total loan minus interest expense on deposits to total deposit (Sibusiso, et al. 2011). It measures the gap between implicit earnings of the bank from interest bearing activities and the implicit costs incurred for attracting interest bearing funds. Thus, the net interest margin represents the charge required by the bank for providing financial intermediation services. As such, a larger net interest margin may discourage bank clients from using their services, resulting in lower financial deepening.

3.3.2.2. Independent variable

According to the model presented, there are eleven variables that determine interest rate margins these are operating expenses, credit risk, capital, asset size, profitability, liquidity, opportunity cost of reserve, market concentration, market share, inflation and economic growth. The following section depicts each independent variable by grouping in to three sections.

I. Bank-Specific Characteristics

A. Operating Expense (OER): the variable that will be used for the operating expenses is calculated as the overhead expenses or overhead costs or non-interest expense to total assets. Banks incur costs of financial intermediation such as screening loan applicants to assess the risk profile of borrowers and monitor the projects for which loans are advanced. An increase in operating costs is expected to have positive influence on interest rate spreads. High operating costs are likely to include costs due to inefficiency leading to higher spreads and hence this variable is commonly used as an indicator of operational inefficiency. A higher cost of financial intermediation will drive up interest rates on loans while depressing interest rates on deposits. The operating expenses are included in the equation, for testing if the higher costs are passed or not on the bank‟s clients, by setting higher margins (Demirgüç-Kunt and Huizinga, 1999); (Abreu and Mendes, 2003); and (Demirgüç-Kunt, 2004).

B. Loan Loss Provision (LLP): this variable is calculated by Non-performing loans to total loans ratio (NPLR)[2]. It used as an indicator of credit risk or quality of loan. This measurement is consistent with previous studies such as, (Demirgüç-Kunt and Huizinga, 1999). An increase in provision for loan losses implies a higher cost of bad debt write offs. Given the risk-averse behavior, banks facing higher credit risk are likely to pass the risk premium to the borrowers, leading to higher spreads. Hence the

[2] Due to the missing data, the researcher cannot proxy credit risk by the ratio of non-performing loans to total loans. Although a second best option, our measure of the credit risk is still an improvement compared to the ratio of loans to total assets used by (Maudos & Guevara, 2004)

higher the risk, the higher the pricing of loans and advances to compensate for likely loss, alternatively a higher credit risk means a higher risk premium set by the banks for the new loans. In a certain way, the new brewers will pay the costs of old unpaid loans.

C. **Capital or Capital Adequacy Ratio (CAR)[3]:** is a proxy of bank solvency; it represents a premium on bank margins (Valverde & Fer-nandez, 2007). It is measure using the ratio of capital to total assets. Banks often hold more capital above the regulatory minimum capital requirement for additional credit risk exposure, and the costs of such high capital ratio may be covered by widening the spread between lending and deposit rates. A positive coefficient is expected, the capital that the banks hold to cushion themselves against expected and unexpected risks may lead to high margins (Saunders and Schumacher, 2000).

D. **Bank Size (LNSIZE):** bank size is measured as the log of growth in total bank‟s assets. Theoretically one would expect bigger banks to be associated with lower interest rate spreads, arguably because of large economies of scale and ability to invest in technology that would enhance efficiency. However, to the extent that bank size connotes control of the market in the deposit and loan markets, a positive relationship between interest rate spreads and bank size should not be surprising.

E. **Profitability:** profitability which is proxied by return on average assets (ROA) is computed as net income divided by average total assets. This is generally considered as a good indicator to evaluate the profitability of the assets of a bank in comparison to other banks in the same industry. A positive relationship with interest rate spreads is hypothesized.

F. **Liquidity (LIR):** is measured by the ratio of liquid assets to total assets or total loan to total deposit. More liquid banks are expected to have higher margins in order to compensate for the opportunity costs of holding extra liquidity. Liquidity risk:

---

[3] To compute CAR most researcher were used [(Tiler 1 capital –Tiler 2 capital) / Risk weighted Asset], but almost all commercial banks audited financial statement missed such component since the researcher intends to use an alternative measurement approach of CAR i.e. capital to total asset ratio.

Computed as the ratio of bank‟s liquid assets to total assets. Bank liquidity is expected to be negatively related to interest spread. An increase in liquidity reduces the bank liquidity risk, which reduces the interest spread due to a lower liquidity. According to NBE establishment proclamation (No. 591/PP418) liquidity asset of banks includes cash on hand, deposit in other bank, and short term government securities that are acceptable by NBE as collateral (for instance Treasury Bill).

II. Industry/Market-Specific Characteristics

A. **Opportunity Cost of Reserves (OCR):** these costs in our case will be calculated as the proportion of required reserves put in the national bank to total assets. A positive correlation with the dependent variable is expected, because a higher level of reserves (remunerated in lower interest rates) will affect the banks behavior to setting higher loan rates for compensating the missing profit of investing these funds.

B. **Market Concentrations (HHI):** market concentration could measures the degree of competition each bank faces in the market. This indicator is measured by the concentration index in asset terms. Herfindahl-Hirschman index (HHI) is calculated by the sum of squares of total asset shares of all banks in the market. A higher concentration level means more power for the banks, which will result in higher interest margins. The literature suggests two opposite hypotheses related to the effect of concentration on banks price behavior. The first hypothesis is the one so called structure-performance-hypothesis (SPH) which argues that a more concentrated banking sector will behave oligopolistically and a higher concentration will cause higher interest margin for the banks. The second one, the efficient-structure-hypothesis (ESH) confirms that concentration produces efficiency gains (because of cost reductions) causing interest margins decrease. Another reason may be that big banks have a different structure of earning assets or paying liabilities compared to smaller banks, which may affect the interest received or paid and consequently the interest margins.

HHI is a more formal and commonly used measure of market concentration that measures the size of a bank in relation to the industry and serves as indicator of the degree of competition among banks. It is calculated by squaring the market share of

each bank and then summing up the resulting numbers, which is mathematically presented as follows:

$$HHI = \sum_{i=1}^{N} S_i^2$$

Where S_i represents market share of firm in terms of total asset in the market and N refer to the number of competing firms in the market (only sample banks).

C. **Market Share (MSD):** is measured as the total deposits of bank as a percentage of all banks" total deposits. This ratio may be calculated using total assets or loan. However, since both deposits and loans can be considered as bank output, there is a need to make a choice between a deposit or asset measure of market share. In view of the fact that the asset components may include investment in securities and subsidiaries, which certainly would not be homogenous across firms, the deposit measure of market share is considered a more suitable measure of market share for commercial so this paper used deposit as measure of market share. Market share in deposit (MSD) is computed as follows:-

$$MSD_{it} = \frac{Deposit}{\sum_{i=1}^{N}(Deposit)}$$

III. Macroeconomic-Specific Characteristics

A. **Economic Growth (GDP):** this factor captures the market conditions that certainly have an impact on interest rate spread. It is measure using change in growth rate or real GDP. During periods of good economic condition, loan demand tends to be higher, allowing banks to provide more loans. Further, the improved economic condition may positively affect bank margin that is because fewer loan defaults normally occur during these periods. Economic growth has a negative effect (Demirgüç-Kunt and Huizinga, 1999); (Demirgüç-Kunt, 2004); (Carbo and Rodriguez, 2007) on interest rate margin.

B. **Inflation (INF):** the effects of inflation on bank interest depend on whether inflation is anticipated or unanticipated. If inflation is anticipated, then the banks adjust interest rate accordingly, thereby increasing the interest rate margins. On the other hand, if

inflation is not anticipated, then banks may be slow in adjusting their interest rates and so may affect the interest margin negatively because of increased costs occasion by inflation. It is measured by percentage change of consumer price index which is consistent with the measure used by (Demirgüç-Kunt and Huizinga 1999)

3.3.2.3. Summary of Research Variables

The research variable classifications, proxy- measurement formulas and predicted signs for each independent variable are depicted here below:-

Table 3-Summary of Research Variables

Classification	Variable	Proxy	Predicted Sign
1.Bank Specific Variables	Operating Expense (OER)	Non-Interest Expense/Total Asset	Positive
	Loan loss provision (LLP)	Total loans/ Total Asset	Positive
	Capital Adequacy Ratio (CAR)	Capital/Total Asset	Positive
	Return on Asset (ROA)	Net Income / Average Total Asset	Positive
	Asset Growth (LNSIZE)	LN(Asset $_{t+1}$-Asset $_t$)/ Asset $_t$	Negative
	Liquidity Risk (LIR)	Liquidity Asset/Total Asset	Negative
2. Industry or Market Specific Variables	Opportunity cost of reserve (OCR)	Reserve at NBE/Total Asset	Positive
	Market Concentration (HHI)	$HHI = \sum_{i=1}^{N} S_i^2$	Positive
	Market Share (MSD)	$MSD_{it} = \frac{Deposit}{\sum_{i=1}^{n}(Deposit)}$	Positive
3. Macroeconomic Specific Variables	Economic Growth (GDP)	$GDP_{it} = [(GDP)_t - (GDP)_{1-t}]/(GDP)t-1$	Negative
	Inflation (INF)	$IFL = [(CPI)_t - (CPI)_{1-t}]/(CPI)_{t-1}$	Positive

Source: Own Organization

3.4. Diagnostic Tests

Diagnostic tests were performed to check for the validity of the parameters. The researcher is to test for normality, multicollinearity, heteroscedasticity and autocorrelation and also is going to perform maximum likelihood tests.

3.4.1. Normality

One assumption of classical linear regression model (CLRM) is the normal distribution of the residual part of the model. As noted by (Gujarati, 2004), OLS estimators are BLUE regardless of whether the error terms are normally distributed or not. If the disturbances are independently and identically distributed with zero mean and constant variance and if the explanatory variables are constant in repeated samples, the OLS coefficient estimators are asymptotically normally distributed with means equal to the corresponding $\beta's$.

However, as per the central limit theorem, if the disturbances are not normally distributed, the OLS estimators are still normally distributed approximately if there are large-sample data. Thus, since the sample size for this study is large enough, it is approximately considered as normally distributed. This implies that residuals are asymptotically normal in this study.

3.4.2. Multicollinearity

The term multicollinearity refers to the existence of a "perfect," or exact, linear relationship among some or all explanatory variables of a regression model (Gujarati, 2004). If it exists the remedy is to drop a variable with a high R-square or do nothing. The correlation matrix was used to detect the presence of severe multicollinearity. A correlation coefficient is high if it is in excess of 0.8.

3.4.3. Heteroscedasticity

According to (Gujarati, 2004) this is a situation whereby the error variances are not constant. This is a violation of one important assumption of the classical linear regression assumptions. To detect heteroscedasticity, the research employed the Whites test for heteroscedasticity. The problem of continuing to use data that suffers heteroscedasticity is that whatever conclusion or inferences, they will be misleading.

3.4.4. Autocorrelation

The violation of the basic assumption that residuals are mutually independent results in serial autocorrelation. In time series data the successive residuals tend to be highly

correlated. Autocorrelation can also be extended to cross section data where the residuals are correlated with those of the neighboring units (Maddala, 1977). The Durbin-Watson method is used to test for autocorrelation. A Durbin Watson statistic around two is generally accepted though there are zones of indifference and zones of both positive and negative correlation.

3.5. Data Presentation and Analysis Plan

Descriptive statistics of the variables (both dependent and independent) were first calculated over the sample period. This is in line with (Malhotra, 2007), which states that using descriptive statistics methods helps the researcher in picturing the existing situation. Then, a diagnostic test includes multicollinearity; heteroscedasticity, autocorrelation, and normality were to ensure that the data are suitable for ordinary least square (OLS) analysis.

Before moving to interpretation of regression results the suitability of fixed model over random effects model need to be determined based on number of cross-section, number of observations and nature of omitted variables.

3.6. Summary

The chapter began by outlining the research methodology that was adopted for the study. It went on to discuss the model specification that was adopted in conducting the research. The chapter outlined the various sources of data that were utilized in the study. It also looked at the justification of the variables that were adopted from the literature and a discussion of the diagnostic tests that were going to be used. The next chapter will look at data analysis, presentation and interpretation.

CHAPTER FOUR
DATA PRESENTATION AND ANALYSIS

4.1. Introduction

This chapter results of the determinants of cost of financial intermediation in Ethiopia Banking Sector. The chapter presents the diagnostics test results of multicollinearity, heteroscedasticity, autocorrelation, and normality. The chapter also presents results of the regression analysis and discusses the study results. The chapter is concluded by a summary of the chapter.

4.2. Descriptive Statistics

This section presents the descriptive statistics of dependent and explanatory variables used in this study. The dependent variable used in this study was NIM while explanatory variables are OER, LLP, CAR, ROA, SIZE OF ASSET, LIQR, OCR, HHI, MSD, GDP and INF.

4.2.1. Summary Statistics

Table 4 shows the summary descriptive results for all the variables used in the study such as mean, maximum, minimum, standard deviation, skewness, kurtosis and number of observation.

Table 4-Summary of descriptive statistics of study variables over the period of 2000-2013

	Net Interest Margin (NIM)	Operating Expense Ratio (OER)	Loan loss Provisions (LLP)	Capital Adequacy Ratio (CAR)	Return on Asset (ROA)	Growth of Bank Assets (NSIZE)	Liquidity risk (LIQR)	Opportunity Cost Reserve (OCR)	Market Concentration (HHI)	Market Share of Deposit (MSD)	Economic Growth (GDP)	Inflation (INF)
Mean	0.070	0.023	0.537	0.117	0.041	0.318	0.257	0.130	0.513	0.125	0.092	0.125
Median	0.067	0.023	0.568	0.111	0.029	0.265	0.248	0.111	0.505	0.042	0.106	0.108
Maximum	0.102	0.042	0.838	0.294	1.786	1.127	0.661	0.370	0.690	0.853	0.126	0.364
Minimum	0.030	0.009	0.225	0.037	-0.022	0.031	0.075	0.009	0.391	0.004	-0.021	-0.106
Std. Dev.	0.015	0.007	0.130	0.048	0.167	0.224	0.110	0.077	0.093	0.223	0.039	0.125
Skewness	0.315	0.440	-0.176	1.319	10.358	1.691	1.264	1.030	0.477	2.304	-1.897	0.363
Kurtosis	2.574	3.953	2.484	5.723	108.872	5.901	5.748	3.551	2.111	6.538	5.689	2.687
Jarque-Bera	2.701	7.856	1.820	67.083	54311	92.676	65.063	21.206	7.940	157.508	100.89	2.918
Probability	0.259	0.020	0.402	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.232
Sum	7.793	2.537	60.186	13.127	4.626	35.606	28.747	14.551	57.508	14.000	10.288	14.032
Sum Sq. Dev.	0.026	0.005	1.865	0.252	3.089	5.552	1.333	0.661	0.963	5.521	0.167	1.729
Observations	112	112	112	112	112	112	112	112	112	112	112	112

Source: Own estimation of research data (2015)

Net interest margin (NIM) ratio proxy of measurement of cost of financial intermediation measured by ratio of interest income on loan to total loan minus interest expense to total deposit ranges from 3 to 10.2 percent. It has a mean of 7.00% showing the standard deviation of (1.5%) from its mean value. This indicates that NIM of Commercial Banks in Ethiopia has exhibited an increasing trend in interest rate margin within the study period i.e. 2000 to 2013.

With regard to OER ratio that was measured using total non-interest expense divided by total asset, it ranges from a minimum of 0.9% to a maximum of 4.2%. It has a mean of 2.3% with standard deviation (0.7%) from its mean value. LLP ratio that was measured using total loans & advance divided by total asset, it ranges from a minimum of 22.5% to a maximum of 83.8%. It has a mean of 53.7% with standard deviation (13.0%) from its mean value.

CAR is also measured using total capital & reserve divided by total assets and its value ranges from a minimum of 3.7% to maximum of 29.4% with a mean value and standard deviation of 11.7% and 4.8% respectively. As far as profitability ratios concerned, the ROA value ranges from a minimum of -2.2% to a maximum of 178.6% with a mean value and standard deviation of 4.1% and 16.7% respectively. The result suggests that commercial banks in Ethiopia show low performance with regard to ROA during the study period. Furthermore, size of asset measured by asset growth demonstrates a minimum of 3.1% and maximum of 112.7% with a mean value 31.8% and standard deviation of 22.4%. The last bank specific variable i.e. liquidity risk measured using total liquid asset to total asset ranges from minimum values of 7.5% to a maximum of 66.1% with a mean value 25.7% and standard deviation of 11.0%.

Regarding to descriptive statistics of industry specific explanatory variables the following were observed. OCR measured by reserve account with NBE to total asset ranges from minimum values of 0.9% to a maximum of 37.0% with a mean value 13.0% and standard deviation value of 7.7%. Market concentration in total asset terms ranges from 39.1% to 69.0% with a mean of 51.3% and a standard deviation value of 9.3%. Market share measured in terms of deposit share ranges from 0.4% to 85.3% with a mean value of 12.5% and a standard deviation value of 22.3%. Macroeconomic specific explanatory variables such as economic growth and inflation also showed a mean of 9.2% and 12.5% and a standard deviation of 3.9% and 12.5% respectively within the study period.

For almost all the variables, the mean and median values lie within their maximum and minimum values showing a good level of consistency. Regarding kurtosis and skewness, the result shows that most of the data lack normality. As can be seen from Table 4, the kurtosis value of the eight variables exceeds 3 suggesting that the series are leptokurtic (peaked) relative to the normal. Also, the probability that the Jarque-Bera statistic exceeds (in absolute value) the observed value is generally low for all series; suggesting rejection of the hypothesis of normal distribution at 5% degree of significance. In terms of the skewness, all the variables are positively skewed except economic growth and loan loss provision. Except the return on asset whose skewness values are far from zero, the rest are showing values closer to zero; suggesting little problem with regard to skewness..

4.2.2. Correlation Matrix

Table 5 presents the results of the Correlation Analysis which was done to examine any serial Correlations among the Independent Variables which, when entered into the model for regression analysis, would lead to spurious results.

Table 5-Correlation Matrix (With Dependent Variable)

	Net Interest Margin (NIM)	Operating Expense Ratio (OER)	Loan loss Provisions (LLP)	Capital Adequacy Ratio (CAR)	Return on Asset (ROA)	Growth of Bank Assets (NSIZE)	Liquidity risk (LIQR)	Opportunity Cost Reserve (OCR)	Market Concentration (HHI)	Market Share of Deposit (MSD)	Economic Growth (GDP)	Inflation (INF)
Net Interest Margin (NIM)	1.000											
Operating Expense Ratio (OER)	0.306	1.000										
Loan loss Provisions (LLP)	-0.696**	-0.139	1.000									
Capital Adequacy Ratio (CAR)	0.069	0.393	0.129	1.000								
Return on Asset (ROA)	0.202	0.113	-0.045	0.146	1.000							
Growth of Bank Assets (NSIZE)	-0.383	0.021	0.311	0.150	-0.116	1.000						
Liquidity Risk (LIQR)	-0.064	0.109	-0.169	0.125	-0.074	-0.150	1.000					
Opportunity Cost Reserve (OCR)	0.250	-0.095	-0.399	-0.129	-0.076	-0.092	-0.133	1.000				
Market Concentration (HHI)	-0.307	0.229	0.341	0.120	-0.035	0.068	0.141	-0.595**	1.000			
Market Share of Deposit (MSD)	0.354	-0.057	-0.513***	-0.652**	-0.038	-0.296	-0.146	0.287	-0.255	1.000		
Economic Growth (GDP)	0.243	-0.082	-0.162	-0.074	0.042	-0.057	-0.129	0.295	-0.536***	0.145	1.000	
Inflation (INF)	0.420	-0.106	-0.320	-0.022	0.037	-0.107	-0.188	0.416	-0.601**	0.153	0.078	1.000

* Vary High Correlation at the 0.05 level (2-tailed) * *High Correlation at the 0.05 level (2-tailed) * **Medium Correlation at the 0.05 level (2-tailed)

Source: Own estimation of research data (2015)

The result presented in the Table 5 outlined the correlation matrix among the variables. Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The chief objective is measuring the strength or degree of linear relationship between two variables. As noted by (Gujarati, 2004), most widely

used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which was used in this study. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship). The sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. The lower and upper correlation coefficients were varying among scholars.[4]

The results presented in Table 5 show that loan loss provision and net interest rate margin are highly correlated at 5%. This also included market share of deposit and capital adequacy, market concentration and opportunity cost of reserve as well as inflation and market concentration. However, they are kept in the model as the correlation coefficient did not exceed 0.8 (vary high correlation) in absolute term. The rest of the correlations were medium and low.

4.3. Econometric Analysis

The researcher conducted diagnostic tests to guard against the possibility of obtaining and interpreting spurious regression results. The results of the tests are presented in the following sections.

4.3.1. Multicollinearity Test

The result of the test for existence multicollinearity between independent variable are presented in the correlation analysis using only independent variables in Table 6:-

[4] There is no common criterion to measure significance of correlation between variables but one of lower and upper boundary ranges given by most scholars were 0.00-0.19, 0.20-0.39, 0.40-0.59, 0.60-0.79 and 0.80-1.00 as vary low correlation, low correlation, medium correlation, high correlation and vary high correlation respectively. ያለው እንዳወቅ፡፡2006፡፡የምርምር መሰረታዊ መርሆችና አተገባበር፡፡ ሥስተኛ አትም፡፡ ባህር ዳር ዩኒቨርሲቲ፡፡

Table 6-Correlation Matrix (Only Independent Variables)

	Operating Expense Ratio (OER)	Loan loss Provisions (LLP)	Capital Adequacy Ratio (CAR)	Return on Asset (ROA)	Growth of Bank Assets (NSIZE)	Liquidity risk (LIQR)	Opportunity Cost Reserve (OCR)	Market Concentration (HHI)	Market Share of Deposit (MSD)	Economic Growth (GDP)	Inflation (INF)
Operating Expense Ratio (OER)	1.0000										
Loan loss Provisions (LLP)	-0.1393	1.0000									
Capital Adequacy Ratio (CAR)	0.3935	0.1286	1.0000								
Return on Asset (ROA)	0.1130	-0.0454	0.1457	1.0000							
Growth of Bank Assets (NSIZE)	0.0207	0.3107	0.1497	-0.1164	1.0000						
Liquidity Risk (LIQR)	0.1088	-0.1687	0.1248	-0.0743	-0.1501	1.0000					
Opportunity Cost Reserve (OCR)	-0.0955	-0.3994	-0.1287	-0.0760	-0.0920	-0.1328	1.0000				
Market Concentration (HHI)	0.2291	0.3410	0.1197	-0.0354	0.0679	0.1405	-0.5951	1.0000			
Market Share of Deposit (MSD)	-0.0566	-0.5127	-0.6523	-0.0382	-0.2962	-0.1463	0.2867	-0.2549	1.0000		
Economic Growth (GDP)	-0.0817	-0.1616	-0.0740	0.0422	-0.0565	-0.1292	0.2951	-0.5363	0.1449	1.0000	
Inflation (INF)	-0.1064	-0.3204	-0.0221	0.0366	-0.1072	-0.1880	0.4157	-0.6016	0.1527	0.0785	1.0000

Source: Own estimation of research data (2015)

As noted by (Gujarati, 2004), a serious problem for multicollinearity is occurred if the correlation is about 0.8 or larger. I.e. if pair-wise or zero-order correlation coefficient between two regressors is out of the recommended range of multicollinearity which is -0.8 or 0.8.In the above correlation matrix there is no pair-wise relation that exceeds 0.8 which suggests for not rejecting the null hypothesis (H_0) which states that there is no perfect pair-wise relation among regressors.

Therefore, it can be concluded that in this study that there is no problem of multicollinearity or the results showed that the problem of multicollinearity did not exist between variables in the model. Hence all the variables were retained for use in the estimations.

4.3.2. Heteroscedasticity Test

It has been assumed that the variance of the errors is constant. This is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be Heteroscedasticity. The Whites‟ test was used to check for the presence of heteroscedasticity in the residuals (see Table 7).

Table 7-Heteroscedasticity Test: White (Summary)

Version of Test	Value	df	Probability
F-statistic	0.95179	Prob. F(11,100)	0.495
Obs*R-squared	10.6147	Prob. Chi-Square(11)	0.476
Scaled explained SS	8.25826	Prob. Chi-Square(11)	0.690

Source: Own estimation of research data (2015)

As shown in Table 7 both F-statistic and chi-square version of test give the same conclusion that there is no evidence for the presence of heteroscedasticity since the p-values in all of the cases were above 0.05. The third version of the test statistics "Scaled explained SS", which is, as the name suggests, based on a normalized version of the explained sum of squares from the auxiliary regression also give the same conclusion.

Generally, in the regression models used in this study it was proved that the test statistics is not significant and the variance of the error term is constant or homoscedastic and we had sufficient evidence to accept the null hypothesis of Homoscedasticity. The linear model is also correctly specified.

4.3.3. Normality Test

A normal distribution is not skewed and is defined to have a kurtosis coefficient of 3. Bera-Jarque formalizes this by testing the residuals for normality and testing whether the coefficient of Skeweness and kurtosis are zero and three respectively. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. The Bera-Jarque probability statistics/P-value is also expected not to be significant even at 10% significant level (Brooks, 2008). According to (Gujarati, 2004), the BJ is a large sample test and our sample of 112 was equal to the frame was large; the study considered the BJ test also.

As shown in the histogram in the appendix-2 skewness and kurtosis approaches to zero (i.e. 0.150080) and Three (i.e. 3.318659) and the Jarque-Bera statistics (i.e. 0.894320) was not significant even at 10% level of significance as per the P-values shown in the histogram in the appendix was 0.639442). Hence, the null hypothesis that the error term is normally distributed should not be rejected. Even though, this is contradictory to what Table 4 shows i.e. Jarque-Bera probability for most of variables suggest lack of normality this would not have any effect as the sample size is large. Therefore it is possible to say that error terms follow normal distribution.

4.3.4. Autocorrelation Test

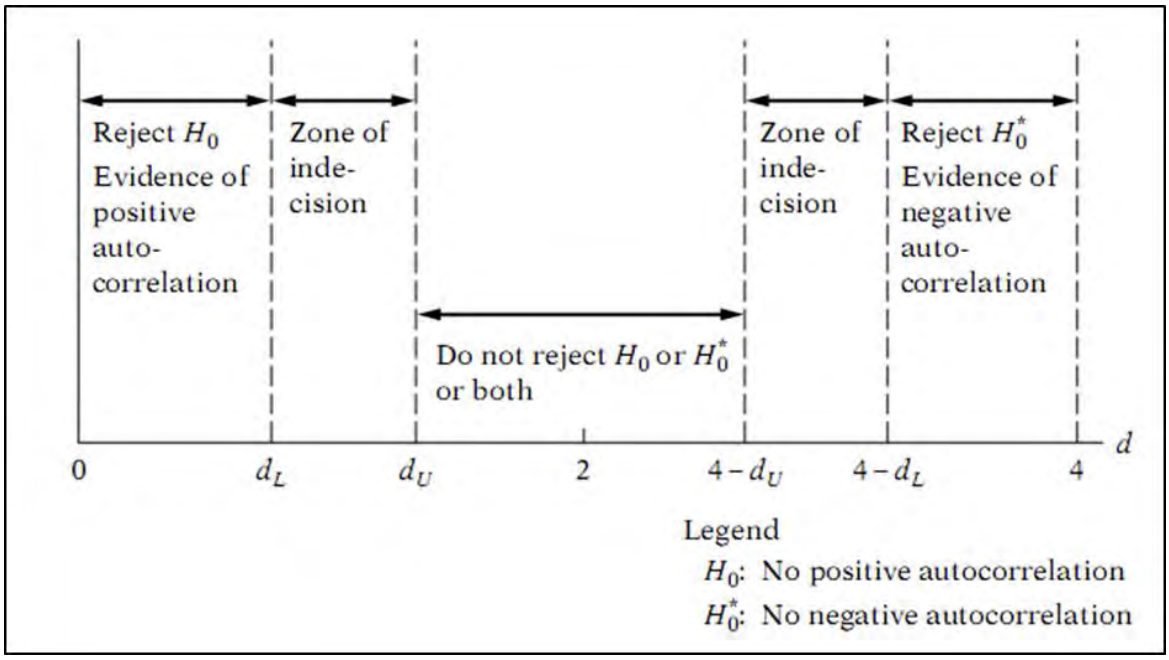
Under this section the researcher incorporate both methods of testing of autocorrelation i.e. Durbin-Watson autocorrelations test in the first section and Breusch-Godfrey Serial

Correlation LM Test in the second section. Both confirm that there is no autocorrelations between an immediately previous lag value and the 12th lag value respectively.

A. First Order Durbin-Watson Autocorrelations Test

The test for autocorrelation was made by using Durbin and Watson (1951). Durbin-Watson (DW) is a test for first order autocorrelation i.e. it tests only for a relationship between an error and its immediately previous value. DW is approximately equals to two, when there is no autocorrelation between the error term and its first order lag (Brooks, 2008). The null hypothesis for the DW test is no autocorrelation between the error term and its lag. According to (Brooks, 2008), DW has 2 critical values: an upper critical value (dU) and a lower critical value (dL), and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The rejection, non-rejection, and inconclusive regions are shown on the number line in figure 2 below.

Figure 2-Rejection and Non-Rejection Regions for DW Test



Source: Basic Econometrics, Fourth Edition by Gujrarati, 2004 Page No. 469.

The study used the d_L and d_U values for 112 observations as approximation of 112 observations. As per the DW table for 112 observations with 12 variables including constant at 1% level of significance, the d_L and d_U values are 1.36285 and 1.78510

respectively. The DW value for 112 observations was 1.79658. The DW value lies in the non-rejection region i.e. do not reject H_o (no evidence of autocorrelation which indicates the absence of autocorrelation).

B. Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test, this is another test for Autocorrelation in residuals. The Breush-Godfrey test is used because the Durbin Watson test is not reliable when lagged values are used in the model. The Breusch-Godfrey test is much more general in that it allows for both AR and MA error structures as well as the presence of lagged regress and as an explanatory variable (Gujarati, 2004). The null hypothesis is that there is no serial correlation. The summary statistic is depicted here below:

Table 8-Breusch-Godfrey Serial Correlation LM Test (Summary)

Version of Test	Value	df	Probability
F-statistic	1.73386	Prob. F(12,88)	0.0729
Obs*R-squared	21.417	Prob. Chi-Square(12)	0.0446

Source: Author Estimation of Research Data (2015)

Table 8 shows that the Breush-Godfrey Serial Correlation LM Test gives an F-statistic of 1.7338 with a probability of 0.07229 and chi-square version gives statics of 21.417 with probability of 0.0446. Hence, from both versions of the test we fail to reject the hypothesis of no autocorrelation in the residuals at 1% significant level.

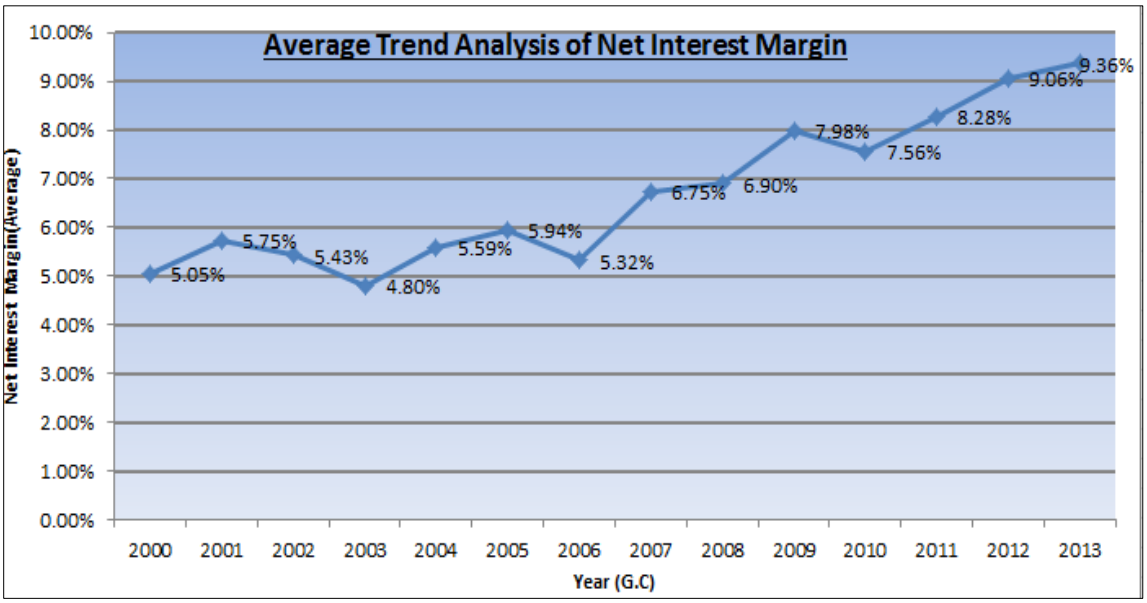
4.4. Trend Analysis of NIM from 2000-2013

This analysis establishes a pattern for Net Interest Margin (NIM) of commercial banks operating in Ethiopia during the period under consideration, which are from 2000-2013. Accordingly, the figure 3 provides a pictorial presentation for NIM from 2000-2013. In figure 3, x-axis represents years whereas y-axis represents the level of NIM in percentage of Commercial Banks in Ethiopia.

NIM is measured by taking the average of eight Commercial Banks in Ethiopia which is selected in the study for each year. As it can been seen from Figure 3, the trends of net

interest margin which is calculated as interest incomes on loan to total loans minus interest expense on deposit to total deposits for the period from 2000 to 2013 were increasing.

Figure 3-Average trend analysis of net interest margin



Source: Own computation from NBE via Pivot Data Analysis Tool (2010)

The lower NIM is 4.8% (2003) and the higher 9.36 % (2013). This significant increase of NIM could result from the following factors:

- Lack of changes in the structure and institutional behavior of the Ethiopian Banking system shown by concentration (Ahmed & Desalegn, 2014) and the barring conditions of free entry and competitive pricing (Sime et.al., 2013) that contributed for significant increase in net interest margin.

- High reserve requirements set by National Bank of Ethiopia. The reserve requirement increase from 5 to 10 percent starting July 2007 (NBE directive no SBB/42/2007) and as per Directive No‟s SBB/44/08 and SBB/45/08, the reserve and liquidity requirements increased from 10 Percent to 15 Percent and from 15 Percent to 25 Percent (20 percent in the form of primary reserve and 5 percent secondary reserve), respectively starting from 7th day of April 2008., which act as implicit financial tax. While reserve requirements may be designed with the aim of protecting depositors, the availability of a pool of resources allows for financing

high fiscal deficits through the implicit financial tax, creating an environment that can promote high inflation and persistent high intermediation margins.

- High operational costs have also been found to be a source of persistent and wide intermediation margin in developing countries like Ethiopia. High operational costs reflect variations in cost of capital, employment, and wage levels. Inefficiency in bank operations may also be shifted to bank customers through wide margins.

- The cost of capital that banks hold to cushion themselves against risks is relatively more expensive than debt because of taxation and such factor may lead to high margin and macroeconomic instability and the policy environment may also affect the pricing behavior of commercial banks.

4.5. Statistical Distinguish Between Models

With panel/cross sectional time series data, the most commonly estimated models are probably fixed effect and random effects models. The researcher has used fixed effect regression instead of random effect model because of the following reasons:

i. 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. On this score, FEM may be preferable since the number of time series (i.e. 14 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks).

ii. According to (Brooks, 2008; Verbeek, 2004 and Wooldridge, 2004), it is often said that the REM is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a FEM is more plausible when the entities in the sample effectively constitute the entire population/sample frame. The sample for this study was not selected randomly rather purposively and as such FEM is more appropriate than REM.

iii. According to (Richard, 2015), the nature of the variables that have been omitted from the model affects the selection of the models i.e. if we think there are no

omitted variables–or if we believe that the omitted variables are uncorrelated with the explanatory variables that are in the model, then a random effects model is probably best. However, if there are omitted variables that are correlated with the variables in the model, fixed effects models may provide a means for controlling for omitted variable bias. In a fixed-effects model, subjects serve as their own controls. In this study, the researcher identified variables that are omitted such as quality of management, management style, differences in the skills of the workforce, and others which were correlated to explanatory variables. Thus, the FEM is more preferable.

iv. According to (Richard, 2015), with fixed effect models, we do not estimate the effects of variables whose value do not change across time. Rather, we control for them or "partially them out". This is similar to an experiment with random assignment. Radom effect models will estimate the effects of time-invariant variables but the estimates may be biased because we are not controlling for omitted variables.

Considering the above theoretical backgrounds in to consideration, the researcher has adopted fixed effects regression technique instead of random effect models.

4.6. Results of Regression Analysis and its Interpretation

4.6.1. Results of Regression Analysis

This section presents the regression result of fixed effect model that examines the determinant of cost of financial intermediation (CFI) of commercial banks in Ethiopia.

Operational model: the operational panel regression model used to find the statistically significant determinants of cost of financial intermediation in Ethiopian commercial banks was:

$$NIM_{it} = \alpha_i + \beta_1 * OER_{it} + \beta_2 * LLP_{it} + \beta_3 * CAR_{it} + \beta_4 * ROA_{it} + \beta_5 * LNSIZE_{it} + \beta_6 * LIR_{it} + \beta_7 * OCR_{it} + \beta_8 * HHI_{it} + \beta_9 * MSD_{it} + \beta_{10} * GDP_t + \beta_{11} * INF_t + \epsilon_{it} \dots \quad (4.1)$$

Accordingly, Table 9 below presents the result of fixed effect regression model that examines the impact of explanatory variables on financial intermediation cost proxied by net interest rate margin (NIM). Hence, NIM ratio is dependent variable whereas operating expense ratio, loan loss provision, capital adequacy ratio, return on asset, growth of asset, liquidity risk, opportunity cost of reserve, market concentration, market share of deposit; economic growth and inflation rate are explanatory variables.

Table 9-Results of fixed effect regression model

Explanatory Variables	Coefficient	Std. Error	t-Statistic	Prob.
Operating Expense Ratio (H1*)	0.762337	0.207551	3.673004	0.0004*
Loan loss Provisions (H2*)	-0.089025	0.010196	-8.731600	0.0000*
Capital Adequacy Ratio (H3*)	0.102533	0.033256	3.083162	0.0027*
Return on Asset (H4**)	0.001901	0.004840	0.392805	0.6954***
Growth of an Assets (H5*)	-0.003766	0.001206	-3.121882	0.0024*
Liquidity Risk (H6*)	-0.042262	0.010530	-4.013554	0.0001*
Opportunity Cost Reserve (H7*)	-0.037035	0.013386	-2.766765	0.0068*
Market Concentration (H8*)	0.036640	0.016241	2.255965	0.0264**
Market Share of Deposit (H9*)	0.013186	0.003419	3.856818	0.0002*
Economic Growth (H10*)	0.054434	0.024873	2.188458	0.0311**
Inflation (H11*)	0.023653	0.008642	2.736951	0.0074*
Constant	0.110723	0.014235	7.77825	0.0000

R-squared	*0.782803*	*Log likelihood*	*395.51970*
Adjusted R-squared	*0.740765*	*F-statistic*	*18.62125*
S.E. of regression	*0.007771*	*Prob(F-statistic)*	*0.00000*
Sum squared resid	*0.005615*	*Durbin-Watson stat*	*1.79658*

Note: *significant at 1%, **significant at 5%, and ***insignificant
H* accept null and H** reject null hypothesis

Source: Own estimation of research data (2015)

Based on the regression result, the relationship between the variables included in the model can, therefore, be represented as follows;

$$NIM = 0.1107 + 0.7623 * OER - 0.0890 * LLP + 0.1025 * CAR + 0.0019 * ROA - 0.0037 * LNSIZE - 0.0422 * LIQR - 0.0370 * OCR + 0.0366 * HHI + 0.0131 * MSD + 0.0544 * GDP + 0.0236 * INF \ldots. \quad (4.2)$$

Where: - Dependent variable-net interest margin (NIM) and independent variables includes- bank specific variables (OER-operating expense ratio, LLP-loan loss provision,

CAR-capital adequacy ratio, ROA-return on asset, LNSIZ-growth of asset, and LIQR-liquidity risk), industry specific variables (OCR-opportunity cost of obligatory reserve, HHI-market concentration, and MSD-market share of deposit) and macroeconomic specific variables (GDP-economic growth and INF-inflation rate).

4.6.2. Interpretation of R-squared, Adjusted R-squared and F-statistic

4.6.2.1. Interpretation of R-squared

As shown in Table 11, an R-squared coefficient of 0.782803 obtained from the estimated model; revealing that 78.28 percent of variation in interest rate margin or cost of financial intermediation (CFI) is explained by the selected explanatory variables (operating expense ratio, loan loss provision, capital adequacy ratio, return on asset, growth of asset, liquidity risk, opportunity cost of reserve, market concentration, market share of deposit, economic growth and inflation rate).

The R-square result makes sense because there are other factors such as quality of management, management style, differences in the skills of the workforce that were not included in the model but could help in explaining net interest margin or cost of financial intermediation in Ethiopian commercial banks. These and other remaining factors can account for the remaining 22.02 percent.

4.6.2.2. Interpretation of Adjusted R-squared

An adjusted R-squared value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models. In other words the adjusted R-squared shows satisfactory levels, which mean that nearly 74 percent of the volatilities in the interest rate margin or cost of financial intermediation, are explained by the volatilities of independent variables included in the equation. Therefore, an adjusted R-square having value of 0.740765 shows that 74.08 percent of dependent variable is explained by the independent variables included in the model.

4.6.2.3. Interpretation of F-Statistics

The F-statistics tests the fitness of the model and a recommended F-statistics should be greater than 5 for it to be considered fit. The regression F-statistic takes a value of 18.62125 which is greater than 5 hence the model was fit for estimation.

Furthermore, F-statistics tests for the joint impact of all explanatory variables on the dependent variables. A corresponding p-value of zero attached to the test statistic shows that the null hypothesis that all of the slope parameters are jointly zero should be rejected even at 1 percent level of significance. This implies that all selected explanatory variables can affect the level of interest rate margin or cost of financial intermediation jointly.

4.6.3. Interpretation Results of the Regressors Values

According to the regression results, bank specific factors, market/industry specific factors and macroeconomic factors determine the width of net interest rate margin or cost of financial intermediation. From the results except return on asset all bank specific factors, market/industry specific factors and macroeconomic factors used in the study had the greatest influence on cost of financial intimidation of commercial bank of Ethiopia a detailed analysis of each of the variables of the model is provided below.

4.6.3.1. Bank-Specific Characteristics

All the coefficients for the bank specific variables have the expected signs (except loan loss provisions) and are highly significant at one present in all the estimated equation except return on asset which is insignificant even at 10% significant level.

A. Operating Expense (OER) on Financial Intermediation Cost

For operating expense, considering the regression model, the coefficient of the operating expenses variable displays (as expected) a positive in its relationship with the bank‟s net interest margin and it is statistically significant at 1 percent significant level. This result implies that the net interest margin increases when the operating expenses increase, in order to cover the additional cost. Banks that are not able to keep their overheads at low levels will raise the margin to compensate for the extra costs of operations and can be considered operationally inefficient. The expansion of retail banking products, increasing

retail branch networks and rising staff costs as a result of a salary increase award to bank workers contributed much to the rising costs of operations.

This result is consistent with the economic theory which premises a positive relationship between the bank interest rate margin and overhead costs. Banks that incur high overhead costs are associated with wide bank margin and higher costs indicate banking inefficiency. These results are consistent with other scholars who also found a positive relationship between the interest margin and bank operating costs (Liebeg & Schwaiger, 2006; Naceur, 2003; Abreu & Mendes, 2003; Maudos & Guevara, 2004, Maria & Agoraki, 2010; Carbo & Rodrigues, 2007). (Beck & Dermigurc-Kunt, 2009) noted that overhead costs are generally higher in developing poorer countries therefore they are of greater relevance in the Ethiopia since the country is still developing.

The statistically significant impact of operating expense on net interest margin is in line with hypothesis 1. In the Ethiopian commercial banks, the ratio of operating expenses (non-interest expense) to total assets has an estimated coefficient of 0.7623 in the net interest margin regression, which means that a unit increase in operating expenses results in 0.7623 unit increase in net interest margin passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates). Economic magnitude of the variable is the largest among bank-specific determinants, suggesting that a standard deviation increase in operating expense increases the net interest margin by 0.76 units.

B. Loan Loss Provision (LLP) on Financial Intermediation Cost

For loan loss provision, considering the regression model, the coefficient sign of the credit risk variable is negative in its relationship with the bank‟s net interest rate margin and statistically significant at 1 percent significant level. The relationship of non-performing loans to the interest rate margin shows that an increase in the quantity of non-performing loans leads to a decrease of the interest rate margin. Ethiopian banks during this period have given more importance to loan market share increase, which is reflected in the balance sheet position. During this period, the banks have increased the variety of loan products that offer, but have shortened the processing time, deriving from the increasing competition in loan market. And also NPLs shows a downward sloping in commercial banks in Ethiopia over the time of 2002-2013 (Gadise, 2014).

According to empirical results such as (Angbazo, 1997; Demirgüç-Kunt & Huizinga, 1998; Abreu & Mendes, 2003) a positive correlation was expected. In some studies made in Argentina and Peru (Brock & Rojas-Suarez, 2000) and (Doliente, 2003) it is concluded that the sign of the coefficient is negative, which means that the margin reacts negatively to a nonperforming loans‟ increase. In Ethiopia case, the margin reacts negatively to the increase of the nonperforming loans in that period. A significant negative relationship indicates that NIM falls as the quality of loans declines (due perhaps to inadequate provisioning for loan losses or regulators reluctance to close banks in trouble, may even encourage high risk taking behavior banks with large bad loans may lower margin in trying to solve problems, (Brock and Suarez, 2000).

The statistically significant impact of loan loss provision on net interest margin is in line with hypothesis 2. In Ethiopian Commercial Banks, the ratio of total loan and advance to total assets has an estimated coefficient of -0.089025 in the net interest margin regression, which means that a unit increase in the non-performing loans brings about 0.0890 unit decreases in the interest rate margin. The variable has a t-test of over 2 (larger t-value of 8.76160) which implies that it is a very significant variable in the model.

C. Capital Adequacy Ratio (CAR) on Financial Intermediation Cost

In respect to the model specifications, the CAR proxy by capital and reserve to total asset shows a positive and significant (at 1 percent significant level) impact in its relationship with the banks' net interest margin. Capital adequacy measures the ability of the bank to absorb the risks emanating from its different banking activities. This result implies that the net interest margin increases when increasing the level of capital. This indicates that the addition of the required amount of capital in order to support business in normal and abnormal conditions will increase the cost of capital of the bank. Banks will finance an increase in the cost of capital by raising the net interest margin. The relationship point to the fact that the costs of keeping high levels of bank capital (increase in legal reserve) makes banks to charge high spreads.

This result is consistent with the economic theory which premises a positive relationship between the bank interest rate margin and capital. This result concurs to the bulk of the research which associates banks with high capital levels to incur high margin. Such conclusion is in line with previous evidences. Banks often hold more capital above the

regulatory minimum capital requirement for additional risk exposure, and the costs of such high capital ratio may be covered by widening the spread between lending and deposit rates. (Saunders & Schumacher, 2000) provide evidence in developed countries of the positive and significant relationship between margin and capital ratio. A positive relationship with NIM is expected as net interest rate margins should increase the capital base as the exposure to risk increases (Ho & Saunders, 1981; Berger, 1995). However, high capital adequacy may reflect greater banking stability and contribute to lower interest rate margins (Horvath, 2009 and Hawtrey & Liang, 2008).

The statistically significant impact of capital on net interest margin is in line with hypothesis 3. In the Ethiopian commercial banks, the ratio of capital to total assets has an estimated coefficient of 0.102533 in the net interest margin regression, which means that a unit increase in capital results in 0.1025 unit increase in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

D. Profitability(ROA) on Financial Intermediation Cost

ROA is insignificant (even at 10 percent significant level) and positive. This indicating that net interest margin for commercial banks in Ethiopia is not related to an efficient use of assets and the positive relationship between net interest margin and ROA has implied that in other countries banks with a better ROA has the leverage to reduce net interest margin and improve the intermediation efficiency of the financial system. However, this is not the case in the Ethiopian. The positive effect could be also interpreted as an indication of profit-maximizing behavior whereby banks with higher profitability relative to average assets are not inclined to charge higher borrowing rates relative to the deposit rates in Ethiopia.

The statistically insignificant impact of profitability (ROA) on net interest margin is not in line with hypothesis 4. In the Ethiopian commercial banks case, the ratio of net income after tax and provision to total assets has an estimated coefficient of 0.001901 in the net interest margin regression, which means that a unit increase in return on asset results in 0.002 unit increase in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates) but statistically insignificant.

E. Bank Asset Growth (LNSIZE) on Financial Intermediation cost

In respect to the model specifications, the bank size was proxied by the natural logarithm of assets. Asset growth of each bank shows a negative and significant (at 1 percent significant level) impact in its relationship with the banks' net interest margin. This implies that bank size was able to explain the rising bank net interest margin but had a negative sign. Estimation result suggests that larger banks in terms of total asset tend to have lower margins. This finding is consistent with theories emphasizing the importance of scale effects for financial intermediation costs.

(Liebeg & Schwaiger, 2006 and Maudos & Guevara, 2004) suggest a positive relationship between the size of a bank and NIMs; however, the literature presents contrasting results (Fungacova & Poghosyan, 2009) argue that due to increased economies to scale, banks that maintain sufficient asset should benefit from their size and have lower margins.

The statistically significant impact of asset size on net interest margin is in line with hypothesis 5. In the Ethiopian commercial banks, the bank size has an estimated coefficient of -0.003766 in the net interest margin regression, which means that a 100% change (increase) in asset growth generate 0.0038 change (decrease) in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

F. Liquidity Risk (LIQR)on Financial Intermediation Cost

The liquidity coefficient is negative and significant at 1 percent, indicating lower interest rate margin for banks with a higher proportion of liquid assets. The high level of liquidity arises mainly from the inability/reluctance of commercial banks to extend risky loans at competitive rates or protecting of providing credit (credit selling set by NBE). Consequently, such banks tend to invest in short-term liquid investments that yield lower interest revenue (or noninterest income). Periodic increase liquidity requirement by NBE like from 15 to 25 percent (SBB/45/08) has posed pressures on reduction of intermediation margin. The negative relationship implies that in the economy with liquidity shortages, large banks like commercial bank of Ethiopia are able to mobilize funds at lower costs through bank deposits hence can charge lower spreads. Banks that

are highly liquid are associated with lower interest rate margin as they do not have to incur extra costs of sourcing funds when faced with increased demand for credit.

Bank liquidity may have either a negative or positive effect on interest rate margins. The negative effect of bank liquidity on interest margins implies that excess liquidity by banks does not lead to higher interest rate margins, which may be due to existence of low deposit rates and government debt instruments for banks. The positive effect of bank liquidity on interest margins is a scenario where banks with excess holdings of liquid assets incur more opportunity costs which they pass over to borrowers. Holding liquid assets reduces the risk that banks may not have adequate cash to meet deposit withdrawals or new loan demand (i.e. liquidity risk); forcing them to borrow at excessive costs. Consequently, as the proportion of liquid assets increase, a bank‟s liquidity risk decreases, leading to a lower liquidity premium component of the net interest margin (Angbazo, 1997 and Drakos, 2003).

The statistically significant impact of liquidity risk on net interest margin is in line with hypothesis 6. In the Ethiopian commercial banks, the liquidity risk proxied by liquid asset to total asset ratio has an estimated coefficient of -0.042262 in the net interest margin regression, which means that a unit increase in liquid risk results in 0.042 unit decreases in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

4.6.3.2. Industry/Market-Specific Characteristics

Bank specific factors are not adequate in explaining variations in bank margin since banks‟ margins are mostly determined at industry level. The identified factors such as the degree of competition in the industry, market structure and the obligatory reserve requirement as the factors those are relevant in explaining bank margin.

A. Opportunity Cost of Reserves (OCR) on Financial Intermediation Cost

The opportunity cost of obligatory reserve coefficient is negative (unexpected) and significant at 1 percent, indicating lower interest rate margin for banks with a higher opportunity cost of reserves (OCR). The opportunity cost of obligatory reserves is proxied by the level of cash at National Bank of Ethiopia (reserve account with NBE) in terms of its total assets. Surprisingly, commercial banks in Ethiopia tend to decrease the

margins instead of increasing the margin in order to compensate for the missing incomes from investing in obligatory reserves (zero interest rates).

The relationship between OCR and NIM is not positive as expected but significant; a number of studies report a positive and significant relationship (Saunders & Shumacher, 2000; Maudos & Solis, 2009; and Maudos & Guevara, 2004) and others like (Neelesh & Parmendra, 2011) found negative relationship. The result above, perhaps, banks in Ethiopia do not mind the regulatory requirements. Perhaps, there really is a lack of bankable projects in Ethiopia since the government uses "government bond" as a means to finance those projects and regulatory requirements provide decent alternative use of funds.

The statistically significant impact of opportunity cost of reserve on net interest margin is in line with hypothesis 7. In the Ethiopian commercial banks, the opportunity cost of obligatory reserve proxied by reserve account with NBE to total asset ratio has an estimated coefficient of -0.037035 in the net interest margin regression, which means that a unit increase in opportunity cost of obligatory reserve results in 0.037 unit decreases in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

B. Market Concentrations (HHI) on Financial Intermediation Cost

For market concentration of the banking sector (measured by Hirschman Herfindahl index (HHI) for total asset), the estimated coefficient is positive and statistically significant (at 5% significant level). The result shows a positive relationship between market concentration and net interest margin among the commercial banks in Ethiopia. Generally, increase in HHI indicates a decrease in market competition and increase in market power of larger firm (Ahmed & Desalegn, 2014).This indicates that the impact of concentration on interest margins depends on bank efficiency in utilizing its asset. In other words, compared to inefficient banks, highly efficient banks increase their margins more in concentrated markets. Because inefficient banks have higher costs, when the market becomes more concentrated they can increase their margin by less than their inefficient competitors. What can be seen for the Ethiopian banking sector is that the relative-market power hypothesis is confirmed. This means that the banks that operate in Ethiopia exploit the higher level of market concentration; implying more market power

by few larger banks and fewer competitions and hence is likely to be associated with higher intermediation margin.

This was in line to other empirical studies where the bank concentration index had a positive and significant effect on interest rate spreads. For example, margins have been found to be positively related to the level of market concentration in European banking sector (Saunders & Schumacher, 2000 and Maudos & Guevara, 2004), and the US (Angbanzo, 1997). Highly concentrated banking industries are associated with wide spreads. The few banks that possess market power are likely to collude and raise margin in order to earn higher returns (Afzal & Mirza, 2011)

The statistically significant impact of market concentration on net interest margin is in line with hypothesis 8. In the Ethiopian commercial banks, the market concentration proxied by sum of square of total asset has an estimated coefficient of 0.036640 in the net interest margin regression, which means that a unit increase in market concentration results in 0.037 unit increase in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

C. Market Share (MSD) on Financial Intermediation cost

The coefficient on market share of deposit is positive and significant at 1 percent significant level; suggesting that the ability to exercise power in the market as measured by the market share of deposits that a bank holds was significant in explaining interest rate margin in Ethiopia. The positive relationship between the market share of deposits and interest rate margin shows that large banks in terms of deposit set higher interest rate margin whilst smaller banks (in terms of deposit) that own a smaller portion of the market charge lower interest rate margin in order to attract customers. The ability of large banks to negotiate higher interest rate margin shows that there is a lack of an incentive to improve on efficiency which causes them to raise interest rate margin. Relative-market hypostasis was confirmed.

This result was consistent with the rest of literature which postulates that a positive relationship exists between bank margin and market share. Few studies such as the one conducted in Pakistan by (Afzal & Mirza, 2011) found a negative relationship between the margin and market share.

The statistically significant impact of market share on net interest margin is in line with hypothesis 9. In the Ethiopian Commercial Banks case, the market share of deposit proxied by logarithm of share of deposit has an estimated coefficient of 0.013186 in the net interest margin regression, which means that 100% change (increase) in market share generate a 0.0132 change (increase) in net interest margin or cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

4.6.3.3. Macroeconomic-Specific Characteristics

The level of stability in an economy has a bearing on the way banks set margin. Generally, low bank margin have been associated with countries that have economic stability. The macro economy is made up of factors such as the inflation rate and business cycles as measured by the gross domestic product growth in the economy.

A. Economic Growth on Financial Intermediation Cost

Business cycles occur in the economy. At times the economy can experience a boom or a recession. These cycles alternate from time to time. Business cycles are measured by the changes in the growth of the gross domestic product of an economy. High GDP levels resemble a boom in the economy and low GDP show that the economy is experiencing difficulties at that time. The coefficient on GDP is positive and significant (at 5 percent significant level), the real growth in gross domestic product which is denoted by GDP in the model. This variable has a positive relationship with the interest rate margin. This implies that in a boom of the economy fewer loan defaults normally occur during these periods.

There is no consensus on how economic growth affects interest margins. Some studies argue that economic growth has a positive effect on interest margins (Claessens et al., 2001), others do not find any effect in cross country studies of European countries (Abreu & Mendes, 2003 and Maria & Agoraki, 2010), while a majority find a negative effect (Demirgüç-Kunt & Huizinga, 1999; Demirgüç-Kunt et al., 2004 and Carbo & Rodriguez, 2007). As (Valverde et al., 2004) noted that because of the costs of intermediating between savers and borrowers, only a fraction of the savings mobilized by banks can be

finally channeled into investments as some of the savings will be absorbed by costs. This, therefore, implies that inefficiency can result in a reversal or offsetting of the gains of GDP. This seems to be one of the reasonable reasons why the Ethiopian banks interest rate margin continues to widen even if GDP is growing.

The statistically significant impact of GDP on net interest margin is in line with hypothesis 10. In the Ethiopian commercial banks, the real growth in gross domestic product has an estimated coefficient of 0.054434 in the net interest margin regression, which means that a unit increase in the real growth in GDP is leading to a 0.054 unit increase in the interest rate margin. As the growth in the GDP represents an increase in production and economic capacity in a nation, it can have effect to widen net interest margin or increase the cost of financial intermediation that would be passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates).

B. Inflation on Financial Intermediation Cost

Inflation refers to changes in the price level in an economy. The general inflation rate proxied by yearly rate of change of the consumer price index has been significant at 1 percent significant level and the coefficient having a positive sign. This shows that the general performance of the price index plays a very crucial role in the width of the interest rate margin. High inflation is expected to result in the non-normalization of prices in the economy which in turn result in high costs of doing business. Higher costs are expected to result in higher margin which means. These extra costs of operations are then passed on to the customers by increasing the margins to preserve purchasing power.

The financial statements of banks showed an increase in the salaries of bank personnel which raised staff costs. Banks therefore, continued to suffer from high costs of doing business although there were lower levels of inflation recorded in the economy. This being the case, banks was very sensitive to slight changes in the inflation rate. The result shows that lower inflation did not benefit much for the banking industry in terms of cost reduction during the period.

These findings are in line with rest of the literature which premises that the spreads are likely to rise in the event that there are high costs of doing business. A positive relationship between inflation and NIM has been observed in previous studies (Demirgüç-

Kunt & Huizinga, 1999; Claessens et al., 2001; Drakos, 2002; Gelos, 2009), since bank spreads may be correlated with the inflation level (Gelos, 2009). Thus, a positive relationship between the net interest margin and inflation has been established especially in developing countries (Chirwa & Mlachila, 2004).

The statistically significant impact of inflation on net interest margin is in line with hypothesis 11. In the Ethiopian commercial banks, inflation has estimated coefficient of 0.023653 in the net interest margin regression, which means that a unit increase in the level of inflation results in a 0.0237 unit increase or widening of interest rate margin or increase in cost of financial intermediation passed on to its lenders and depositors (by setting higher loan rates or lower deposit rates). The impact of inflation was able to explain why bank margins are widening in Ethiopia. This result was most expected in Ethiopia because the double digit inflation rate regime that was prevalent failed to normalize the prices of other goods and services in the economy.

4.7. Summary

This chapter discussed the results of the study regarding to the determinant of cost of financial intermediation in Ethiopia banking sector. Trends of net interest margin proxy of financial intermediation cost of commercial banks, descriptive statistics, and some diagnostic tests for classical linear regression model assumptions were presented.

The trend analysis of net interest margin of commercial banks in Ethiopia shows an upward sloping in NIM; i.e. from 4.8 percent (2003) and to 9.36 percent (2013) for the period under consideration. The descriptive statistics confirmed that data are in a good level of consistency, stability normally distributed. Following the descriptive statistics, tests for normality, heteroscedasticity, multicollinearity and autocorrelation problems were checked.

Eventually, the result shows that bank interest margin in Ethiopia were mainly driven by bank specific factors, market/industry specific factors and macroeconomic factors. From the results except return on asset, all bank specific factors, market/industry specific factors and macroeconomic factors used in the study had the greatest influence on determinants of cost of financial intermediation of commercial banks of Ethiopia whilst loan loss provisions, opportunity cost of obligatory reserve and economic growth were

found to have opposite effect from what they were hypothesized. The result of this finding is summarized in the following table 10.

Table 10 Summary of actual and expected signs of explanatory variables on the dependent variables

Classification	Variable	Predicted Sign and Significant	Actula Sign and Significant
1.Bank Specific Variables	Operating Expense Ratio (H1*)	Positive and Sig	Positive and Sig
	Loan loss Provisions (H2*)	Positive and Sig	Negative and Sig
	Capital Adequacy Ratio (H3*)	Positive and Sig	Positive and Sig
	Return on Asset (H4**)	Positive and Sig	Positive and Insig
	Growth of an Assets (H5*)	Negative and sig	Negative and sig
	Liquidity Risk (H6*)	Negative and sig	Negative and sig
2. Industry or Market Specific Variables	Opportunity Cost Reserve (H7*)	Positive and Sig	Negative and Sig
	Market Concentration (H8*)	Positive and Sig	Positive and Sig
	Market Share of Deposit (H9*)	Positive and Sig	Positive and Sig
3. Macroeconomic Specific Variables	Economic Growth (H10*)	Negative and sig	Positive and Sig
	Inflation (H11*)	Positive and Sig	Positive and Sig

Note: H* accept null and H** reject null hypothesis
Sig- Statistically Significant
Insig- Statistically Insignificant

Source: Own organizaion

The next chapter will look at the summary of the study, conclusions of findings and recommendations to the study.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The study established the factors that determine cost of financial intermediation in Ethiopia banking sector during the period from 2000-2013. Findings indicated that bank margins are influenced by overhead costs, loan loss provisions, capital adequacy, bank size, liquidity risk, opportunity cost of reserve, market concentration, market share, economic growth and inflation. This chapter outlines the summary and conclusions of the study in accordance with the study results. It also gives an insight on the policy recommendations as well as suggestions for future studies.

5.2. Summary of the Study

The thrust of the study was on identifying the determinants of cost of financial intermediation in commercial banks operating in Ethiopia. Studies of bank interest rate spreads have generally relied on the net interest margin as the measure of cost of financial intermediation. However, the availability of more disaggregated data through the bank‟s income statements has recently allowed researchers to explore other form of spreads. In this study the net interest margins (NIMs) is calculated from the selected banks‟ balance sheet and income statement. The hypothesis of the study was that bank net interest margin is influenced by bank specific, industry specific and macroeconomic factors. The research employed the models proposed for the determination of bank net interest margin such as (Demirgüç-Kunt and Huizinga, 1999; Abreu and Mendes, 2002, and Athanasoglou et al., 2005) models and the Dealership model. These models premised that the role of banks is to provide liquidity to the economy and that the bank margin act as an incentive to perform this role. Banks‟ major objective is to earn maximum profits for shareholders.

Literature also identified lack of efficiency, lack of competition in deposit markets, poor risk absorption capability and macroeconomic instability as the major drivers of cost of financial intermediation in developing countries. The major factors identified from literature as causes of wide net interest margin fall in three categories: (i) individual bank-specific factors such as operating or administrative costs, non-performing loans,

return on assets, capital of the bank, bank size, and bank liquidity; (ii) factors specific to the banking sector/industry such as the degree of competition or market concentration, regulatory requirements such as obligatory reserve requirements, and market share and, (iii) macroeconomic indicators which include real gross domestic product (GDP) growth rate and inflation.

The literature differs about the category of factors that had the greatest influence on financial intermediation cost. Some of the studies argue that the main determinants of net interest margins are bank-specific factors; whereas others claim that the industry-specific factors are more important. Others also argue that the macroeconomic factors are the most important factors that explain the level of interest rate margins; particularly in developing countries like Ethiopia. Therefore, there is a continuous debate on the key determinants of cost of financial intermediation (CFI) in a country. Cognizant of the need for further research in the area, the current study proposed a model based on literature to analyze the effects of bank specific, industry/market specific and macroeconomic factors on net interest margin or cost of financial intermediations.

An explanatory research design was adopted to explain the casual relationships between the variables. The study employed quantitative methods on secondary data sourced from financial statements of banks, industry variables, and NBE publications for macro-economic variables.

Results from the regression analysis estimated by fixed effect regression model showed that overhead costs, loan loss provisions, capital, growth of an asset size, liquidity risk, opportunity cost of reserve, market concentration, market share, economic growth and inflation had a significant effect on the determination of net interest margin or cost of financial intermediation cost in Ethiopian banking sector. The impact of profitability in terms of asset (ROA) on bank interest rate margin could not be established because it might be due to the inadequacy of the proxy (ROA) used to represent the variable to accurately reflect its perceived effects.

Generally, ten findings out of eleven were in line with literature which postulates that bank specific variables, industry/market specific variables and macroeconomic variables have an impact on bank net interest margin or cost of financial intermediation. Specific conclusion on each factor is depicted in the following section.

5.3. Conclusions

This section presents the conclusion drawn from findings of the study.

- Related to operating expenses, the increase in the intermediation margins of banks that operate in Ethiopia is significantly and positively affected by higher operating costs. Recently banks have been more aggressive towards the expansion in more geographical areas by opening new branches which has caused an increase in the level of operating expenses; resulting in intermediation margin increase.

- Concerning to loan loss provision, the intermediation margin reacts negatively towards the increase of nonperforming loans proxied by loan loss provision. Cost of financial intermediation falls as the quality of loans declines due perhaps to inadequate provisioning for loan losses or regulators reluctance to close banks in trouble, may even encourage high risk taking behavior banks with large bad loans may lower margin in trying to solve problems. In other words banks might not involve in financing risky loans which results a lower amount of provisions and it might ultimately results a lower intermediation margin.

- The most surprising result of the research is the profitability of banks which is not statistical significance in determination of cost of financial intermediation. Although this bank specific variable has been highlighted in the literature as one of the determinants of interest rate spreads in numerous countries, it was unable to explain the variation in banking sector intermediations of the Ethiopian economy studied. The failure of significance of profitability might be due to the inadequacy of the proxy (ROA) used to represent the variable to accurately reflect its perceived effects.

- About capital of the banks, the study showed that the intermediation margin increases when increasing the level of capital. The addition of the required amount of capital in order to support business in normal and abnormal conditions or in case when banks add more capital (as a result of NBE‟s requirement or activity rise according to the level of license taken) would result in an increase in the cost of capital by raising the net interest margin. The cost of keeping high levels of bank capital like legal reserve (i.e. 25% of annual net profit until the reserve equals capital amount and 10% of net

profit after the legal reserve equals capital amount) makes banks to charge high intermediation margin.

- In regarding to bank size which is proxied by percentage growth of an asset, the study showed that the intermediation margin decreases when the bank size increases. Larger banks in terms of total asset like commercial bank of Ethiopia tend to have lower margins because of large economic of scale and ability to invest in technology that would enhance efficiency.

- In connection with liquidity, the study indicated that the intermediation margin decreases when the bank liquidity increases or reduces liquidity risk. Liquidity arises mainly from the inability/reluctance of commercial banks to extend risky loans at competitive rates or credit selling set by NBE which leads banks to invest in short-term liquid investments that yield lower interest revenue. In addition to this, periodic increase in liquidity requirement by NBE like from 15% to 25% (SBB/45/08) has posed pressures on reduction of intermediation margin.

- Even though, the obligatory reserve rate by NBE has ranged from 15% (SBB/43/08) to 5% (SBB/14/96, SBB/37/04, SBB/55/13) during the period taken into account, the increase in the volume of deposits (deriving from attractive offers made by the banks) has led to the increase of the volume of the obligatory reserves settled in the National Bank of Ethiopia. The missing income from the investment of this reserve in more profitable activities has obliged the banks to pass a part of these costs to their clients. But, practically in Ethiopia this did not happen this might be, banks in Ethiopia could do not mind the regulatory requirements. Perhaps, there really is a lack of bankable projects in Ethiopia since the Ethiopian government recently uses “government bond” as a means to finance of projects and regulatory requirements provide decent alternative use of funds.

- Concerning to degree of computation measured by market concentration, the intermediation margin reacts positively towards the increase in computation pressure. Ethiopian banking system exploits the higher level of market concentration; which implies more market power by few lager banks and fewer competitions and hence is likely to be associated with higher intermediation margin.

- In connection to market share, the intermediation margin reacts positively towards the increase in market share. Banks with larger market share in terms of deposit are able to exercise market power in setting prices to earn higher net interest margin whiles smaller banks that own a smaller portion of the market charge lower net interest margin in order to attract customers.

- The intermediation margin reacts positively towards increase economic growth. The relationship is different from the expected sign which implies that inefficiency of banks in mobilizing deposits and channeling into investment that would result in a reversal or offsetting of gains of GDP.

- The intermediation margin reacts positively towards the increase in inflation. The relationship is similar to the expected sign. Since the county has experienced double digits inflation in the study period that results in higher costs of doing business; which leads to charging higher intermediation margin in order to cover the costs.

5.4. Recommendations

The empirical findings of the research have prompted the researcher to suggest the following policy recommendations:

5.4.1. Improving on Bank Efficiency

- Commercial banks need to improve on their operational efficiency for bank intermediation margins to lower. Improving operational efficiency by reducing operating expense using appropriate cost reduction strategies and improvement in asset quality will help to bring bank intermediation cost down. This can be done by moving towards mobile banking, internet banking and effective utilization of Automotive Teller Machine (ATM) facilities rather than the conventional banking methods which are very expensive.

- Commercial banks have properly managed liquidity and credit risk within the study period which contributes a lot for reduction of intermediation cost. Thus, commercial banks shall continue managing those risks and NBE shall also keep its

liquidity requirement in the future and NBE also rethinks supervision practices in connection with provisioning for loan losses by commercial banks even though it has favorable impact on intermediation margin.

- Increasing statutory reserve (like directive no SBB/4/95) and fostering compliance with capital requirements (like directive no SBB/24/95 and SBB/50/2011) would increase stability in the banking sector but in some way it can also lead to increase in intermediation cost to cover the higher cost of tied up of funds. Therefore, NBE shall take into account that the increase of capital and statutory reserve requirements has posed pressure on widen of cost of financial intermediation while revised directive in connection with capital and statutory reserve requirements.

5.4.2. Improving on Competition

- The study established that banks that possess a greater market share charge high intermediation margin. In Ethiopia the commercial banking sector has relatively a fewer players and the industry still lacks competition. Hence, there is need for the NBE to instill competition in the commercial banking sector in order to reduce intermediation cost. Usually, if there are many players in the industry, competition is likely to increase.

- The National Bank of Ethiopia need to understand the competition level of banking industry in Ethiopia in order to scale up and strengthen financial sector development which ultimately results low intermediation cost in the industry. It is also important to draw a lesson from other developing countries which exercise low intermediation cost and adapts important practices of financial sector into Ethiopian economy.

5.4.3. Improving Economic Environment

- At the regulatory or supervisory level, the result of the study is relevant for policy makers, since it implies that in order to achieve lower intermediation cost; public policy shall be oriented towards creating the necessary market conditions for banks to enhance their efficiency. The study suggests the importance of ensuring and

promoting favorable economic situations such as lower inflation rate and sustainable economic growth like GDP per capita.

- Even though the NBE impose control over deposit rate in order to keep lending rate low with the aim of improving efficiency in the intermediation process, the study identified an increase in net interest margin in the study period showing that the interest rate policy was not effective in bringing intermediation cost down. By increasing the lending rate it is easy to transfer the costs of inefficiency to the customers. When market forces fail to instill efficiency as in this case, there is need for the NBE to introduce lending interest rate ceilings to limit the growth in the lending rates. This strategy shall be approached with caution since imposition of tight controls can harm the industry.

Overall, the results provide evidence that bank specific, industry/market specific and macroeconomic variables determine the cost of financial intermediation in Ethiopia commercial banks.

5.5. Suggestions for Future Studies

The prime focus of this research was on identifying determinants of cost of financial intermediation in the case of commercial bank in Ethiopia using selected variables. However, there are so many bank specific, industries specific and macroeconomic variables that were not included in this study. Thus, future researchers are recommended to undertake similar study by considering additional variables such as ownership, exchange rate, management risk aversion and the like on the same banks. Such researches are useful to validate findings of the current study. Furthermore, future research can consider undertaking the same study by considering the newly emerging banks.

REFERENCES

Abreu, M., & Mendes, V. (2002). Commercial Bank Interest Margins and Profitability Evidence for Some EU Countries. CISEP No. 830.

Abreu, M., & Mendes, V. (2003). Do Macro-Financial Variables Matter for European Bank Interest Margins. Financial Management Association International.

Admas, J. T., Robert, R., & White, D. (2007). Research Methods forGraduate Business and Social Science Students.

Afzal, A., & Mirza, N. (2011). Market Discipline in Commercial Banking: Evidence from the Market for Bank Equity. The Lahore Journal of Economics, pp. 233-254.

Ahmed, Z., & Desalegn, G. (2014). Structure Competation of Banking Industry in Ethiopia. Birritu, 26.

Ahmet, U., & Hakan, E. (2010). Determinants of the Net Interest Margins of Banks in Turkey. Journal of Economic and Social Research, 12(2), 101-118.

Ahokpossi, C. (2013). Determinats of Bank Intrest Margins in Sub-Saharan Africa. IMF Working Paper Wp/13/34.

Akinlo, A. E., & Babatunde, O. (2012). The Determinants of Interest Rate Spreads in Nigeria: . Department of Economis, Obafemi Awolowo University, Ile-Ife, Nigeria, 837-845.

Angbazo, L. (1997). Commercial Bank Net Interest Margins, Default Risk, Interest-Rate Risk and Off-Balance. Journal of Banking and Finance, 21(1), 55–87.

Barajas, A., Steiner, R.; Salazar, N. (1999). Intrest Spread in Banking in Colombia 1974-96. IMF staff Paper(46), 196-224.

Beck, T., & Hesse, H. (2009). Why Are Interest Spreads So High in Uganda. Journal of Development Economics, 88(2), 192-204.

Bekaert, G. (1998). Regime Switches in Interest Rates. Cambridge, Mass: National Bureau of Economic Research.

Bernanke, b. (1998). Nonmonetary effects of the financial crisis in the propagation of the great Depression. American Economic Review, 7, 7-7.

Brock, P., & Rojas-Suarez, L. (2000). Understanding Interest Rate Spreads in Latin America. Journal of Economic Development, 63, 113-134.

Brooks, C. (2008). Introductory Econometrics of Finance 2nd ed. the ICMA Center, University of Reading, CAMBRIDGE University press. .

Caplan, B. (2000). Rational expectation. George Mason University: Department of economics .

Chirwa, E. W. (2001). Market Structure, Liberalization and Performance in the Malawian Banking Industry. African Economic Research Paper, No. 108, Nairobi.

Chirwa, E., & Mlachila, M. (2004). Financial Reforms and Interest Rate Spreads in the Commercial Banking System in Malawi. IMF Staff Papers, Vol 51, No.1.

Chodechai, S. (2004). Determinants of Bank Lending in Thailand: An Empirical Examination for 1992-1996. Unpublished Thesis.

Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. (2001). How does Foreign Entry affect Domestic Banking. Journal of Banking and Finance(25), 891-911.

Claeys, S., & Vennet, R. (2007). Determinants of Bank Interest Margins in Central and Eastern Europe: A Comparison with the West, Economic Systems. 32(2), 197-216.

Creswell, W. (2003). Qualitative, Quantitative, and Mixed Methods Approaches (Second Edition ed.).

Crowley, J. (2007). Interest Rate Spreads in English-Speaking African Countries. IMF Working Paper, WP/07/101.

Daniel, K., Yonas, B. C., & Milcah, M. (2012). Determinants of Net Interest Margins of Commercial Banks in Kenya: A Panel Study . Elsevier Ltd, 199-2008.

De Haan, J., & Poghosyan, T. (2012). Bank Size, Market Size, Market Concentration and Bank Earnings Volatility in the U.S. Journal of International Financial Markets & Institutions and Money, 22, 35-54.

Demirgüç-kunt, A., & Huizinga, H. (1998). Determinants of Commercial Bank Margin and Profitability: Some International Evidence. World Bank policy Research working papers, wps1900.

Demirguc-Kunt, A., & Huizinga, H. (1999). Determinants of Commercial Bank Interest Margins and Profitability: Some Internationa Evidence. World Bank Economic Review, 13(2), 379-408.

Doliente, J. (2003, August). Determinants of Bank Interest Margins of Southeast Asia. ISI Journal.

Drakos, K. (2002). The Dealership Model for Interest Margins: The Case of the Greek Banking Industry. Journal of Emerging Finance(1), 75-98.

Emmanuelle, J. (2003). Monetary and fiscal policy. Kenya:University of Nairobi. .

Enendu, C. I. (2003). Determinants of Commercial Bank Interest Rate Spreads in a Liberalized Financial System: Empiri-cal Evidence form Nigeria 1989-2000. Economic and Financial Review, 41(1).

Eshete, A. (2011). The Application of Management Control System in Ethiopian Commercial Bank. Addis Ababa, Ethiopia: Published thesis (Msc), Addis Ababa University .

Friedman, B. M., & Kuttner, K. N. (1991). Why does the paper-bill spread predict real economic activity? Cambridge, MA: National Bureau of Economic Research.

Fry, M. (1995). Money,Intrest and Banking in Economic Development, Second edtion. John Hopkins University Press.

Gadise, G. (2014). Determinants of nonperforming loans: empirical study in case of commercial banks in Ethiopia. Jimma: Jimma University .

Gelos, G. (2006). Banking Spreads in Latin America. IMF Working Paper, 06/44.

Genay, H. (1999). Assessing the Conditions of Japanese Banks: How Informative Are Accounting Earnings? Economic Perspectives, Federal Reserve Bank of Chicago, 15, 12-34.

Grenade. (2007). Determinants of Commercial Banks Interest Rate Spreads; Some Empirical Evidence from the Eastern Carribean Currency Union. ECCB Staff research paper. Wp/07/01.

Gujarat, D. (2004). Basic Econometric, 4th edn. USA.: McGrawHill.

Hanson, J. A., & Rocha, R. D. (1998). High interest rates, spreads and the cost of intermediation. Industry and Finance. series 8.

Hassan, H. (2012). The Determinants of Bank Net Interest Margin:Evidence from the Lebanese Banking Sector. Journal of Money, Investment and Banking Faculty of Business Administration and Economics Notre Dame University(23).

Hawtrey, K., & Liang, H. (2008). Bank interest margins in OECD countries. North American Journal of Economics and Finance, 19, 249-260.

Hesse, H. (2007). Financial Intermediation in the Pre-Consoli-dated Banking Sector in Nigeria. World Bank Policy Research Working Paper, 4267.

Ho, T., & Saunders, A. (1981). The Determinants of Bank Interest Margins: Theory and Evidence. Journal of Financial and Quantitative Analysis, 16(4), 581-600.

Horváth, R. (2009). Interest margins determinants of Czech Banks. Charles University Prague, Faculty of Social Sciences Working Papers IES 2009/11.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous Panels. Journal of Econometrics, P. 33-74.

Jayaraman, K., & Sharma, R. (2003). Determinant of Interest Rate Spread in the Pacific Island Countries: Some Evidences from Fiji. 8-9.

Kiyota, K., Barbara, P., & RobertM, S. (2007). The Case for Financial Liberalization in Ethiopia. Research Seminar in International Economics. University of Michigan,Working Paper 565.

Koehn, M., & Santomero, A. (1980). Regulation of Bank Capital and Portfolio. Journal of Finance, 35, 1235-1250.

Kothari, C. (2004). Research Methodology, Methods and Techniques (Edition, Second Revised ed.). University Of Rajasthan.

Levin, A., & Lin, C. F. (1992). Unit Root Tests in Panel Data: Asymptotic and Finite Sample Properties. San Diego: University of California.

Liebeg, D., & Schwaiger, M. (2006). Determinants of the Intrest rate Margins of Ausrian Banks. 104-116: Oesterreichische nationalbank financial stability report, .

Mahamudu, B., Franklin, B., & Martin, E. O. (2005). The Determination of Bank Interest Spreads in Ghana: An Empirical Analysis of Panel Data. Working Paper, WP/BOG-2005/09.

Maria, K., & Agoraki. (2010). The Determinants of Net Interest Margin During Transition. Department of Accounting & Finance, Athens University of Economics and Business.

Martinez, P., & Mody, A. (2004). How Foreign Participation and Market Concentration Impact Bank Spreads: Evidence from Latin America. Journal of Money, Credit and Banking, 36(3), 511-537.

Maudos, J., & Guevara, F. (2004). Factors Explaining the Interest Margin in the Banking. Journal of Banking and Finance, 28(9), 2259–2281.

Maudos, J., & Solis, L. (2009). The Determinats of Net Intrest Income in the Mexican Banking Sytem: An Integrated Model. 33(10), 1920-1931.

Naceur, S. B. (2003). The Determinants of the Tunisian Banking Industry Profitability: Panel Evidence,. Universite Libre de Tunis Working Papers .

NBE. (2002). Amendment of Limitation on Loans to Related Parties-. Directive No. SBB/30/2002 . Ethiopia: NBE-Licensing and Supervision of Banking Business .

NBE. (n.d.). Liquedity Requirment Directive No. SBB/5/95, Directive No. SBB/15/96, Directive No. SBB/44/2008, Directive No. SBB/45/2012 and Directive No. SBB/57/2014. Addis Ababa: National Bank of Ethiopia.

NBE. (n.d.). Reserve Requirment Directive No. SBB/37/2004, Directive No. SBB/42/2007, Directive No. SBB/45/2008, Directive No. SBB/46/2012 and Directive No. SBB/55/2013. Addis Ababa: National Bank of Ethiopia.

Ndung‟u, N. S., & Ngugi, R. W. (2000). Banking Sector Interest Rate Spreads in Kenya. Kenya Institute for Public Policy Discussion Paper No. 2.

Neelesh, G., & Parmendra, S. (2011). Determinants of Bank Net Interest Margins in a Small Island Developing Economy: Panel Evidence from Fiji. Department of Accounting, Finance and Economics, Griffith University.

Ngugi, R. (2000). Banking sector interest rate spread in Kenya. Nairobi, Kenya: Institute for Public Policy Research and Analysis.

Perry, P. (1992). Do Banks Gain or Lose From Inflation. Journal of Retail Banking, 14(2), 25-30.

Porter, M. (1979). How Competitive Forces shape Strategy. Harvard Business Review, 55(2), 137-145.

Quadan, W. (2004). Efficient Intermediation. Institute of Research and Development. Ghana.: International Monetary Fund.

Randall, R. (1998). Intrest Rate Spread in the Eastern Caribbean,IMF Working Paper 98/59. Washington: IMF.

Ransford, Q. C., Collinst, O., & Owusut, A. (2014). The determinant of bank interest rates spreads in Ghana. International Journal of Economic Behavior and Organization, @KakQ.

Rasiah, D. (2010). Theoretical Framework of Profitability as Applied to Commercial Banks in Malaysia. European Journal of Economics, Finance and Administrative Sciences, 19, 74-97.

Richard, W. (2015, 02 21). Richard Williams, University of Notre Dame. Retrieved 05 2015, 2015, from https://www3.nd.edu/~rwilliam/stats3/Panel04-FixedVsRandom.pdf

Robinson, J. W. (2002). Commercial Bank Interest Rate Spreads in Jamaica: Measurement, Trend. Retrieved January 27, 2015, from http://boj.org.jm/uploads/pdf/papers_pamphlets/papers_pamphlets_commercial_bank_interest_rate_spreads_in_jamaica.pdf.

Rochon, L., & Vernengo, M. (2001). Credit, interest rates, and the open economy: essays on. The Banking sector.China:Research Department. Cheltenham, UK: Edward Elgar.

Rudra, S., & Ghost, S. (2004). Net Interest Margin: Does Ownership Matter.

Samy, B. (2003). The Determinants of the Tunisian Banking industry Profitability: Panel Evidence. Université Libre de Tunis, 2003.

Sandi, S. (2009). The Price Concentration Relationship in the Commercial Bank Deposit Markets in Zambia. University of Zambia, Economics Department. .

Saunders, A., & Schumacher, L. (2000). The Determinants of Bank Interest Rate Margins: An International. Journal of International Money and Finance, 19, 813-832.

Sibusiso, M. K., Yinusa, D. O., & Francis, N. (2011). Determinants of Commercial Bank Interest Rate Margins in Swaziland . International Journal of Economics and Business Studies.

Sime, Z. E., Wolde, K. T., & Ketama, T. A. (2013). Competition in Ethiopian Banking Industry. African Journal of Economics, 176-190.

Stiglitz, J., & Weiss, A. (1981, June). Credit Rationing in Markets with imperfect information. The American Economic Review 71(3), 393-410.

Suzana, K. (1999). Costs of financial intermediation. Bank of Albania Economic Bulletin, 3.

Tennant, D., & Folawewo, A. (2007). Macroeconomic and Market Determinants of Banking Sector Interest RateSpread: Empirical Evidence from Low and Middle In-come Countries. Department of Economics, University of West Indies, Mona, Mimeo. .

Valverde, C., & Fer-nandez, R. (2007). The Determinants of Bank Margins in European Banking. Journal of Banking and Finance, 31(7), 2043-2063.

Valverde, M. (2004). High yields: the spread on German interest rates. Cambridge: MA: National Bureau of Economic Research. .

Were, M., & Wambua, J. (2014). What factors drive interest rate spread of commercial banks? Empirical evidence from Kenya. Review of Development Finanace.

Zuzana, F., & Tigran, P. (2008). Determinants of Bank Interest Margins in Russia. University of Groningen.

APPENDIX

Appendix 1: Raw Data

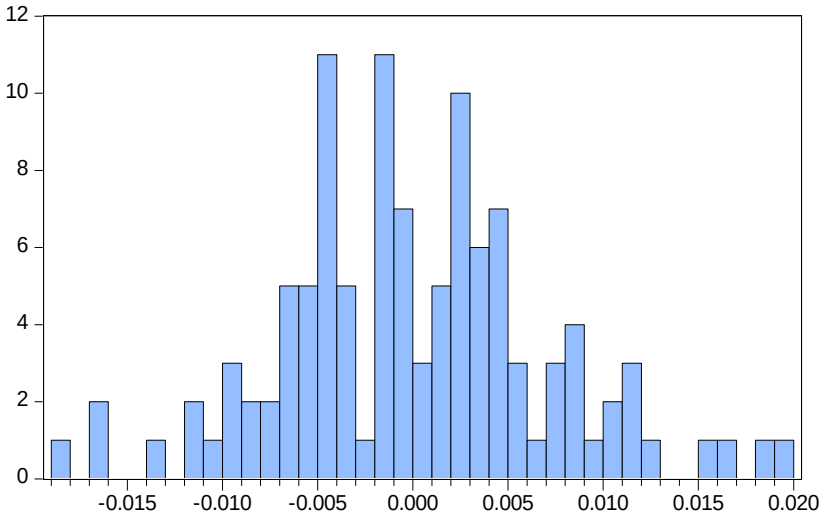
YEAR	BANK	NIM	OER_2	LLP	CAR	ROA	NSIZE	LIQR	OCR	HHI	MSD	GDP	INF
2000	AIB	0.078	0.026	0.589	0.124	0.023	0.416	0.327	0.036	0.690	0.032	0.034	0.054
2001	AIB	0.062	0.019	0.619	0.115	0.013	0.195	0.248	0.089	0.664	0.036	0.074	-0.003
2002	AIB	0.065	0.016	0.573	0.118	0.012	0.226	0.290	0.073	0.619	0.040	0.106	-0.106
2003	AIB	0.050	0.017	0.571	0.098	0.011	0.260	0.353	0.044	0.578	0.045	-0.021	0.109
2004	AIB	0.052	0.018	0.534	0.088	0.016	0.263	0.312	0.116	0.550	0.049	0.117	0.073
2005	AIB	0.056	0.018	0.580	0.102	0.019	0.258	0.284	0.105	0.509	0.054	0.126	0.061
2006	AIB	0.054	0.019	0.634	0.103	0.030	0.327	0.234	0.080	0.461	0.061	0.115	0.106
2007	AIB	0.065	0.019	0.656	0.113	0.042	0.297	0.159	0.136	0.442	0.061	0.118	0.158
2008	AIB	0.064	0.021	0.568	0.124	0.033	0.259	0.194	0.189	0.413	0.064	0.112	0.253
2009	AIB	0.078	0.023	0.422	0.117	0.025	0.332	0.220	0.276	0.391	0.068	0.100	0.364
2010	AIB	0.071	0.023	0.396	0.118	0.034	0.237	0.300	0.209	0.398	0.067	0.106	0.028
2011	AIB	0.072	0.024	0.394	0.129	0.040	0.273	0.176	0.225	0.456	0.060	0.114	0.181
2012	AIB	0.091	0.025	0.461	0.135	0.036	0.180	0.170	0.095	0.501	0.055	0.087	0.341
2013	AIB	0.087	0.020	0.519	0.135	0.038	0.245	0.166	0.074	0.516	0.058	0.098	0.135
2000	BOA	0.041	0.022	0.727	0.171	0.022	0.851	0.273	0.088	0.690	0.026	0.034	0.054
2001	BOA	0.063	0.025	0.767	0.164	0.024	0.248	0.283	0.057	0.664	0.031	0.074	-0.003
2002	BOA	0.060	0.025	0.586	0.123	-0.002	0.275	0.639	0.061	0.619	0.039	0.106	-0.106
2003	BOA	0.052	0.024	0.607	0.112	0.005	0.167	0.651	0.055	0.578	0.042	-0.021	0.109
2004	BOA	0.078	0.023	0.607	0.122	0.026	0.189	0.661	0.066	0.550	0.042	0.117	0.073
2005	BOA	0.064	0.023	0.600	0.123	0.033	0.298	0.310	0.214	0.509	0.045	0.126	0.061
2006	BOA	0.066	0.023	0.693	0.142	0.035	0.378	0.218	0.167	0.461	0.052	0.115	0.106
2007	BOA	0.066	0.020	0.679	0.119	0.022	0.198	0.347	0.128	0.442	0.054	0.118	0.158
2008	BOA	0.063	0.023	0.660	0.098	0.004	0.257	0.291	0.192	0.413	0.057	0.112	0.253
2009	BOA	0.077	0.020	0.495	0.095	0.021	0.283	0.366	0.309	0.391	0.061	0.100	0.364
2010	BOA	0.058	0.021	0.502	0.093	0.024	0.147	0.432	0.256	0.398	0.056	0.106	0.028
2011	BOA	0.085	0.021	0.456	0.091	0.027	0.159	0.432	0.182	0.456	0.047	0.114	0.181
2012	BOA	0.097	0.024	0.473	0.110	0.028	0.132	0.397	0.108	0.501	0.040	0.087	0.341
2013	BOA	0.081	0.028	0.464	0.109	0.024	0.229	0.238	0.075	0.516	0.039	0.098	0.135
2000	CBB	0.049	0.011	0.838	0.071	0.003	0.053	0.075	0.067	0.690	0.027	0.034	0.054
2001	CBB	0.053	0.010	0.838	0.069	0.002	1.000	0.080	0.068	0.664	0.024	0.074	-0.003
2002	CBB	0.057	0.022	0.753	0.080	0.004	1.000	0.101	0.086	0.619	0.026	0.106	-0.106
2003	CBB	0.060	0.010	0.751	0.084	0.012	1.000	0.186	0.049	0.578	0.024	-0.021	0.109
2004	CBB	0.064	0.011	0.693	0.079	0.004	0.122	0.205	0.110	0.550	0.022	0.117	0.073
2005	CBB	0.056	0.009	0.468	0.058	0.012	0.733	0.207	0.131	0.509	0.029	0.126	0.061
2006	CBB	0.030	0.010	0.656	0.087	0.031	1.000	0.262	0.050	0.461	0.023	0.115	0.106
2007	CBB	0.067	0.017	0.704	0.112	0.030	0.051	0.257	0.050	0.442	0.022	0.118	0.158
2008	CBB	0.069	0.011	0.580	0.108	0.039	0.266	0.144	0.246	0.413	0.025	0.112	0.253
2009	CBB	0.060	0.009	0.607	0.104	0.030	0.084	0.096	0.269	0.391	0.025	0.100	0.364

2010	CBB	0.066	0.013	0.553	0.101	0.032	0.220	0.133	0.261	0.398	0.026	0.106	0.028
2011	CBB	0.068	0.014	0.493	0.104	0.026	0.109	0.273	0.125	0.456	0.019	0.114	0.181
2012	CBB	0.075	0.012	0.303	0.081	0.024	0.697	0.341	0.121	0.501	0.021	0.087	0.341
2013	CBB	0.082	0.014	0.293	0.099	0.022	0.127	0.420	0.037	0.516	0.019	0.098	0.135
2000	CBE	0.072	0.021	0.522	0.065	0.022	0.137	0.140	0.206	0.690	0.853	0.034	0.054
2001	CBE	0.068	0.018	0.496	0.061	0.001	0.084	0.184	0.100	0.664	0.830	0.074	-0.003
2002	CBE	0.084	0.021	0.440	0.037	-0.022	0.031	0.256	0.102	0.619	0.798	0.106	-0.106
2003	CBE	0.066	0.018	0.353	0.053	0.024	0.093	0.432	0.132	0.578	0.765	-0.021	0.109
2004	CBE	0.070	0.030	0.298	0.053	0.013	0.156	0.453	0.141	0.550	0.741	0.117	0.073
2005	CBE	0.080	0.023	0.288	0.043	0.019	0.186	0.186	0.341	0.509	0.701	0.126	0.061
2006	CBE	0.081	0.017	0.259	0.042	0.023	0.081	0.406	0.186	0.461	0.671	0.115	0.106
2007	CBE	0.095	0.029	0.225	0.097	0.022	0.212	0.379	0.212	0.442	0.647	0.118	0.158
2008	CBE	0.075	0.022	0.344	0.090	0.029	0.160	0.178	0.176	0.413	0.622	0.112	0.253
2009	CBE	0.099	0.025	0.352	0.085	0.035	0.178	0.132	0.130	0.391	0.593	0.100	0.364
2010	CBE	0.101	0.024	0.324	0.075	0.029	0.249	0.085	0.125	0.398	0.599	0.106	0.028
2011	CBE	0.100	0.028	0.315	0.055	0.030	0.540	0.143	0.122	0.456	0.652	0.114	0.181
2012	CBE	0.093	0.025	0.392	0.049	0.040	0.390	0.076	0.082	0.501	0.692	0.087	0.341
2013	CBE	0.081	0.026	0.363	0.046	0.034	0.241	0.104	0.076	0.516	0.707	0.098	0.135
2000	DB	0.057	0.029	0.616	0.089	0.014	0.283	0.254	0.123	0.690	0.033	0.034	0.054
2001	DB	0.063	0.036	0.649	0.085	0.021	0.272	0.241	0.080	0.664	0.042	0.074	-0.003
2002	DB	0.058	0.024	0.587	0.082	0.019	0.351	0.275	0.068	0.619	0.051	0.106	-0.106
2003	DB	0.046	0.022	0.636	0.065	0.016	0.340	0.257	0.069	0.578	0.063	-0.021	0.109
2004	DB	0.050	0.021	0.631	0.064	0.024	0.345	0.242	0.084	0.550	0.072	0.117	0.073
2005	DB	0.058	0.021	0.653	0.071	0.023	0.278	0.185	0.114	0.509	0.078	0.126	0.061
2006	DB	0.054	0.022	0.696	0.085	0.033	0.329	0.147	0.106	0.461	0.088	0.115	0.106
2007	DB	0.061	0.021	0.660	0.090	0.035	0.329	0.134	0.143	0.442	0.096	0.118	0.158
2008	DB	0.070	0.020	0.560	0.093	0.034	0.296	0.146	0.226	0.413	0.102	0.112	0.253
2009	DB	0.073	0.021	0.457	0.093	0.028	0.243	0.130	0.354	0.391	0.108	0.100	0.364
2010	DB	0.071	0.020	0.409	0.091	0.029	0.269	0.245	0.180	0.398	0.111	0.106	0.028
2011	DB	0.070	0.021	0.424	0.095	0.033	0.187	0.223	0.201	0.456	0.091	0.114	0.181
2012	DB	0.081	0.023	0.464	0.104	0.041	0.195	0.201	0.128	0.501	0.083	0.087	0.341
2013	DB	0.084	0.025	0.449	0.104	0.033	0.127	0.194	0.113	0.516	0.074	0.098	0.135
2000	NIB	0.071	0.019	0.373	0.253	0.006	0.053	0.494	0.057	0.690	0.004	0.034	0.054
2001	NIB	0.066	0.024	0.625	0.185	0.049	1.127	0.235	0.039	0.664	0.010	0.074	-0.003
2002	NIB	0.061	0.019	0.607	0.185	0.030	0.589	0.303	0.009	0.619	0.015	0.106	-0.106
2003	NIB	0.049	0.018	0.621	0.141	0.018	0.657	0.231	0.045	0.578	0.023	-0.021	0.109
2004	NIB	0.053	0.017	0.630	0.139	0.033	0.409	0.216	0.050	0.550	0.027	0.117	0.073
2005	NIB	0.053	0.016	0.654	0.129	0.031	0.389	0.211	0.057	0.509	0.034	0.126	0.061
2006	NIB	0.051	0.019	0.728	0.141	0.031	0.170	0.169	0.046	0.461	0.034	0.115	0.106
2007	NIB	0.059	0.021	0.697	0.163	0.033	0.286	0.160	0.107	0.442	0.037	0.118	0.158
2008	NIB	0.074	0.021	0.579	0.164	0.036	0.400	0.168	0.197	0.413	0.041	0.112	0.253

2009	NIB	0.091	0.022	0.462	0.152	0.036	0.317	0.297	0.189	0.391	0.045	0.100	0.364
2010	NIB	0.083	0.025	0.426	0.154	0.037	0.242	0.358	0.156	0.398	0.045	0.106	0.028
2011	NIB	0.097	0.025	0.389	0.165	0.038	0.191	0.275	0.237	0.456	0.040	0.114	0.181
2012	NIB	0.091	0.026	0.448	0.185	0.037	0.164	0.259	0.101	0.501	0.035	0.087	0.341
2013	NIB	0.098	0.030	0.497	0.182	1.786	0.105	0.191	0.055	0.516	0.031	0.098	0.135
2000	UNB	0.065	0.042	0.615	0.280	0.027	0.882	0.210	0.035	0.690	0.004	0.034	0.054
2001	UNB	0.066	0.042	0.626	0.294	0.028	0.497	0.201	0.121	0.664	0.006	0.074	-0.003
2002	UNB	0.073	0.032	0.519	0.280	0.015	0.467	0.334	0.118	0.619	0.008	0.106	-0.106
2003	UNB	0.045	0.028	0.618	0.194	0.013	0.494	0.252	0.117	0.578	0.011	-0.021	0.109
2004	UNB	0.050	0.024	0.570	0.142	0.012	0.437	0.361	0.070	0.550	0.017	0.117	0.073
2005	UNB	0.051	0.022	0.553	0.116	0.035	0.592	0.325	0.126	0.509	0.024	0.126	0.061
2006	UNB	0.054	0.019	0.628	0.119	0.033	0.490	0.192	0.179	0.461	0.029	0.115	0.106
2007	UNB	0.061	0.024	0.646	0.165	0.034	0.365	0.283	0.065	0.442	0.030	0.118	0.158
2008	UNB	0.066	0.024	0.572	0.144	0.034	0.489	0.252	0.174	0.413	0.040	0.112	0.253
2009	UNB	0.073	0.023	0.463	0.112	0.024	0.431	0.248	0.286	0.391	0.049	0.100	0.364
2010	UNB	0.074	0.022	0.443	0.108	0.033	0.268	0.259	0.296	0.398	0.052	0.106	0.028
2011	UNB	0.080	0.020	0.424	0.117	0.034	0.310	0.282	0.178	0.456	0.047	0.114	0.181
2012	UNB	0.098	0.025	0.465	0.125	0.036	0.137	0.229	0.097	0.501	0.040	0.087	0.341
2013	UNB	0.097	0.035	0.472	0.120	0.023	0.136	0.160	0.047	0.516	0.037	0.098	0.135
2000	WB	0.062	0.039	0.510	0.097	0.007	0.404	0.342	0.119	0.690	0.020	0.034	0.054
2001	WB	0.073	0.036	0.590	0.099	0.011	0.134	0.286	0.101	0.664	0.021	0.074	-0.003
2002	WB	0.065	0.039	0.628	0.099	0.010	0.108	0.252	0.101	0.619	0.022	0.106	-0.106
2003	WB	0.049	0.030	0.642	0.105	0.014	0.376	0.291	0.062	0.578	0.027	-0.021	0.109
2004	WB	0.069	0.029	0.647	0.113	0.032	0.282	0.275	0.083	0.550	0.029	0.117	0.073
2005	WB	0.058	0.028	0.620	0.111	0.035	0.418	0.345	0.038	0.509	0.036	0.126	0.061
2006	WB	0.060	0.027	0.705	0.113	0.037	0.398	0.215	0.077	0.461	0.042	0.115	0.106
2007	WB	0.066	0.023	0.619	0.116	0.039	0.541	0.285	0.094	0.442	0.054	0.118	0.158
2008	WB	0.071	0.024	0.569	0.147	0.037	0.185	0.232	0.205	0.413	0.049	0.112	0.253
2009	WB	0.088	0.025	0.413	0.163	0.039	0.241	0.200	0.370	0.391	0.051	0.100	0.364
2010	WB	0.081	0.028	0.431	0.183	0.041	0.122	0.376	0.152	0.398	0.043	0.106	0.028
2011	WB	0.091	0.027	0.361	0.166	0.047	0.404	0.275	0.238	0.456	0.046	0.114	0.181
2012	WB	0.100	0.030	0.427	0.192	0.041	0.035	0.265	0.069	0.501	0.034	0.087	0.341
2013	WB	0.102	0.031	0.451	0.176	0.037	0.245	0.170	0.097	0.516	0.035	0.098	0.135

Source: NBE and CSA via simple excel

Appendix 2: Normality Test



Series: Standardized Residuals	
Sample 2000 2013	
Observations 112	
Mean	1.86e-19
Median	-0.000599
Maximum	0.019119
Minimum	-0.018773
Std. Dev.	0.007113
Skewness	0.150080
Kurtosis	3.318659
Jarque-Bera	0.894320
Probability	0.639442

Appendix 3: Heteroscedasticity Test: White

Heteroscedasticity Test: White				
F-statistic	0.946905	Prob. F(11,100)		0.4996
Obs*R-squared	10.56539	Prob. Chi-Square(11)		0.4804
Scaled explained SS	8.215776	Prob. Chi-Square(11)		0.6939
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 04/16/15 Time: 07:57				
Sample: 1 112				
Included observations: 112				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000146	7.80E-05	1.876255	0.0635
OER_2^2	-0.041621	0.034938	-1.191269	0.2364
LLP^2	-3.37E-05	8.80E-05	-0.383116	0.7024
CAR^2	-0.000451	0.001028	-0.438189	0.6622
ROA^2	-1.16E-05	3.12E-05	-0.372262	0.7105
LOG(SIZE)^2	-8.04E-06	4.42E-06	-1.817032	0.0722
LIQR^2	0.000133	0.000132	1.008038	0.3159
OCR^2	-0.000572	0.000417	-1.371245	0.1734
HHI^2	-3.01E-05	0.000164	-0.183296	0.8549
LOG(MSD)^2	1.20E-06	2.75E-06	0.436464	0.6634
GDP^2	-0.001602	0.002853	-0.561510	0.5757
INF^2	-0.000100	0.000286	-0.350577	0.7266
R-squared	0.094334	Mean dependent var		6.86E-05
Adjusted R-squared	-0.005289	S.D. dependent var		9.63E-05
S.E. of regression	9.65E-05	Akaike info criterion		-15.55261
Sum squared resid	9.32E-07	Schwarz criterion		-15.26135
Log likelihood	882.9463	Hannan-Quinn criter.		-15.43444
F-statistic	0.946905	Durbin-Watson stat		1.957927
Prob(F-statistic)	0.499557			

Appendix 4: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	1.733860	Prob. F(12,88)		0.0729
Obs*R-squared	21.41703	Prob. Chi-Square(12)		0.0446
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 04/16/15 Time: 08:00				
Sample: 1 112				
Included observations: 112				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001046	0.013308	0.078620	0.9375
OER_2	0.047115	0.170078	0.277018	0.7824
LLP	0.005066	0.009437	0.536803	0.5928
CAR	0.002855	0.029453	0.096944	0.9230
ROA	-0.001768	0.005254	-0.336512	0.7373
LOG(SIZE)	-3.44E-05	0.001358	-0.025310	0.9799
LIQR	0.000665	0.008920	0.074572	0.9407
OCR	0.005024	0.014487	0.346760	0.7296
HHI	-0.010576	0.016680	-0.634046	0.5277
LOG(MSD)	8.79E-05	0.001356	0.064843	0.9484
GDP	0.007744	0.027680	0.279774	0.7803
INF	-0.007549	0.009808	-0.769620	0.4436
RESID(-1)	0.308788	0.110617	2.791509	0.0064
RESID(-2)	0.155263	0.119861	1.295355	0.1986
RESID(-3)	0.096750	0.120104	0.805555	0.4227
RESID(-4)	-0.204613	0.120448	-1.698768	0.0929
RESID(-5)	0.147377	0.119717	1.231044	0.2216
RESID(-6)	-0.039030	0.123449	-0.316164	0.7526
RESID(-7)	-0.049121	0.124470	-0.394642	0.6941
RESID(-8)	-0.179603	0.122100	-1.470945	0.1449
RESID(-9)	0.020682	0.126355	0.163686	0.8704
RESID(-10)	0.095154	0.126340	0.753160	0.4534
RESID(-11)	0.032639	0.124733	0.261668	0.7942
RESID(-12)	-0.006914	0.121207	-0.057041	0.9546
R-squared	0.191223	Mean dependent var		2.06E-17
Adjusted R-squared	-0.020161	S.D. dependent var		0.008321
S.E. of regression	0.008404	Akaike info criterion		-6.532769
Sum squared resid	0.006215	Schwarz criterion		-5.950233
Log likelihood	389.8350	Hannan-Quinn criter.		-6.296415
F-statistic	0.904623	Durbin-Watson stat		1.901222
Prob(F-statistic)	0.592186			

Appendix-5 Fixed Effect Regression Outputs

Dependent Variable: NIM				
Method: Panel Least Squares				
Date: 04/16/15 Time: 07:48				
Sample: 2000 2013				
Periods included: 14				
Cross-sections included: 8				
Total panel (balanced) observations: 112				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.110723	0.014235	7.778250	0.0000
OER_2	0.762337	0.207551	3.673004	0.0004
LLP	-0.089025	0.010196	-8.731600	0.0000
CAR	0.102533	0.033256	3.083162	0.0027
ROA	0.001901	0.004840	0.392805	0.6954
LOG(SIZE)	-0.003766	0.001206	-3.121882	0.0024
LIQR	-0.042262	0.010530	-4.013554	0.0001
OCR	-0.037035	0.013386	-2.766765	0.0068
HHI	0.036640	0.016241	2.255965	0.0264
LOG(MSD)	0.013186	0.003419	3.856818	0.0002
GDP	0.054434	0.024873	2.188458	0.0311
INF	0.023653	0.008642	2.736951	0.0074
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.782803	Mean dependent var		0.069583
Adjusted R-squared	0.740765	S.D. dependent var		0.015262
S.E. of regression	0.007771	Akaike info criterion		-6.723565
Sum squared resid	0.005615	Schwarz criterion		-6.262391
Log likelihood	395.5197	Hannan-Quinn criter.		-6.536452
F-statistic	18.62125	Durbin-Watson stat		1.796575
Prob(F-statistic)	0.000000			