ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGMENT

Credit Drivers: Empirical Study on Commercial Banks in Ethiopia

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Credit Drivers: Empirical Study on Commercial Banks in Ethiopia

A thesis submitted to Addis Ababa University, College of Business and Economics, Department of Management in partial fulfillment of the requirements for the degree in Executive Masters of Business Administration

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Addis Ababa
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This is to certify that Sintayehu Sibehate Wondimu has carried out her research work on the topic entitled *"Credit Drivers: 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 Executive Master of Business Administration at the Addis Ababa University.

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This is to certify that the thesis prepared by Sintayehu Sibehate, entitled: **Credit Drivers: Empirical Study on Commercial Banks in Ethiopia** and submitted in partial fulfillment of the requirements for the degree in Executive Master of Business Administration complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

Financial Development is a cornerstone for economic growth and development. Banks in developing countries like Ethiopia play dominant role in the financial sector through playing intermediation function. Hence, increasing credit supply while also ensuring the soundness of the finical sector is key for accelerating economic activity. However, like in most African countries, bank credit in Ethiopia is low though credit to GDP is growing steadily overtime. Hence, this research investigates credit drivers of Ethiopian commercial banking sector during the period from 2002 to 2014. It was conducted based on the hypothesis that credit in Ethiopian banking industry is determined by bank, industry and macro-economic specific factors. Several theories and empirical outcomes were examined to explain the determinants of bank credit supply. The variables were selected based on both theoretical and empirical literatures. Explanatory design, quantitative research approach and secondary data were used in carrying out this research. The regression technique was used to estimate the model using the EViews 8 econometric package. The results obtained indicated that bank lending is determined by banks and industry specific factors than macroeconomic specific factors. And specifically the estimation results show that deposit volume, capital of banks, liquidity position, investment portfolio, cost of financial intermediation and market concentration have significant effect on bank lending. However, economic growth proxied by real GDP and inflation are not significant. The study recommends banks to increase deposit level, manage liquidity effectively, enhance their capital level and decrease the cost of financial intermediation. Similarly, NBE needs to enhance competition with strengthened supervision. Further studies were recommended in the areas by considering additional variables and at regional and cross country level.

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ACRONYMS AND ABBREVIATIONS

CAR	**Capital Adequacy Ratio**
FEM	**Fixed Effect Model**
GDP	**Gross Domestic Product**
HHI	**Herfindahl-Hirschman Index**
INF	**Inflation**
IRS	**Interest Rate Spread**
JB	**Jarque-Bera**
IAR	**Investment to tolal Asset Raito**
LIQR	**Liquidity Ratio**
LLP	**Loan Loss Provision**
MoFED	**Ministry of Finance and Economic Development**
NBE	**National Bank of Ethiopia**
NIM	**Net Interest Margin**
NPL	**Non Performing Loans**
VOD	**Volume of Deposit**
VOL	**Volume of Loan**

CHAPTER ONE
INTRODUCTION

1.1   Introduction

This chapter being the precedent outlines defines and addresses the basic idea of the research. It gives a brief background of the study followed by statement of the problem and introduces the thrust of the research by identifying its main areas. The chapter also presents objectives of the study, the hypothesis statement, significance, scope and limitations of the study. In short it is the foundation upon which the rest of the research is lay on and guides the researcher through the research process.

1.2   Background of the Study

Finance is one of the essential factors for economic growth so for developing countries it plays crucial role by facilitating investment and economic processes of firms and households. Financial system assists in mobilizing savings, transforming maturities, and capital accumulation; it is ultimately through improvements in resource allocation and productivity growth that finance helps economies grow more quickly (Beck, Maimbo, Faye, & Triki, 2011). Calderon & Liu (2002) studied the direction of causality between financial development and economic growth on pooled data of 109 developing and industrial countries from 1960–1994 and found that financial development generally leads to economic growth, through both a more rapid capital accumulation and productivity growth, with the latter channel being the strongest. Hence, particularly in country where banks are dominate players of the financial system and stock markets are small and illiquid the role of banks is crucial for economic growth.

Banks by mobilizing savings for the purpose of lending to investments play key role in country's economy; as they have specialty in providing maturity intermediation, risk reduction via diversifications and reducing asymmetric information being efficient at collection and analysis of information. In performing the intermediation role, it must be realized that banks have the

potential, scope and prospects for mobilizing financial resources and allocating them to productive investments (Olkoyo, 2011). Commercial banks' lending has significantly played crucial roles in igniting industrialization in every economy by facilitating the mobilization of capital which oils the wheels of economic production and those well-functioning banks spur technological innovations by identifying and funding entrepreneurs assessed to have brighter chances of successful implementing innovative products and production process (Olumuyiwa, Oluwatosin, & Chukwuemeka, 2012, p. 72).

Empirical studies conducted in different parts of the world show that access to external credit enhances firms' survival and growth. Firms able to access external finance are more likely to survive, invest and grow than those without access (Fiestas & Sinha, 2011). In their study about access to credit and the effect of credit constraints on the performance of manufacturing firms in the east African region, Buyinz & Bbaale (2013) found out that having access to credit and a long loan duration increase firm performance while increase in the annual interest rate reduces firm productivity. However, firms in developing countries are severely constrained by access to finance among other obstacles according to World Bank's Enterprise Surveys. Besides, empirical studies conducted on demand side i.e. firms need and access to finance indicates that access to finance is difficult in developing countries, especially for medium and small firms (Sanya and Gaertner 2012; Fetene , 2010).

Bank credit growth is also related to banks stability, which need to be given emphasis through deploying strong risk management mechanisms by the central bank as well as respective bank management as excess credit growth causes monetary instability. Besides, unless banks manage their credit function properly their sustainability become in question and failure of the financial system brings adverse consequences for the economy as evident from the resent financial crisis and associated economic recession. Sound financial sector policies that arouse banking sector capitalization and limit non-performing loans or assets are essentials for robust credit growth (Pua, 2012).

Regarding Ethiopia's financial industry structure, the sector consists of 18 banks (2 public banks and 16 private banks), 14 private insurance companies,1 public insurance company, 31 microfinance institutions and over 8200 Saving and Credit Cooperatives (SACCOs) in both rural

and urban areas[1]. In the financial sector of Ethiopia the Banking sector is dominant accounting for over 80% of the total assets of the financial sector (Getnet, 2014).

In Ethiopia, bank lending has gone through different stages. During the pre- reform period; credit was highly regulated to be consistent with the government's plan and financial requirements. In the post-liberalization period different and successive liberalization policy and credit policy reforms emerged through the termination of discriminatory interest rate and preferential sector lending modalities and reduction of credit controls (Tsigab, 2014).

During the Post-liberalization period, supply of bank credit, starting from a low base had grown remarkably. According to total new loans disbursed by the banking sector reached 59.9billion in 2013/14, indicating above 500% increase to the level of loan disbursement in 2004/05[2].The average annual rate of growth of new loan disbursement by the banking sector over 2008/09 – 2013/14 period was 25%.[3] However, compared to GDP, private sector credit to GDP declined from 15.4 percent in 2003/04 to 10.9 percent in 2013/14, and remained below the SSA averages for the period reviewed (worldbank, 2015). Moreover, empirical studies done on the demand side of credit also point out the need to enhance access to credit as less than 10 percent of the households have access to formal credit (Getnet, 2014).

Therefore, financial sector need to grow to satisfy the credit demand of the growing economy of the country and consideration of credit supply drivers of banks in Ethiopia is crucial. The main purpose of this study is to investigate bank credit behaviour drivers in Ethiopian banking sector by categorizing the factors into Bank-Specific factors, Industry Specific and Macroeconomic Specific factors.

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1 WWW/nbe/et

2&3 own computation using data from NBE extracted from bank's annual Audited Repots.

1.3 Statement of the Problem

Bank credit is key for any nation's economic growth more so for countries with underdeveloped alternative financial mechanisms. Studies conducted in different part of the world evidenced that high credit growth leads to economic growth (Guo and Stepanyan 2011; Sharma &Gounder 2012; Abdi & Aregie, 2012). However, as deliberated by a number of studies such as (Hussain & Junaid, 2012; Beck & Triki 2011) a rapid growth of domestic credit supply has possible financial as well as macroeconomic instability consequences.

Therefore, understanding the key drivers of bank credit growth is quite noteworthy to enhance performance and soundness of the financial sector and also economic growth and stability. Literatures conducted in different part of the world identified how bank lending is affected and Pointed out a wide array of different factors ranging from macroeconomic factors to bank specific factors(John, 2014; Sharma & Gounder 2012; Olusanya & Chukwuemeka, 2012 and Tomak ,2013). However, due to differences in wide array of circumstances, determinants of lending behavior are numerous and vary across countries and regions so that countries and regions need to explore their own determinants (Sharma & Grounder, 2012).

In Ethiopian context a couple of study is done to investigate determinants of banks' lending behavior Mitiku (2014) and Amino (2014). However, no evidence on impact of soundness of the financial sector and market structure factors on credit growth is provided so far. Moreover, this study considers bank lending factors from both supply i.e banks perspective as well as demand perspective. Financial soundness is key as rapid and excess credit growth causes instability of the financial sector as well as the economy. Market structure of the financial sector has significant impact on bank credit supply. Boot and Thakor (2000) indicate that the level of banking industry competition significantly influences bank lending strategy positively. According to Amidu(2014) cross country evidence, concentration i.e lower competition adversely and significantly affects bank lending in Sub Saharan Africa.

Above all, the motivation of this research is the low credit supply in Ethiopia despite the demand of the growing economy. Ethiopia domestic credit is low and steadily growing; credit to GDP

was 13.61 percent in 2008/9 increased to 16.1 percent in 2013/14[4] and such performance of 16.1% credit to GDP ratio is far below 100% optimal level. Private sector credit to GDP ratio above the 100% limit i.e too much credit has negative effect on economic growth (Arcand, Berkes, & Panizza, 2000). Moreover, low credit availability in Ethiopia is also evidenced by empirical studies done from demand i.e borrowers' perspective such as (Fetene, 2010). Recent studies done on availability of finance also point out the need to enhance access to credit as less than 10 percent of the households have access to formal credit (Getnet, 2014).

Thus, this study is aimed to contribute to the current literature by providing some evidence on factors of credit growth in Ethiopian context by analyzing bank-specific, industry-specific and macroeconomic factors for the Ethiopian commercial banks. To what extent does bank specific factors which can be under control of bank management affect bank credit growth/lending behaviour? To what extent does economic and industry variables affect bank credit growth? These shall become the interest of this research.

1.4 Objectives of the Study

1.4.1 General Objective

The overall objective of this study is to analyze the factors that determine credit behavior of commercial banks in Ethiopia using variables from theoretical as well as empirical researches.

1.4.2 Specific Objectives

The study has three specific objectives as outlined below:

- To examine bank specific bank credit behavior drivers of commercial banks operating in Ethiopia.
- To examine industry specific bank credit behavior drivers of commercial banks operating in Ethiopia.
- To examine and macroeconomic bank credit behavior drivers of commercial banks operating in Ethiopia.
- To examine the trends of bank credit growth of commercial banks in Ethiopia.

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4 own computation using data from NBE extracted from bank's annual Audited Repots.

1.5 Research Questions

The research questions this research aims to answer are:

- What factors significantly affect bank credit in Ethiopian banking sector?
- What is the trend in Bank credit growth in Ethiopia?

1.6 Research Hypothesis

The following nine research hypothesis about credit/lending behavior proxied by volume of credit are identified based on theories and past empirical studies related to determinants of banks' lending /credit behavior.

H1: Volume of deposit has positive and significant impact on volume of loans and advance of commercial Banks of Ethiopia.

H2: Capital Adequacy has positive and significant impact on level of loans and advances of commercial Banks of Ethiopia.

H3: Liquidity Position has negative and significant influences on level of loans and advance of commercial banks in Ethiopia.

H4: Investment Portfolio has negative and significant influences on level of loans and advances of commercial banks in Ethiopia.

H5: Credit Risk Has negative and significant influences on level of loans and advances of commercial banks in Ethiopia.

H6: Net Interest Margin has negative and significant influence on level of loans and advances of commercial banks in Ethiopia.

H7: Concentration of banks has negative and significant influence on level of loans and advances of commercial banks in Ethiopia.

H8: Economic growth has positive and significant impact level of loans and advances of commercial banks in Ethiopia.

H9: Inflation has positive and significant impact on level loans and advances of commercial Banks in Ethiopia

1.7 Significance of the Study

The study is designed to examine factors of bank credit behavior in Ethiopian commercial banking sector. Hence, the findings of the study are tremendously beneficial to academia, regulatory body, policy makers and the management of commercial Banks.

- Based on empirical data, this research identifies the factors that determine bank lending growth. By implication, it contributes to future research through providing additional empirical evidence. In addition, based on the implication of the research findings, the research also recommends areas for future research.
- The findings of the study identify significant factors affecting the lending activities of the Commercial banks. As such, it suggests the regulatory and policy makers in formulating appropriate policies on bank lending so as to achieve economic growth.
- Furthermore, the findings of the study are of immense benefit to management of commercial banks in terms of using them as inputs in formulating strategies, policies, and guidelines with which to effectively and efficiently manage their credit activities in the economy.

1.8 Scope of the Study

The scope of this research is determined to fit its objectives of examining credit behavior drivers of commercial banks in Ethiopia within the limits of specified time and feasibility .This study will focus on bank specific factors, industry specific and macro economic specific factors of lending of Ethiopian commercial banks. External factors that affect bank credit growth such as

socio-cultural and legal factors are out of the scope of this study. Besides, except inflation and economic growth other macroeconomic factors are not considered. Moreover, the scope of this study will be limited to the relationship between lending growth and its determinants of eight Ethiopian Commercial Banks over the period 2002 to 2014.

1.9 Limitations of the Study

A study of the determinants of credit growth 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. Despite the limitations, comprehensive study is conducted leading to the achievement of the research objectives.

1.10 Organization of the Research Report

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. The second chapter provides the literature review which constitutes theoretical and empirical research. The third chapter which is about methodology of the research presents the research design employed the sampling method, data collection methods, and the data analysis technique. The fourth chapter presents analysis results and findings the study. Lastly, the fifth chapter presents summery of the study, concludes the investigation, forward recommendations and suggests areas for future research.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter discusses theoretical and empirical literature on bank credit growth and its determinants. This section summarizes and analyses points of divergence and convergence among various authors and clearly identified the gap in the literature that helps to formulate the research hypotheses for the study and develop the conceptual framework.

2.2 Theoretical Framework

2.2.1 Credit Market Theory

A model of the neoclassical economics, credit market theory postulates that the terms of credits clear the market. The theory postulates that if collateral and other pertinent restrictions remain given, then it is only the lending rate that determines the amount of credit that is dispensed by the banking sector. Therefore with an increasing demand for credit and a fixed supply of the same, interest rates will have to rise. Any additional risk to a project being funded by the bank should be reflected through a risk premium that is added to lending rate to match the increasing risk of default. Subsequently, there exist a positive relationship between the default probability of a borrower and the interest rate charged on the advance. It is thus believed that the higher the failure risks of the borrower, the higher the interest premium (Ewert et al, 2000).

2.2.2 Theory of Multiple Lending

Literature indicates that in the presence of well-developed equity markets and after a process consolidation, banks should be less inclined to share lending (loan syndicate). Both outside equity; and mergers and acquisition increases banks' lending capacity, thus reducing that need of

greater diversification and monitoring through share lending (Chinaecherem & Mgbataogu, 2013).

2.3 Approach of Identifying Bank Credit Determinants

Pham (2015) has developed the following equation of bank lending determinants basing on the different theoretical approaches discussed hereunder as outlined in (Pham, 2015, pp: 4-5). Based on the balance sheet approach of representing the bank firm, the starting point is a primitive type of bank balance sheet in which the bank has no physical capital on its assets and no equity on its liabilities. This simple balance sheet of a bank is having credit and reserve as an asset in its debit side while deposit as liability in the credit side. The balance sheet can be represented as follows:

$$C + R = D \dots\dots\dots\dots\dots\dots\dots\dots\dots. (1)$$

Where C is credit, R is reserve and D is deposit. From the above balance sheet and in developing a framework for the analysis of the banking firm, Baltensperger (1980) sets the objective function of the bank as a profit function.

$$\pi = \Upsilon c C - \Upsilon_D D - l - s - c \ \dots\dots\dots. (2)$$

Where Υc is the interest rate of bank credit, Υ_d is the interest paid on deposit l is cost of illiquidity, s is cost due to default, and c is the real resource cost. From Function (2), we can also generalize the function of credit supply as follows:

$$C = f(\pi; \Upsilon c; \Upsilon d; l; s; c)\dots\dots\dots(3)$$

Now, we consider another type of bank balance sheet in which the bank has credits, reserves and treasury bills on its assets, and deposits and capital requirements on its liabilities. This balance sheet is written as credit, reserves and treasury bills as an asset on the debit side and deposit and capital requirements as a liability on the credit side. In this case, the equation of balance sheet of a bank is presented as follows:

$$C + R + T = D + K = L = D + K - R - T \dots. (4)$$

Basing on this bank balance sheet approach, the determinants of bank credits supply are bank reserves, treasury bills, bank deposits and capital requirement. In general, credit supply positively depends on the credit rate of return. This positive relation is, nevertheless, influenced not only by other costs stemming from the bank's decision of credit supply but also by other components of balance sheet such as capital requirements and so on.

In addition most important determinants to a bank may allocate its resources either in credits or in government securities. The rates of return of a bank include, Return in credits supply i.e Υc-Υ_D and Return on investment: Υ_T-Υ_D. Considering that Y1 is the bank resource allocation in credits and Y2 is the bank resource allocation in T-bills with $0 < Y_1 + Y_2 < 1$, the function of bank rates of return is given as follows:

$$\pi = Y_1 (\Upsilon c - \Upsilon_D) + Y_2 (\Upsilon_T - \Upsilon_D) = Y_1 \Upsilon c + Y_2 \Upsilon_T - \Upsilon_D(Y_{1+} Y_2) \dots..(5)$$

The credit supply C is expected to be positively related to its rate of return of $(\Upsilon c - \Upsilon_D)$,and negatively to π , which is the cost of controlling default risk. We assume that these relations are linear and given as follows:

$$C = \sum_{i=1}^{n} Y1\, i(\Upsilon C - \Upsilon D)i + \sum_{i=1}^{n} \pi i + \epsilon \dots \dots \dots \dots \dots \dots \dots \dots \dots. (6)$$

Where ϵ is the vector containing other factors determining bank credit supply.

The capital requirement ratio (CR) expresses the own funds K of a bank as a proportion of risk weighted assets and off-balance sheet items.

$$CR = \frac{Total\ own\ fund}{risk\ weighted\ assets + notional\ risk\ weigted\ assets} \alpha \dots \dots \dots.(7)$$

Where the risk weighted assets are the credit risk assets, and the notional risk weighted assets are the operational risk and market risk (RN). The capital requirement ratio can be rewritten as follows: Where W_1 is the weight for risky credits and $W_2 = 0$ is the weight for government securities. It is assumed that:

$$CR = \frac{k}{W1C + W2T + RN} \geq \alpha \ \dots\dots\dots\dots\dots\dots\dots(8)$$

Formula (8), there is a minimum value b required for a bank Basel index, which is the ratio between capital and risk weighted assets. Moreover, the coefficient w1 defined in regulation and known by the bank. Following Furfine (2001), we assume that the own capital of a bank approximates the minimum level stated by the requirement faces increasing costs. Equation (8) means that credit supply positively relates to the own capital of a bank. On the other hand, it confirms a negative relationship between bank credits, operational and market risks and the Basel index. From Equations 2-6-9, we obtain the following reduced empirical form of bank credit supply:

$$C = \sum_{i=1}^{n} Y1_i (YC - YD)_i + \sum_{i=1}^{n} \pi_i + \frac{k}{\alpha w1} - \frac{RN}{w1} - (l + s + c) + \epsilon \ \dots.. \quad (9)$$

2.4 Bank Credit/lending behavior Determinants.

Based on theoretical and empirical studies, the determinants of bank credit fall in to three broad categories: (i) individual bank-specific factors that focus on the balance sheet of the bank are deposit , non-performing loans, interest spread, bank liquidity, investment portfolio among others; (ii) factors specific to the banking sector/industry such as market structure i.e degree of competition or market concentration and, (iii) macroeconomic indicators which include real gross domestic product (GDP) growth rate and inflation.

2.4.1 Bank-Specific Determinants

2.4.1.1. Deposit

One of the main role of commercial banks is mobilization of deposit in the form of checking accounts, saving accounts and various time deposits for the purpose of extending wide variety of loans in all denominations to consumers, businesses and state and local governments (Olkoyo, 2011). Where access to alternatives like investment in securities is limited which is very prevalent in some developing countries where capital market may not be available and could be small and illiquid banks have high opportunity to mobilize deposit and accordingly expand their credit level. Banks with higher deposit ratio are expected to expand the supply of loans more

than banks with lower deposit ratios i.e. there should be a positive association between them. On the other hand, it may not be desirable to rely too heavily on deposits as banks with greater deposit levels are more likely to be affected at times of bank runs (Laidroo, 2010).

Researches conducted in different part of the world indicated that volume of loan and advance of bank is significantly and positively affected by the volume of deposit (Amino, 2014); (John, 2014) and (Sharma & Grounder, 2012). However, in his study on determinants of lending behavior of Ethiopian Banks Mitiku(2014) found that deposit doesn't have impact on lending behavior of banks in Ethiopia. Similarly, Laidroo(2010) in his cross country evidence found out a negative relationship between deposit and credit growth. The study remarked that there may not be necessary relationship between deposits and loans; if there is no demand for credit i.e private sectors do not wish to borrow no amount of money supply will encourage them to do so (Laidroo, 2010).

However, in this research, a positive relationship is expected as in Ethiopia demand for credit is high driven by the growing economy so that banks once achieved to mobilize deposit are able to lend. Hence, an increase/decrease in deposit is expected to result in possible increase/decrease in credit.

2.4.1.2 Capital Adequacy

Economic theory gives different possibility on impact of bank capital on bank lending. A decline in bank capital, which results from a capital loss, can be accommodated without any change in bank assets and therefore any change in bank lending because the bank is well capitalized both before and after the loss and because the capital loss can be offset by alternative sources of funding. However, banks unable to raise their equity capital tend to very actively manage their assets in order to maintain a constant bank capital-to-assets ratio . In this case, a bank's only option for maintaining a constant bank capital ratio is to reduce its asset levels i.e to cut back disbursement of new loans. Hence, in capital constrained environment banks will reduce the supply of loans.

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Hernando & Villanueva (2010) in their study of, the recent slowdown of bank lending in Spain, find that capital growth has been a relevant factor to explain lending supply, at least in2009 indicating that banks that have either experienced capital short falls or increased their capital but without reaching the level that is demanded by financial markets might have had no option but to reduce their lending. Similarly, (Martynova, 2015) in his study of show that higher bank capital requirements may reduce bank lending especially to the most bank-dependent borrowers such as small businesses. Banks facing higher capital requirements can reduce credit supply as well as decrease credit demand by raising lending rates which may slow down economic growth. However, having better-capitalized banks enhances financial stability by reducing bank risk-taking incentives and increasing banks' buffers against losses(ibid).

On the other hand, however, according to (Bernanke & Lown, 1991) the size of bank capital has a positive and significant effect on bank lending. (Laidroo, 2010) provided evidence in ECC countries of the positive and significant relationship between loan growth and capital ratio. Similarly in this research a positive relationship between capital and lending behavior is expected.

2.4.1.3 Liquidity Position

Liquidity is the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses (BIS, 2008). Liquidity management of banks is critical as the very nature of banking business is to create liquidity by transforming liquid liabilities into illiquid assets. Aisen and Franken(2010) discussed that banks with ultimate liquidity stress may restrict lending but very high liquidity ratios may also be indicative of weaker demand for loans.

The empirical literature provides two opposite views on the relationship between liquidity and bank lending. Laidroo(2010) in his study of CEE countries discussed the need to have higher liquidity ratio as these banks are better protected from shocks to their deposit size (bank runs),that they should be able to expand lending and be less vulnerable to economic shocks. Similarly positive relationship between liquidity and credit supply is evidenced by findings of

other research such as (Olkoyo, 2011; Olumuyiwa, Oluwatosin, & Chukwuemeka, 2012) from Nigeria and (Mitku, 2014) from Ethiopia. On the other hand, however, Gambacorta and Marques-Ibanez (2011) argue that the current developments in the financial sector reduced the need for liquid assets, so that the positive relationship may not be as evident as before. Hence, generally banks need to manage their liquidity very actively to get a good balance of both handling liquidity risk as well as maximizing lending growth.

However, in this research bank liquidity is expected to be negatively related to credit growth in Ethiopia as the banks were holding high level of liquidity in most of the study period partly as a result of inability to lend due to regulatory prudential measures of credit cap and liquidity and reserve requirements were increased.

2.4.1.4 Investment Portfolio

Investment in this research refers to investment in securities by banks with a given level of lone-able and investable fund at hand; banks tend to trade off between investments in securities and extending loans that a negative relationship between investment and credit growth should not be surprising. Yetbarek (2013) in his study of treasury bills in Ethiopia discussed the relationship between treasury bills and loans to remain negative due to the high return and high risk characteristic of loans and the low return and low risk nature of treasury bills. Besides, when loans are liquidated, there will be a temporarily idle fund that could be invested in short-term investments of which treasury bills are only active in Ethiopia and when loans are to be disbursed some treasury bills maybe liquidated (ibid).

Ethiopian private banks, since 2011, are required to purchase bond as per National Bank of Ethiopia (NBE) bills as per directives No. MFA/NBEBILLS/001/2011. Such bills are expected to increase investment portfolios of the banks. Hence, in this research negative relationship between Investment and credit is expected.

2.4.1.5 Credit Risk

According to NBE (2002) credit risk is the risk to earnings and capital arising from an obligated party failure to meet the terms of any contract with the bank or if an obligor otherwise fails to

perform as agreed. Credit risk is proxied by loan loss provisions over total assets. 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.

(Mitku, 2014) indicated that credit risk is positively associated with increase in loan amount in Ethiopian banks while (Tomak, 2013)found that Banks with larger nonperforming loans to total loans (NPL) exhibit lower ratios of total loans to assets. In this study negative relationship between credit risk and bank lending is expected as higher nonperforming loans to total loans (NPL) affect negatively the total business lending capacity of commercial banks.

2.4.1.6. Cost of Financial Intermediation (Net Interest Margin).

Interest rates spread measure intermediary efficiency computed as the difference between contractual lending and deposit interest rates in financial intermediation process of the provision of financial products and services of credit and savings. Cost of financial intermediation can be seen from supply i.e banks perspective as well as from demand i.e. borrowers perspective. Finance literatures depicts that borrowers suffer because of high cost of financial intermediation resulted from high lending rate as it is an increase in cost of debt capital. Similarly, high cost of financial intermediation as a result of low deposit rates also have adverse consequences as such situation discourages savings and limiting loan able fund of banks and decreasing credit supply. Reduced credit supply victimize small and medium enterprises as banks tend to highly ration credit to these firms during such periods of shortage of lone-able fund (Ghosh, Mookherjee, & Ray, 1999).

Empirical evidences indicated adverse impact of high interest rate spread on bank credit growth. According to (Ladime, Sarpong-Kumankoma, & Osei, 2013) the interest rate spread represents a premium charged by the banks as an additional cost to borrowers and the numerous risks levels that are faced by the banks. Therefore, higher spread depicts the volatility among borrowers that makes it difficult for banks to lend as borrowers willingness and ability to pay more premium is adversely impacted (ibid).

However, other empirical researches such as (Hussain & Junaid, 2012)conducted in Pakistan banks found out a positive relationship between high cost of financial intermediation and credit growth as moderate interest margin is an incentive for banks to extend credit facilities. In addition, (Moussa & Chedia, 2016) also found a positive relationship between interest rate spread and credit growth in their study of lending behavior of Tunisian Banks.

In Ethiopia banks cost of intermediation margin is increasing such as due to increase in operating costs, capital of banks and market concentration so that among others banks need to improve operational efficiency and level of competition (Belay,2015).

In this study, a negative relationship between net interest margin and bank credit growth is expected as the increase in cost of financial intermediation which partly resulted due to increase in lending rate could affect credit demand as well as borrowers repayment capacity adversely impacting lending of Ethiopian Banks.

2.4.2. Industry Specific (Market Structure) Determinant.

Market structure refers to interconnected characteristics of a market, such as the number and relative strength of buyers and sellers and degree of collusion among them, level and forms of competition, extent of product differentiation, and ease of entry into and exit from the market(www/businessdictionary.com). Hence, market structure factors can be presented in terms of concentration or competition and contestability (freedom of entry and exit to industry).

According to the Structure Performance Hypothesis (SPH) a firm with market power i.e with high concentration has the ability to individually affect either the total quantity or the prevailing price in the market and this leads to lower supply and increase in price. However, another school of thought argue that in the presence of market power, banks have more incentive to invest in the acquisition of soft information through relationship banking with borrowers over time thereby enhancing the supply of credit and consequently reducing firms financial constraints. Theoretically, the precise relationship between bank industry structure and lending is arguable.

Bulk of empirical studies done in different part of the world found out that bank concentration has significant negative impact on lending behavior of banks. Boot and Thakor (2000) found out that the level of banking industry competition significantly and positively influences bank lending strategy. Ladime1,Sarpong-Kumankoma & Osei (2013), based on their research on determinants of lending behavior in Ghana, evidenced that competitive banking environment has a positive and significant effect on bank lending behavior that is likely to enhance bank credit growth.

In addition Beck, Demirguc-Kunt & Maksimovic (2004), in their study of Bank Competition and Access to Finance , find that bank concentration increases financing obstacles, but only in countries with low levels of economic and institutional development. The study point out that a larger share of foreign-owned banks minimizes the impact of concentration on financing obstacles, while the effect is intensified by more restrictions on banks' activities, more government interference in the banking sector, and a larger share of government-owned banks. Similarly, according to Amidu(2014) cross country evidence in SSA, concentration significantly and negatively affect bank lending showing that in Sub Saharan Africa countries where banks are most concentrated, the supply of loan is less. Laidroo(2010) in his study of CEE(Countries of Eastern Europe) found out negative relationship between bank concentration and credit growth in all of the counties in the study.

On the other hand, however, (Jiménez, Salas, & Saurina, 2006) found out that as borrowers increase their wealth and have more assets to use as collateral, parallel increases in credit market competition will not lower the access to credit since lenders can substitute market power by the use of collateral.

2.4.3. Macroeconomic Factors

2.4.3.1. Economic Growth

Economic growth impact both supply i.e bank lending behavior and demand i.e firms, households and public enterprises need for bank credit. In terms of credit supply i.e bank side, increase in real GDP boost up the manufacturing sector's income as well as the general peoples earning, which leads to higher domestic deposits. Hence increase the liquidity of banks and they

can lend more for investment needs, so the GDP has a positive association with private credit. From demand side, a strong economic condition creates more demand for goods and services which lead to more investment in different sectors hence increase the per capita income as well as the savings, collectively these factors convince firms to expand business resulting in increased bank credit.

Empirical evidence for instance, Sharma and Grounder (2012) indicated that stronger economic growth may increase demand for more credit and thus lead to higher credit growth. In Italy, Vazakidis and Adamopoulos (2009) indicated that economic growth had a positive effect on credit market. Others studies such as (Amidu, 2014) and (Hussain & Junaid, 2012) also evidenced the positive impact of real GDP on credit growth.

On the other hand, however, studies such as (Moussa & Chedia, 2016; Amino, 2014; Pua, 2012) found out that real GDP growth rate had statistically insignificant impact on loans and advances.

2.4.3.2. Inflation

Inflation affects bank lending from demand as well as supply side. At times of high inflationary situations a rise in real cost of debt is exhibited which hampers demand for bank lending as cost of debt capital increases. Similarly high cost of debt capital also adversely affect viability of projects as well which makes financial appraisal complicated from the side of the financer i.e banks .

Empirical studies provided evidence on negative impact of inflation on lending. Olumuyiwa, Oluwatosin, & Chukwuemeka (2012) discussed that inflation increased, the purchasing power of money lodged in deposit accounts reduce to the extent that savers are forced to pay an inflation tax. Moreover, high inflationary economy also entails the need for monetary intervention of regulators one being obligatory reduction of lending by banks(ibid). Hence, inflation is expected to significantly and negatively affect volume of loan.

However, studies also found positive impact of increase in inflation on loan grows in Turkey (Tomak, 2013); in Tunisia (Mohamed Aymen Ben Moussa, 2016) and in Ethiopia Amino (2014).

In this research inflation is expected to be positively related to credit growth, as a rise in inflation results in higher nominal credit.

2.5 Empirical Studies on bank lending determinants

2.5.1 *Empirical Studies on bank lending in countries of Emerging Economies.*

Guo and Stepanyan (2011) examines determinants of bank credit in emerging market economies using pool of data from 38 emerging countries, during the period from the first quarter of 2001 to the second quarter of 2010, using a pooled estimation technique to run a regression on a large set of micro and macro-economic variables. The result of the study shows that domestic &foreign funding and economic growth positively affect credit growth. It also indicates that high inflation, while increasing nominal credit, is detrimental to real credit growth. Loose monetary conditions of both domestic and global result in more credit, and that the health of the banking sector also matters.

Hussain and Junaid(2012)studied growth drivers of bank credit in Pakistan using data serious of 26 commercial banks from 2001 to 2010. The result of the study indicated that past credit growth, bank soundness, relative bank size, spread ratio, employees' incentives, private and domestic bank ownership, real depreciation, budget deficit, GDP growth and growth of industry have significant and positive impact on growth of bank credit. Bank liquidity, however, has positive but insignificant impact. Higher per capita income a proxy for self-finance capabilities, high real cost of debt reflective of tight monetary conditions; inflation and public and foreign bank ownership are detrimental to credit growth.

(Tomak, 2013) Studied commercial banks lending behavior in Turkey using quarterly bank level data of 15 private commercial banks and 3 state-owned banks for the period of 2003-2012 by using pooled data regression method. They found out that bank lending depends on its size, total liabilities, nonperforming loans to total loans (NPL) and inflation rate. In relation to ownership structure the result indicated that private banks loans performance is better than the state-owned commercial banks.

2.5.2 *Empirical Studies on bank lending in different parts of Africa.*

Ladime1, Sarpong-Kumankoma & Osei (2013)studied the determinants of bank lending behavior in Ghana, using the GMM-System estimator and secondary data of seventeen years period from 1997 to 2006. The study examined impact of lending behavior of banks (proxied by level of commercial banks loan advances) and assumed the determinants as bank specific variables; bank past lending experience, bank size and capital structure; banking industry specific characteristic of competition and concentration and macroeconomic variables of central bank lending rate, exchange rate and economic growth Rate. The result of the study indicated that good relationship among banks and borrowers could be further reinforced by previous lending relationship giving high likelihood that banks will lend more in a current period. Bank size, and capital structure have a statistically significant and positive relationship with bank lending behavior. They also found evidence of negative and significant impact of some macroeconomic indicators (central bank lending rate and exchange rate) on bank lending behavior. Again, competition in the industry was found to have a positive and significant impact on bank lending behavior. Relationship banking was found to have a positive correlation with bank lending behavior in Ghana. Authors recommended that policies aimed at maintaining stable macroeconomic fundamentals would greatly accelerate bank lending decision.

Olumuyiwa, Oluwatosin, & Chukwuemeka(2012)takes a look at determinants of lending behavior of commercial banks in Nigeria: a Co-integration analysis between 1975 to 2010 i.e. for the period of thirty-seven years using pooled data regression methods. The model tested explanatory variables such as volume of deposits, annual average exchange rate of the naira to dollar, Investment Portfolio, Interest rate (lending rate), Gross domestic product at current market price and Cash reserve requirement ratio. However, the model result reveals that there is positive relationship between Loan and advances and Volume of deposits, annual average exchange rate of the naira to dollar, Gross domestic product at current market price and cash reserve requirement ratio except Investment portfolio and Interest rate (lending rate) that have a negative relationship. It was also revealed from the result that there is a long run relationship between Loan and advances and all the explanatory variables in the model and this shows that commercial bank has a lot of impact of their lending behavior.

(Moussa & Chedia, 2016) takes a look at determinants of lending behavior of commercial banks in Tunisia: through panel data regression model using data over an eighteen year s period, 2000-2013 .In the study they found out that return on assets, net interest margin, liquidity has a significant impact on bank loans while external factors of inflation rate and GDP has a significant impact on bank loans.

Amidu (2014) in his study " What Influences Bank's Lending in Sub-Saharan Africa " using panel data regression model and data over an eight-year period, 2000-2007,covering 264 banks from 24 SSA countries, investigated on whether bank lending in SSA is influenced by bank-specific characteristics, the monetary policy stance, macroeconomic variables, and legal and financial structure. The result of the study indicated that in all the sampled countries , bank-specific variables i.e. size of the bank, the liquidity position of such bank, the growth level as well as the efficiency of the management of the banks influence bank credit to private sector. The coefficient of bank size, its growth variable and efficiency are positive, demonstrating that, in SSA, bigger and most growing banks provide credit to the private sector. Furthermore, the lagged dependent variable of last year volume of credit positively influences credit delivery to the private sector, suggesting that, in Sub Saharan Africa, the current year banks' finance to private sector is influenced by the previous year's results.

Cihak and Podpiera (2005) analyzed structure, performance and role of banking system in Eastern Africa of Kenya, Tanzania and Uganda, against the backdrop of recent financial sector reforms. Their result indicates that there is no support for the argument that the presence of large international banks would have an adverse effect on the effectiveness and efficiency of banking sectors in developing countries. And international banks are more efficient and active in lending than domestic banks except in the case of Kenya where the presence of international banks may not lead to increased competition and provisioning of banking services as weak institutions are permitted to operate in the financial system.

2.5.3   Related Empirical Studies in Ethiopia

Empirical researches in Ethiopian context have been done to identify determinants of lending behavior of banks. Amino (2014) using balanced fixed effect panel regression for the period 2001 -2013, identified and analyzed determinates of lending behavior of Ethiopian Banks. Factors of Deposit, liquidity ratio, interest rate, bank size, Cash reserve requirement, inflation and GDP were analyzed. The results showed that volume of deposit and bank size had positive and significant impact on loan and advance. Liquidity ratio and interest rate had negative and significant impact on loan and advance. Cash reserve requirement, and inflation rate had positive and significant impact on loan and advance. Real GDP growth rate had statistically insignificant impact on bank's loan and advance. The study then suggests that commercial banks should focus on mobilizing more deposits as this will enhance their lending performance and should formulate critical, realistic and comprehensive strategic and financial plans.

Again another study Mitiku (2014) was done on lending behavior of commercial banks in Ethiopia by using panel data of eight commercial banks using Ordinary least square (OLS) in the period from 2005 to 2011. Selected Variables were bank size, credit risk, gross domestic product, investment, deposit, interest rate, liquidity ratio and cash required reserve. The result suggests that, there is significant relationship between commercial bank lending and its size, credit risk, gross domestic product and liquidity ratio. But deposit, investment, cash required reserve and interest rate does not affect Ethiopian commercial bank lending for the study period. The study suggests that commercial bank have to give more emphasis to credit risk and liquidity ratio because it weakens banks' loan disbursement and leads a bank to be insolvent.

2.6 Summary and Knowledge Gap

In general, the empirical studies suggest that lending behavior determinants vary across countries and regions. Besides, some of those studies argue that the main determinants of lending behavior 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 determine level of loans and advances particularly in developing countries like Ethiopia.

In Ethiopian context empirical evidence is not obtained so far on market structure and financial soundness determinant factors though such issues are significantly essential that numbers of studies of both theoretical and empirical are done in different part of the world. Also, impact of obligatory investment in securities i.e. NBE bill purchase on lending behavior of banks is no studied so far. Moreover, so far no study indicating both demand and supply side factors of bank credit growth is conducted. This study considers impact of explanatory variables of economic growth, inflation and cost of financial intermediation (net interest margin) variables from both demand i.e borrowers and supply i.e. bank perspective.

Knowledge of market structure determinants of lending behavior is very important as empirical studies done in another country found out that industry structure has significant impact on lending behavior of banks. Boot & Thakor (2000) indicate that the level of banking industry competition greatly influences bank lending strategy positively. Competition in the industry was found to have a positive and significant impact on bank lending behavior in Ghana (Ladime, Sarpong-Kumankoma & Osei. 2013).

Similarly financial soundness is so crucial to the health of the financial sector and to economic stability as well. To this end regulatory factors such as liquidity requirement and capital adequacy requirements are of the interests of many researches especially following Basel capital accord and also the financial crisis.

Hence, this study will fill the gap in literature by providing evidence on impact of market structure factors, financial soundness factors of capital adequacy and bank efficiency and investment portfolio on credit behavior in Ethiopia. Moreover, demand side perspectives to credit growth will also be provided.

2.7 Conceptual Framework

The objective of this research is to analyze the behavior and the factors that determine lending growth of commercial banks in Ethiopia using variables. The bank specific variables are deposit, capital, liquidity, investment portfolio, non performing loans and cost of financial

intermediation. The industry variable is market concentration while the macro economic factors included inflation and growth in gross domestic Product

Thus Figure1.1below which is the conceptual framework summarizes the main focus and scope of this study in terms of variables and their relationship.

Figure 1. 1-Conceptual models of determinants of Credit Behavior/Growth.
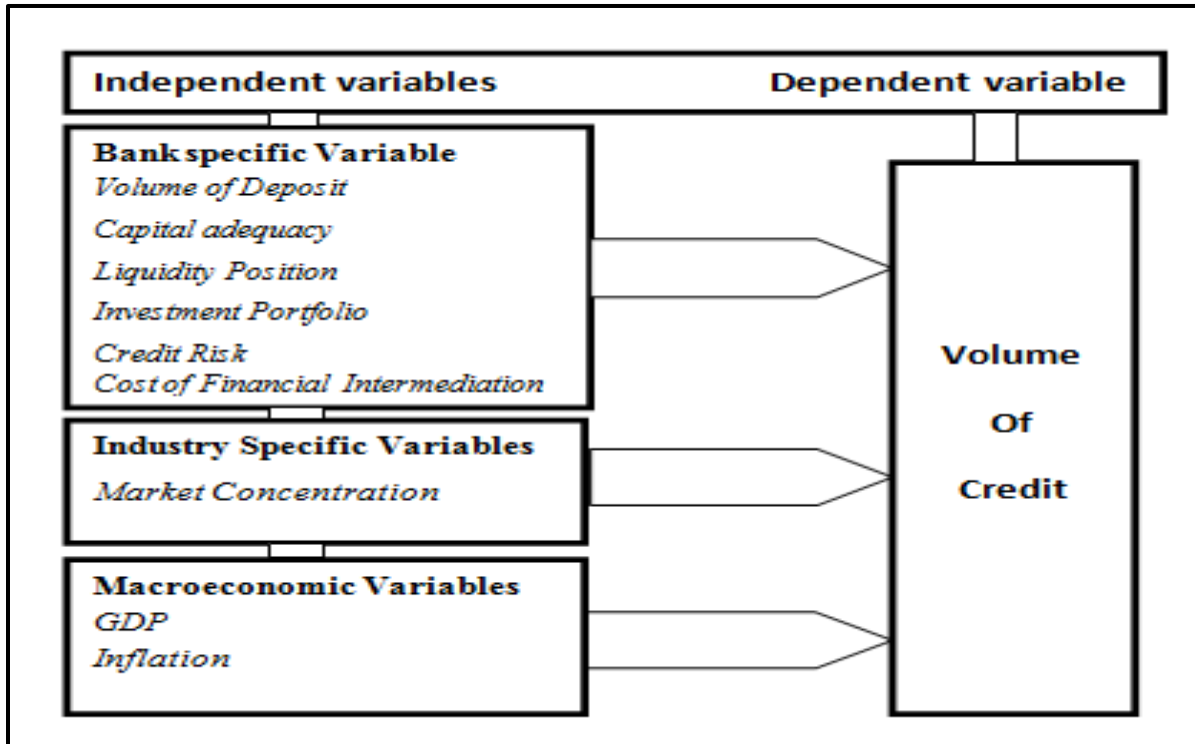
Source: Self-extracted

CHAPTER THREE
RESEARCH METHODOLOGY

3.1   Introduction

This chapter presents a detailed account of the methodology used to carry out the study. It 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 presented at the end of the chapter.

3.2   Methodology of the Study

3.2.1   Research Design and Approach

The selection of research design depends on the objectives the researcher set to achieve (Admas, Robert, & White, 2007). Since this study was designed to examine the casual relationships between lending behavior of banks 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 (Sekaran, 2003). This study examined the previous findings in the literature, and adapted the model in the context of Ethiopian Banking Industry and hypothesizing its relationship between determinants and dependent variable. Therefore, a deductive approach is adopted. The data to be used are quantitative nature and quantitative approaches employ closed-ended instrument based questions, performance data, attitude data, observational data, and census data statistical analysis Creswell(2009). Hence, the research is a quantitative research.

In line with the purpose of this study i.e to examine the cause and effect relationships between credit growth and its determinants, it is an explanatory research. Explanatory research design examines the cause and effect relationships between dependent and independent variables (Kothari, 2004). The research approach for the study also depends on the objective to be achieved in 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 credit growth.

3.2.2 Population Size and Sampling Techniques

In Ethiopia, as of December31,2015 there were nineteen banks these were Commercial bank of Ethiopia, Construction and Business Bank S.C, Development Bank of Ethiopia, 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, , 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 (www.nbe.et). From the listed banks DBE is development bank while the rest are commercial banks.

In selecting the sample banks from the group, this study used purposive sampling method as it 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. 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. Accordingly, the selection criteria set by the researcher was:

  i.   In line with the objective of the study banks need to be commercial banks so that Development Bank of Ethiopia is excluded.
 ii.   Year of establishment of banks was considered and the selected banks are those in operation during the study period i.e 2002 to 2014, having financial statements for consecutive thirteen years and also have encountered different changes and got experience worth of analysis . Ethiopian commercial banks can be grouped in to three peer groups based on years of establishment. There are long stayed commercial banks these are commercial banks operating for more than 20 years even before the financial sector liberalization(1992). Banks in such group are the two public owned banks i.e

CBE and CBB. The second group are those Banks established from1994 up to1999 following the reform that allowed the participation of the private sector in the banking industry. This banks year of existence is above 20 years. The third groups are banks established from 2004 up to 2012. In this study group one and two banks are considered.

iii.   The selected banks had had significant role in bank credit supply during the entire research period. To this effect, during the five years period from the year 2009/10 up to 2013/14 the sampled banks in total have extended of 95% up to 90% of the total industry lending[5].

Based on such criteria, eight commercial banks out of nineteen banks operating from 2002 to 20014 have been 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.

Accordingly, this study used eight experienced commercial bank in Ethiopia for thirteen years. The cut date for the sample period is 2002 which is set considering at least three year of operation since establishment for the latest established bank among the sampled banks. This is to maintain some balance of experience among sampled banks.

3.2.3   Nature, Source of Data, Collection Methods & Instruments

This study prefer to use secondary sources of data mainly because it renders an opportunity to collect high quality data (Soundres, Lewis, & Thornhill, 2009). Besides, using of secondary data is less expensive and require less time for gathering. Accordingly, secondary data of bank level and industry level were collected from bulletins published by National Bank of Ethiopia (NBE), Audited Financial Reports of selected banks, and data of macroeconomic level i.e Gross Domestic Production (GDP) and Inflation Rate are gathered from Ministry of Finance and Economic Development (MoFED).

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5 own computation using data from NBE

The study used panel data set that contains data across eight commercial banks and over time i.e for thirteen years period i.e from 2002 up to 2014. The use of panel data in this study is based on the following three fundamental justifications; which are outlined in Brooks (2008.pp:488-489).

i.   Most importantly, panel data enables to address a broader range of issues and handle more complex problems than would be possible with pure time-series or pure cross-sectional data alone.

ii.   As panel data combines cross-sectional and time series data, one can increase the number of degrees of freedom, and thus the power of the test, by employing information on the dynamic behavior of a large number of entities at the same time. It can also help to mitigate problems of multicollinearity that may arise if time series are modeled individually.

iii. Using panel data enables to remove the impact of certain forms of omitted variables bias in regression results, as it structures the model in an appropriate way.

Thus, this study utilized econometric analysis based on a panel data from 2002-2014 to examine the relationship between credit growth and its determinant factors in Ethiopian commercial banks.

3.2.4   Data Analysis and Regression Methodology

The collected secondary data is analyzed to determine its suitability, reliability, adequacy and accuracy. Thus, this study utilized both descriptive and econometric analysis based on a panel data from 2002-2014 to examine the relationship between volume of loans and advances and its determinant factors of commercial banks in Ethiopia. The study conducted data analysis based on commercial banks operating in Ethiopia over the period from 2002-2014, resulting 104 bank year observations. It employs panel data procedures since the sample contains data across banks and over time. To this end, the researcher used panel data regression methodology to examine the effect of each explanatory variable on the dependent variable.

The panel regression results are 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 the data analysis, the study used EViews 8 software.

3.3 Model Specification and Justification of Variables

In the model credit growth is 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 (Pham, 2015; Laidroo, 2010).

3.3.1 Model Specification

The best-known theoretical model to analyze the determination of bank credit supply is " the Balance Sheet Approach". (Baltensperger, 1981 as cited in Pham, 2015) considered objective function of the bank as a profit function where bank credit depend on the interest rate of bank credit, interest paid on deposits, is cost of illiquidity, cost due to default, and the real resource cost. Pham(2015) based the 'bank balance sheet approach', the determinants of bank credits supply are bank reserves, treasury bills, bank deposits ,capital requirement and credit rate of return. In this research all the mentioned variables are incorporated.

In addition to the bank specific factors that determine credit supply, empirical evidences also pointed out that that bank lending behavior today is explained by banking industry characteristics such as market structure factors and macroeconomic variables of economic growth , inflation , exchange rate etc. (Laidroo, 2010;John, 2014; Pham, 2015).

Therefore, this paper follows the modeling set out in (Pham, 2015; Laidroo, 2010;John, 2014; Hussain & Junaid,2012) to estimate the impact of the factors that may be important in explaining credit growth in Ethiopia. The general panel regression model is as follows:-

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

Where VOL_{it} is the volume of loan 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 into bank-specific factors, industry-specific factors and macroeconomic specific-variables.

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

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 (based on the balance sheet approach discussed above) are volume of deposit, capital, liquidity risk, credit risk and interest rate spread; the industry variable include market concentration 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:-

$$LNVOL_{it} = \alpha_i + \beta_1 * LNVOD_{it} + \beta_2 * CAR_{it} + \beta_3 * LIQR_{it} + \beta_4 * IAR_{it} + \beta_5 * LLP_{it} + \beta_6 * NIM_{it} + \beta_7 * HHI_{it} + \beta_8 * GDP_t + \beta_9 * INF_t + \epsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Were:

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

α_i, β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8, β_9, β_{10}, and β_{11} is a vector of parameters and α_i represents fixed effect.

Where:

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

α_i, β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8 and β_9 is a vector of parameters and α_i represents fixed effect.

$LNVOL_{it}$ Volume of bank loan i at time t on yearly basis of banks i at time t is measured as logarithm of outstanding loan;

$LNVOD_{it}$; Volume of bank deposit i at time t on yearly basis of banks i at time t is measured as logarithm of outstanding deposit;

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

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

IAR_{it}: Investment in securities of bank i at time t is measured as Investment in securities to total asset;

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

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;

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

Bank credit /lending growth is represented by the sum of outstanding loans that to proxy loan and advance, Log of volume of loan and advance was used.

3.3.2.2 Independent variable

According to the model presented, there are nine variables that determine credit growth these are volume of deposit, capital adequacy, liquidity position, investment portfolio, credit Risk, cost of financial intermediation, market concentration, inflation and economic growth. The following section depicts each independent variable by grouping in to three sections.

I. **Bank-Specific Characteristics**

A. **Volume of Deposit (VA).** Bank deposit is measured as the log of total bank's outstanding deposit. One of the main role of commercial banks is mobilization of deposit in the form of checking accounts, saving accounts and various time deposits for the purpose of extending wide variety of loans. According to John (2014) volume of loan and advance of bank is significantly and positively affected by the volume of deposit.

B. **H1: Volume of deposit has positive and significant impact on banks' loans and advances.**

C. **Capital or Capital Adequacy Ratio (CAR).** 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. According to (Gambacorta & Mistrulli, 2003), the effect of excess capital on lending is always significant and positive: well-capitalized banks are less constrained by capital requirements and have more opportunity to expand their loan portfolio.

H2: Capital has positive and significant impact on banks' loans and advances.

D. **Liquidity (LAR):** bank liquidity is measured as raito of banks liquid asset to bank's assets. Highly liquid banks to be associated with lower credit delivery as the very nature of lending is changing liquid asset to illiquid asset negative relation is expected.

H3: Liquidity has negative and significant impact on banks' loans and advances.

E. **Investment (IAR):** Investment is measured as the investment on securities to total assets. Banks tend to trade off between investments in securities and extending loans that a negative relationship between investment and credit supply should not be surprising.

H4: Investment has negative and significant impact on banks' loans and advances.

F. **Credit Risk(LLP):** Credit risk peroxide by loan loss provision measures as a ratio of provision to total loan. As non performing loans determental to loan collection adversely

impacting extending new loans a negative relationship between credit risk and bank credit is expected.

H5: Credit Risk has positive and significant impact on banks' loans and advances.

G. **Cost of Financial Intermediation(NIM):** Cost of Financial Intermediation proxied by NIM measures bank's efficiency also high NIM indicate high lending interest rate as well as low deposit rate both affecting credit supply adversely. Hence, negative impact is expected.

H6: Cost of Financial Intermediation has negative and significant impact on banks' loans and advances.

II. Industry/Market-Specific Characteristic

Market Concentrations (HHI):market concentration could measures the degree of competition each bank faces in the market. Concentrated, uncontested and less competitive market structure leads to low supply and high price both adversely affecting credit growth. Hence, negative relationship is expected. In this research, Herfindahl-Hirschman index (HHI) is calculated by the sum of squares of total asset shares of all banks in the market. HHI is a 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 number.

H7: Concentration has negative and significant impact on banks' loans and advances.

III. Macroeconomic-Specific Characteristics.

A. Economic Growth (GDP): this factor captures the market conditions that have significant impact on volume of loans and advances. 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, improved economic condition may positively affect banks' loan collection performance and hence banks are able to extend more new loans and advances as fewer loan defaults normally occur during these periods. Research findings in different part of

the world rendered evidence that Economic growth has positive effect on volume of loans and advances (Mitku, 2014); (Olkoyo, 2011); (Amidu, 2014).

H8: Economic Growth has positive and significant impact on banks' loans and advances.

B. INF: the effects of inflation on bank credit is adverse however inflation causes overall price escalation it is expected to have positive effect on nominal credit growth.

H9: Inflation has positive and significant impact on banks' loans and advances

3.3. Summary of Research Variables

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

Table 3.1 -Summary of Research Variables

Classification	Variable	Proxy	Predicted sign
Bank Specific Variables	Volume of Deposit(NLVOD)	Log of total outstanding deposit.	Positive
	Capital (CAR)	Total Capital/Total Asset	Positive
	Liquidity position (LAR)	Total liquid asset /Total Asset	Negative
	Investment portfolio(IAR)	Investment in securities/Total Asset	Negative
	Credit Risk (LLP)	Loan Loss Provision/Total loans	Negative
	Net Interest Margin(NIM)	(Interest Income on loans/ total Loans)- (Interest Expense on Deposit/ to total Deposits)	Negative
Industry specific Variable	Market concentration /Competition	$HI = \sum_{i=1}^{N} S_i^2$	Negative
Macroeconomic variables	Economic Growth(GDP)	Growth Rate of Real Gross Domestic Product.	Positive
	Inflation(INF)	Annual Gross Inflation Rate	Positive

Source: Own Organization

3.4 Diagnostic Tests

In order to insure the validity of the parameters diagnostic tests were performed and   test for normality, multicollinearity, heteroscedasticity and autocorrelation is going done 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 (Brooks, 2008). 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

Trend analysis of credit growth during the study period is presented followed by descriptive statistics of the variables (both dependent and independent) were first calculated over the sample period. Then, a diagnostic test includes multicollinearity; heteroscedasticity, autocorrelation, and normality were to ensure that the data are suitable for ordinary least square analysis. Finally, 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 and number of observations.

3.5   Summary

The chapter discusses the research methodology, model specification and sources of data. It also looked at the justification of the variables that were adopted from the literature and a discussion of the diagnostic tests. The next chapter presents data analysis, presentation and interpretation.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents results of the determinants of credit growth in Ethiopia Banking Sector. The chapter presents the diagnostic test results of multicollinearity, heteroscedasticity, autocorrelation, and normality. The chapter also presents results of the regression analysis and discusses the study results and concluded by presenting its summary.

4.2 Trend Analysis of Bank Credit from 2002-2014

This analysis establishes a pattern for credit growth of commercial banks operating in Ethiopia during the period under consideration i.e. from 2002-2014. In figure 4.1 below, x-axis represents years whereas y-axis represents the percentage growth in bank credit in terms of growth in outstanding bank credit and bank credit to GDP ratio.

Figure4.1-Trend of bank credit growth
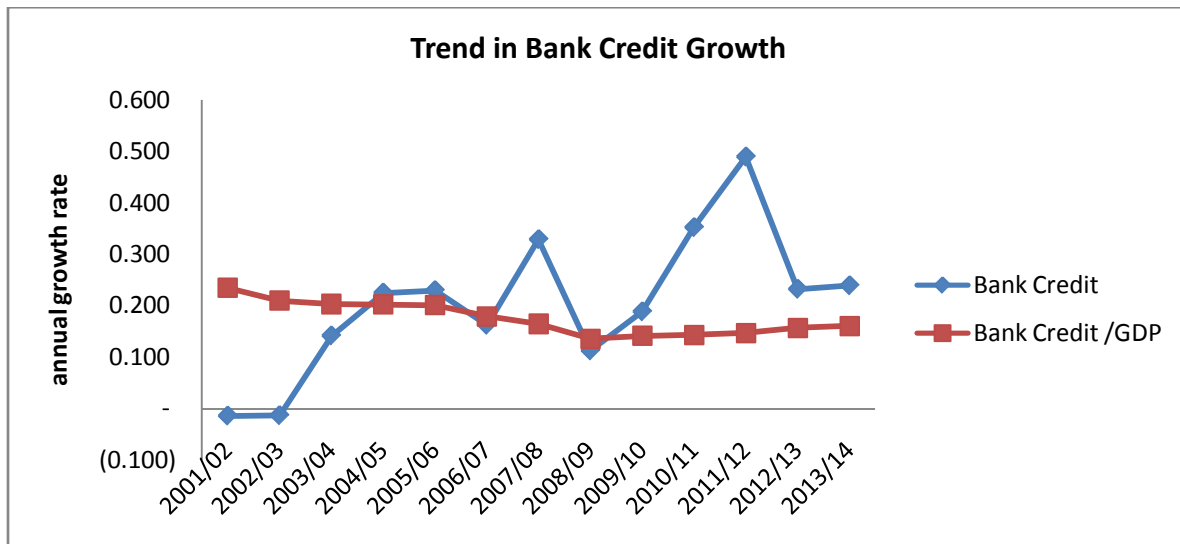
Source: Own computation from NBE via Pivot Data Analysis Tool (2016)

Bank credit to GDP had grown from 13.65% to 16.1% during the five years period i.e from 2009 up to 2014. The growth rate is steady while the achieved rate of 16.1% is far below the maximum value of 100% credit to GDP usually considered as the optimal level. According to (Arcand, Berkes, & Panizza, 2000) credit to GDP above 100% is detrimental to financial stability and hampers economic growth.

Moreover, regarding bank credit growth, it was volatile i.e downward and upward sloping from 2005 up to 2014 among other factors same could be attributed to successive regulatory macro prudential measures taken to achieve economic stability. According to Alemu(2014) in order to control the recurring inflationary episodes in the country the NBE placed different monetary policy mechanisms which affected bank lending adversely. Among the prudential measures taken by the NBE are increasing of reserve and liquidity requirements and setting credit cap lasted from 2009 up to 2011.

4.3 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 NLVOL while explanatory variables are NLVOD, CAR, LIQR, IAR, LLP, NIM, HHI, GDP and INF.

4.2.1 Summary Statistics

Table 4.1 below shows the summary descriptive results for all the variables used in the study such as maximum, minimum, standard deviation, skewness, kurtosis and number of observations.

Table 4.1 -Summary of descriptive statistics of study variables over the period of 2002-2014

	NLVOL	NLVOD	CAR	LIQR	IAR	LLP	NIM	HHI	GDP	INF
Mean	3.26	3.66	0.11	0.36	0.12	0.06	0.07	0.46	0.09	0.14
Median	3.18	3.61	0.11	0.36	0.08	0.04	0.07	0.44	0.11	0.11
maximum	6.77	7.56	0.28	0.59	0.51	0.29	0.12	0.62	0.13	0.36
Minimum	0.49	0.64	0.03	0.13	0	0.01	0.05	0.36	-0.02	0.11
Std. Dev.	1.15	1.36	0.04	0.11	0.14	0.05	0.02	0.08	0.04	0.12
Skewness	0.57	0.51	0.65	0.18	1.14	2.43	0.72	0.65	-1.8	0.22
Kurtosis	3.86	3.32	4.51	2.54	3.26	9.37	3.05	2.39	4.72	2.83
Jarque-Bera	8.94	4.91	17.2	1.48	22.88	278	9.03	8.93	68.65	0.93
Probability	0.01	0.09	0	0.48	0	0	0.01	0.01	0	0.63

Source: Own estimation of research data (2016)

Volume of loans and advances (NLVOL) ranges from 0.49 to 6.77 showing standard deviation of (1.15%), highly disbursed from its mean value of 3.26. The result of the study shows that banks in Ethiopia exhibit different level of credit delivery capacity. Besides, commercial Banks in Ethiopia has exhibited an increasing trend in credit delivery in the post liberalization period (Getnet, 2014).

Similarly, volume of deposit (NLVOD) ranges from 0.64 to 7.56 showing standard deviation of (1.36%), highly disbursed from its mean value of 3.66. The result is indicative of difference in deposit mobilization performance of Commercial Banks in Ethiopia within the study period i.e. 2002 to 2014. The increase in deposit could have resulted by the registered economic growth couples with lack of other capital investment options of depositors. Besides, aggressive effort of banks in deposit mobilization through expansion of retail banking products, increasing retail branch networks etc had contributed to the rise in deposit.

CAR, measured using total capital & reserve divided by total assets, ranges from a minimum of 3.7% to maximum of 28% with a mean value and standard deviation of 11% and 4% respectively. The standard deviation of the CAR shows high variation and provides evidence on the trend that Ethiopian commercial banks maintain higher level of capital requirement   as

required by the National bank of Eithiopia i.e. (8%) during many of the observations in the study perod.

Liquidity risk (LAR) measured using total liquid asset to total asset ranges from a minimum values of 13% to a maximum of 59% with a mean value 36% and standard deviation of 11 %. During the study period liquidity requirement was set to be 15%, 25% and 20% in different times. Hence, it should be noted that Ethiopian banks were mostly in higher liquidity position and also fulfilling the minimum regulatory liquidity requirements. However, excess liquidity has negative consequences on credit delivery and profitability performance.

Investment portfolio (IAR) measured using total investment to total asset ranges from a minimum values of 0% to a maximum of 51% with a mean value 12% and standard deviation of 14 %. Ethiopian private banks are very minimally participate in treasury bills market that explains the nill value of the result and CBE highly participate in such markets. The standard deviation is high that the banks has recently (since 2011) been engaged in purchasing of NBE bill that account to 27% of every new loan disbursement.

LLP that shows soundness of banks measured using total loan loss provision divided by total loan, ranges from a minimum of 1% to maximum of 29% with a mean value and standard deviation of 6% and 5% respectively. The standard deviation of the LLP shows high variation and provides evidence that LLP of Ethiopian commercial banks varied a lot during the study period. In Ethiopia Banks NPL ratio has remarkably declined during the study period (Gadise, 2014). And same is in line with the recent regulatory requirement for Ethiopian banks to maintain the ratio of NPLs at least below 5% (NBE, 2008).

The last bank specific variable, i.e. NIM (measured by total Interest Incomes on loan to total Loans minus Interest Expense on Deposit to total Deposits) ranges from a minimum of 5% to a maximum of 12%. It has a standard deviation of 2% from its mean value of 7%. The data shows that cost of financial intermediation has increased within the study period.

Regarding to descriptive statistics of industry specific explanatory variable the following was observed. Market concentration measured by HHI in total asset terms ranges from 36% to 62.0%

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with a mean of 46% and a standard deviation value of 8% in the study period. This shows that there were variation in concentration level ranging from 36% to 62.0% that during the study period the banking industry had entertained significant changes in concentration.

Macroeconomic specific explanatory variables i.e INF (inflation), and GDP(economic growth) also showed a mean of 14% and 9% and a standard deviation of 12% and 4% in the stated order within the study period. The result showed that during the study period the rate of inflation was highly dispersed indicating volatility in inflationary situation that needs to be managed well.

4.2.2 Correlation Analysis

Pearson correlation also called, Pearson product-movement coefficient is used in this correlation analysis. 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 factor to determine whether or not the correlation coefficient is different from zero i.e statistically significant. As a sample approaches to 100, the correlation coefficient of about or above 0.20 is significant at 5% level of significance (Meyers et al. 2006). The sample size of the study was 8*13 matrixes of 104 observations which was around 100 hence the study used the above justification for significance of the correlation coefficient.

Table 4.2 -Correlation coefficient between the dependent variables   and   independent variable.

	Volume of Deposit (NLVOD)	Capital Adequacy Ratio (CAR)	Investment Portfolio (IAR)	Liquidity Risk (LIQR)	Loan loss Provisions (LLP)	Cost of financial intermediation (NIM)	Market Concentration (HHI)	Economic Growth (GDP)	Inflation (INF)
Bank Credit (NLVOL)	**99%**	**-39%**	**76%**	**-17%**	**1%**	**51%**	**-50%**	**34%**	**33%**

Source: Own estimation of research data (2016)

Brooks (2008) indicates that, if it is stated that y and x are correlated, it means that y and x are being treated in a completely symmetrical way. Thus, it is not implied that changes in x cause changes in y, or indeed that changes in y cause changes in x rather, it is simply stated that

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there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient.

All variables except LIQR and LLP are statistically significant at 5% significant level and negative linear relationship is exhibited with CAR and HHI with coefficient correlation of -0.39 and - 0.50 respectively. Also LIQR had negative linear relationship with independent variable but statistically insignificant/not different from zero with coefficient correlation of - 0.17.

4.4 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.

4.4.1 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 4.3:-

Table 4.3 -Correlation Matrix (Only Independent Variables)

	Volume of Deposit (NLVOD)	Capital Adequacy Ratio (CAR)	Investment Portfolio (IAR)	Liquidity Risk (LIQR)	Loan loss Provisions (LLP)	Cost of financial inter (NIM)	Market Concentration (HHI)	Economic Growth (GDP)	Inflation (INF)
Volume of Deposit	1.0000								
Capital Adequacy Ratio	-0.3969	1.0000							
Liquidity Risk	-0.0685	0.0151	1.0000						
Investment Portifolio	0.7486	-0.3328	-0.1361	1.0000					
Loan loss Provisions	0.0423	-0.4600	0.3950	0.2188	1.0000				
Cost of financial inter.	0.5135	0.2087	-0.2268	0.3423	-0.3705	1.0000			
Market Concentration	-0.4953	-0.0646	-0.1685	-0.0150	0.2284	-0.4559	1.0000		
Economic Growth	0.3238	-0.0361	0.0655	0.0049	-0.1160	0.1838	-0.6558	1.0000	
Inflation	0.3174	0.0348	0.0973	0.0138	-0.1120	0.3411	-0.6098	0.3023	1.0000

Source: Own estimation of research data (2016)

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 repressor 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 repressor.

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

4.4.2 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 Heteroscedastic. The Whites' test was used to check for the presence of heteroscedasticity in the residuals (see Table 4.4).

Table 4.4- Heteroscedasticity Test: White (Summary)

Version of Test	Value		Probability
F-statistic	1.31994	Prob. F(54,49)	0.1631
Obs*R-squared	61.63112	Prob. Chi-Square(54)	0.2219
Scaled explained SS	42.60725	Prob. Chi-Square(54)	0.8685

Source: Own estimation of research data (2016)

As shown in Table 4.4 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.

4.4.3 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 104 was equal to the frame was large; the study considered the BJ test also.

As shown in the histogram in the appendix-2skewness and kurtosis approaches to zero (i.e. 0.24) and Three (i.e. 3.18) and the Jarque-Bera statistics (i.e. 1.168) was not significant even at 5% level of significance as per the P-values shown in the histogram in the appendix was 0.557. Hence, the null hypothesis that the error term is normally distributed should not be rejected. Therefore it is possible to say that error terms follow normal distribution.

4.4.4 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 2nd 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 4.2 below.

Figure 4.2 -Rejection and Non-Rejection Regions for DW Test
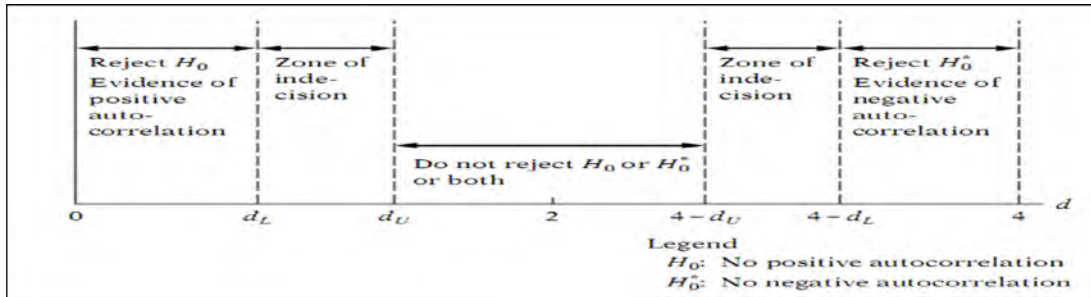
Source: Basic Econometrics, Fourth Edition by Gujrarati (2004 Page No. 469)

The study used the d_L and d_U values for 100 observations as approximation of 104 observations. As per the DW table for 104 observations with 10 variables including the constant at 1 % level of significance, the d_L and d_U values are 1.462 and 1.898 respectively. The DW value for the regression result was 1.6085 and it is above the lower level but below the upper level i.e in the inconclusive region and the null hypothesis is neither rejected nor accepted.

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 4.5-Breusch-Godfrey Serial Correlation LM Test (Summary)

Version of Test	Value	df	Probabilit
F-statistic	2.394313	Prob. F(2,92)	0.0969
Obs*R-squared	5.145409	Pob. Chi-Square(2)	0.0763

Source: Author Estimation of Research Data (2016)

Table 4.5 shows that the Breush-Godfrey Serial Correlation LM Test gives an F-statistic of 2.3943 with a probability of 0.0969 and chi-square version gives statics of 5.1454 with probability of 0.0763. Hence, from both versions of the test we fail to reject the hypothesis of no autocorrelation in the residuals at 1% significant level.

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 (Brooks, 2008), 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.

ii. 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(Gujarati, 2004). Therefore, the choice here is based on computational convenience. On this score, FEM is preferable than REM as the number of time series (i.e. 13 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks).

Hence, based on the above theoretical backgrounds, the researcher has adopted fixed effects regression technique instead of random effect models.

4.6 Results of Regression Analysis and its Interpretation

This section presents the regression result of fixed effect model that examines the determinant of lending behavior of commercial banks in Ethiopia.

Operational model: the operational panel regression model used to find the statistically significant cant determinants of bank credit growth in Ethiopian commercial banks was:

$$LNVOL_{it} = \alpha_i + \beta_1 * LNVOD_{it} + \beta_2 * CAR_{i\,t} + \beta_3 * LIQR_{it} + \beta_4 * IAR_{it} + \beta_5 * LLP_{it} +$$
$$\beta_6 * NIM_{it} + \beta_7 * HHI_{it} + \beta_8 * GDP_t + \beta_9 * INF_t + \epsilon_{it} \quad \ldots\ldots \quad \ldots\ldots\ldots\ldots (4.1)$$

Accordingly, Table 4.6 below presents the result of fixed effect regression model that examines the impact of explanatory variables on proxied by loan volume (NLVOL). Hence, NLVOL is dependent variable where as volume of deposit, capital adequacy, liquidity risk, Investment Portfolio, loan loss provision, interest spread, market concentration, economic growth and inflation rate are explanatory variables.

Table 4.6-Results of fixed effect regression model

Explanatory Variables	Coefficient	Std. Error	t-Statistic	Prob.
Volume of Deposit (H1*)	0.9039	0.022436	40.28762	0.0000*
Capital Adequacy Ratio (H2*)	1.278167	0.298461	4.282519	0.0000*
Liquidity Risk (H3*)	-1.657617	0.080112	-20.69117	0.0000*
Investment Portfolio(H4*)	-0.802076	0.126196	-6.355788	0.0000*
Loan loss Provisions (H5*)	1.415097	0.219846	6.436768	0.0000*
Net Interest Margin (H6*)	-2.903416	0.940429	-3.087331	0.0027*
Market Concentration (H7*)	-0.432861	0.211891	-2.042851	0.0441**
Economic Growth(H8**)	-0.119174	0.20399	-0.584215	0.5606***
Inflation (H9**)	0.105218	0.065032	1.617948	0.1093***
Constant	0.81446	0.169064	4.817464	0.0000*
R-squared	0.997472	Log likelihood		149.4966
Adjusted R-squared	0.997007	F-statistic		21.45507
S.E. of regression	0.06284	Prob(F-statistic)		0000000
Sum squared resid	0.034551	Durbin-Watson stat		1.79658

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

Source: Own estimation of research data (2016)

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

$$LNVOL_{it} = 0.814 + 0.90 * LNVOD_{it} + 1.28 * CAR_{i\,t} - 1.66 * LIQR_{it} - 0.80 * IAR_{it}$$
$$+ 1.42 * LLP_{it} - 2.9 * NIM_{it} - 0.43 * HHI_{it} \quad ....(4.2)$$

4.6.1 Interpretation of R-squared, Adjusted R-squared and F-statistic

4.6.1.1 Interpretation of R-squared

As shown in Table 4.6 an R-squared coefficient of 0.997472 obtained from the estimated model; revealing that 99.74 percent of variation in Bank Credit Growth is explained by the selected explanatory variables collectively. The R-square result is reasonable as the model incorporated all variables affecting bank lending based on 'Balance sheet- approach' for bank specific variables and industry and macro level variables are also incorporated.

4.6.1.2 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 99.74 percent of the volatilities in the credit growth, are explained by the volatilities of independent variables included in the equation. Therefore, an adjusted R-square having value of 0.99700 shows that 99.70 percent of dependent variable is explained by the independent variables included in the model.

4.6.1.3 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 21.45 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 bank credit volume jointly.

4.6.2   Interpretation Results of the Regressors Values

According to the regression results, bank specific factors, market/industry specific factor and macroeconomic factor determine the volume of bank credit. From the results except economic growth all bank specific factors, market/industry specific factor and macroeconomic factors used in the study had the greatest influence on credit growth of commercial bank in Ethiopia. A detailed analysis of each of the variables of the model is provided below.

4.6.2.1 Bank-Specific Characteristics

All the coefficients for the bank specific variables have the expected signs and are highly significant at one percent in all the estimated equation except loan loss provision which resulted having positive sign than the expected negative relationship with credit growth.

A. Volume of Deposit (VOD) on Bank Credit Growth

In the regression model the coefficient of Volume of Deposit (VOD) displays (as expected) a positive sign in its relationship with bank credit and it is statistically significant at 1 percent significant level. This result implies that the volume of loan increases when volume of deposit increase. The expansion of e-banking banking products, increasing retail branch networks and aggressive competition in the deposit market contributed much to the rising deposit level in Ethiopia which also contributed to growth in bank credit.

This result is consistent with the lone-able fund theory which premises a positive relationship between deposit and bank credit and as major source of loan-able fund of banks is deposit. Banks that able to mobilize higher deposit are associated with high credit growth. These results are consistent with other scholars who also found a positive relationship between the growth of deposit and bank credit growth (Amino, 2014); (John, 2014) and (Sharma & Grounder, 2012).

In Ethiopian context, banks major increase in their deposit level goes to lending as banks investment portfolios in securities are undiversified and limited. Moreover, the deposit-credit

relationship is significant as increase in deposit is matched with the high credit demand of a growing economy. In some period of the study, negative real interest rate due to the double digit inflation rate in the country was exhibited and along other possible factors that could discourage to save in banks bank deposit is increasing in Ethiopia during the study period.

However, on the other hand, it may not be desirable to rely too heavily on deposits as banks with greater deposit levels are more likely to be affected at times of bank runs (Laidroo, 2010). Gorton & Winton (2000) in their study showed that banks can create more or less liquidity by simply changing their funding mix on the liability side. Therefore, Ethiopian banks need to actively manage their deposits portfolios in terms of demand, time and saving deposits which are of very different nature of unpredictability and risk of run out. During the eight years period(2007-2014), Ethiopian banks deposit composition was mainly of demand deposit 44%-50% followed by saving and time deposit, with proportion ranging from 44%-50% and 4%- 7% respectively.[5] With such composition i.e about 50% in demand deposit banks need to be cautious of their liquidity management and on maturities of loans and advances they extend to borrowers. Moreover, banks needs to deploy robust risk management mechanisms to mitigate deposit run outs such as diversifying their depositors in number, demography, region etc.

The statistically significant impact of deposit on credit is in line with hypothesis 1. In the Ethiopian commercial banks, the ratio of volume of deposit has an estimated coefficient of 0.904 in the bank credit regression, which means that a unit increase in volume of deposit results in 0.904 unit increase in volume of credit.

B. Capital on Bank Credit Growth

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 Bank Credit Growth. This result implies that bank credit grows with increase level of capital to asset proportion.

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5 Data from NBE extracted from bank's annual Audited Reports.

Economic theory states that banks unable to raise equity very actively manage their assets in order to met regulatory capital adequacy ratio i.e capital over risk weighted assets. And the major way of reducing their asset levels is cutting back of loan disbursement activities. However, in the context of Ethiopia, in most of the study period banks achieved more than regulatory capital level (Dawit, 2015) hence the tendency to cut back loan disbursements to achieve capital requirement ratios is not evident in Ethiopia. Rather, increase in capital contributed significantly to credit growth.

This result concurs to other research which evidenced those banks with high capital levels to be able to increase their credit volume (Bernanke & Lown, 1991; Gambacorta & Mistrulli, 2003; Mohamed, 2016). Besides,(Laidroo, 2010) provided evidence in Eastern Europe countries of the positive and significant relationship between capital ratio and loan growth.

According to (Laidroo, 2010) the role of capital in the financial system is very significant. Strong and resilient financial system is necessary for economic growth as it restores confidence and determines the elasticity of the system to shocks as well as enhancing the credibility of the financial institutions in the system hence enhance credit delivery(ibid).

Hence, regulatory requirements to achieve minimum capital of Br.2 billion by June 2016, to keep 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) and the capital requirement ratio of 8% of total risk weighted assets (based on Basel Capital accord, 1988) are robust measures to achieving financial stability and also enabling banks to increase credit performance.

The statistically significant impact of capital on volume of loan is in line with hypothesis 2. In the Ethiopian commercial banks, the ratio of capital to total assets has an estimated coefficient of 1.28 in the volume of loan regression, which means that a unit increase in capital results in 1.28 unit increase in volume of loans.

C. Liquidity Raito (LIQR) on Volume of Loan.

The liquidity coefficient is negative and significant at 1 percent, indicating lower credit supply for banks with a higher proportion of liquid assets.

The result properly explained the situation that the high liquidity in the banking system and the associated decrease in credit growth. Ethiopian banks has gone through a period of high level of liquidity partly arise as a result of regulatory measures taken to reduce the high inflation exhibited in the study period. Among the measures NBE taken are credit cap (ceiling) not to extend loans above targeted limit and increase of reserve and liquidity requirements. Reserve requirement increase from 5 (SBB/37/2004) 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 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 effective April 2008. Currently, reserve requirement has decreased to 5% while liquidity requirement remained at 20%.

This result agrees with research outcome of (Moussa & Chedia, 2016) while negate that of (Olkoyo, 2011; Olumuyiwa, Oluwatosin, & Chukwuemeka, 2012) from Nigeria and (Mitku, 2014) from Ethiopia.

The statistically significant impact of liquidity risk on credit volume is in line with hypothesis 3. In the Ethiopian commercial banks, the liquidity risk proxied by liquid asset to total asset ratio has an estimated coefficient of -1.657 in the volume of credit regression, which means that a unit increase in liquidity ratio results in 1.657 unit decreases in volume of credit. Moreover, the economic magnitude of the variable is the largest among bank-specific determinants, suggesting that increase in liquidity ratio decreases the credit volume highly other than the impact of other factors.

D. Investment Portfolio(IAR) and Credit Growth

In respect to the model specifications, the investment portfolio was proxied by investment over total assets. Investment of each bank shows a negative and significant (at 1 percent significant level) impact in its relationship with the banks' credit volume.

In Ethiopian banks, investment portfolios are undiversified and limited. Bank's investments in debt instruments as well as equity instruments are less due to small and illiquid capital market limited to treasury bills. Investments of Ethiopian banks was mainly in treasury bill and government securities which government banks highly participate while the portion of private banks is insignificant. Since 2011, private commercial banks in Ethiopia are obliged to buy government bond worth of 27% of every fresh loan disbursement. As the bond is of five years maturity period and effected in proportion of credit disbursement it tightens available loan-able fund for credit. Hence, the finding of the research is plausible that investments in Ethiopian context adversely affected credit growth.

The statistically significant impact of investment portfolio on credit volume is in line with hypothesis 5. In the Ethiopian commercial banks, investment portfolio has an estimated coefficient of -0.802076 in the credit volume regression, which means that a 1 unit increase in investment generate 0.802076 decrease in credit volume.

E. Loan Loss Provision (LLP) on Volume of credit.

For loan loss provision, considering the regression model, the coefficient sign of the credit risk variable is positive in its relationship with the bank's credit volume and statistically significant at 1 percent significant level. The relationship of non-performing loans to the loan volume shows that an increase in the quantity of non-performing loans leads to an increase in loan volume. Hence, the result of the LLP regression indicating volume of credit increases as the quality of loans declines is surprising.

It should be noted that, the result could be the case that provision on non performing loans may not be adequately and properly accounted or as loan classification and provisioning directive was

revised in 2008(SBB/43/08) that the LLP in the study period (2002-2014) possibly lacks consistency and failed to represent the variable i.e non performing loan to accurately reflect its perceived effects. In Ethiopian commercial banks NPLs show a downward sloping trend over the time of 2002-2013 (Gadise, 2014). Nonperforming loan ratio is reduced and reached 2.9% of total gross loan in 2014(NBE 2015).

The statistically significant impact of loan loss provision on volume of loan is not in line with hypothesis 5. In Ethiopian Commercial Banks, the ratio of total loan provision and advance to total loan has an estimated coefficient of 1.415 in the volume of loan regression, which means that a unit increase in the non-performing loans brings about 1.415 unit increase in loan volume. The variable has a t-test of over 2 (larger t-value of 6.43) which implies that it is a very significant variable in the model.

F. Cost of financial Intermediation (NIM) on Volume of credit.

The regression model shows the coefficient sign of the NIM variable is negative in its relationship with the bank's credit volume and statistically significant at 1 percent significant level. The relationship of NIM to the loan volume shows that an increase in cost of financial intermediation leads to a decrease in loan volume.

Ethiopian banks cost of financial intermediation has increased over time (Belay, 2015) and same adversely affect credit delivery so the result is plausible and it is in line with other empirical evidences indicated adverse impact of high interest rate spread on bank credit growth such as (Ladime, Sarpong-Kumankoma, & Osei, 2013) and negate the evidence of (Moussa & Chedia, 2016) and (Hussain & Junaid, 2012).

The statistically significant impact of NIM on volume of loan is in line with hypothesis 6. In Ethiopian Commercial Banks, the ratio of NIM and volume of loan has an estimated coefficient of -2.9 in the volume of loan regression, which means that a unit increase in the non-performing loans brings about -2.9 unit decrease in loan volume. The variable has a t-test of over 2 (larger t-value of -2.9) which implies that it is a very significant variable in the model.

4.6.1.1 Industry/Market-Specific Characteristic

Bank specific factors are not adequate in explaining bank credit growth since variables external to the banks management also impact bank credit growth. The identified factors such as market structure variables are relevant in explaining bank credit growth.

For market concentration of the banking sector (measured by Hirschman Herfindahl index (HHI) for total asset), the estimated coefficient is negative and statistically significant (at 1% significant level). The result shows a negative relationship between market concentration and bank credit growth among the commercial banks in Ethiopia. Increase in HHI indicates a decrease in market competition and increase in market power of larger firm (Ahmed &Desalegn, 2014).

In Ethiopian Banking industry, during the study period i.e 2002-2014 the number of banks has increased from 8 to 18 i.e by 125% because of the entry of ten newly established local banks. Concentration measured in terms of HHI has constantly decreased from 2002 to 2010 but later from 2011 up to 2014 concentration starts to increase.

The result is inline with economic theory that states increase in competition among banks i.e decrease in the concentration, results in expanded credit supply and lower margin. It also support other empirical studies where the bank concentration index had a negative and significant effect on volume of bank credit. For example, bank lending have been found to be positively related to the level of market competition in Ghanaian banking sector (Ladime1,Sarpong-Kumankoma & Osei (2013)and in the US (Boot and Thakor, 2000). Highly concentrated banking industries are associated with constrained credit supply and high margin.

The statistically significant impact of market concentration on credit volume 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 -0.4328 in the credit volume regression, which means that a unit decrease in market concentration results in 0. 0.4328 unit increase in volume of loan.

4.6.2.2 Macroeconomic-Specific Characteristics

The level of stability in an economy has a bearing on banks' lending behavior. Generally, high bank credit has been associated with countries that have economic stability. The macro economy is made up of factors such as inflation and business cycles as measured by the gross domestic product growth in the economy. Out of the two variables Inflation is significant while real GDP is insignificant.

A. Economic Growth on credit volume..

Economic growth proxied by GDP has been insignificant even at 10 percent significant level and the coefficient having a negative sign. During economic growth demand is high that businesses expand hence firms demand for bank credit is high. Hence, the insignificancy of GDP can be explained in terms of unmet credit demand. It could also be because the proxy of economic growth is real GDP which is adjusted for inflation and usually lower than nominal GDP while credit volume considered is not adjusted for inflation. Hence, inflation adjusted economic growth didn't significantly affected credit growth which might be affected by the double digit inflationary episode the country has gone through.

The finding is inline with other empirical studies that also evidenced GDP's insignificant effect on volume of bank credit (Moussa & Chedia, 2016; Amino, 2014; Pua, 2012).

The statistically insignificant impact of GDP on volume of credit is not in line with hypothesis 9. In the Ethiopian commercial banks case, GDP has an estimated coefficient of -0.1191 in the volume of loan regression, which means that a unit increase in GDP results in 0.1191 unit decrease in credit volume but statistically insignificant.

B. Inflation on credit volume.

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 insignificant at 5 percent significant level though it is significant at 10% significant level and the coefficient having a positive sign.

This shows that the general performance of the price index plays a role in increasing nominal credit i.e higher total business loans as percent of assets. 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 nominal credit volume.

These findings are in line with rest of the literature which evidences that high inflation is likely to increase credit volume. A positive relationship between inflation and credit volume has been observed in previous studies (Tomak, 2013; Moussa & Chedia, 2016 ; Omondi,2014).

The statistically insignificant impact of inflation on credit volume is not in line with hypothesis 9. In the Ethiopian commercial banks, inflation has estimated coefficient of 0.1052 in the volume of loan regression, which means that a unit increase in the level of inflation results in a 0.1052 unit increase in volume of loans but it is statistically insignificant at 5% level.

4.7   Summary

This chapter discussed the results of the study regarding the factors of bank credit growth in Ethiopia banking sector. Trends of bank credit, descriptive statistics, and some diagnostic tests for classical linear regression model assumptions were presented.

The trend analysis of credit growth of commercial banks in Ethiopia shows volatility of increasing and decreasing trend since 2008 for the period under consideration while bank credit to GDP shows a stable and steady growth which is low compared to standard. 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 credit growth in Ethiopia were mainly driven by bank specific factors, market/industry specific factors and macroeconomic factors. From the results except real GDP, all bank specific factors, market/industry specific factor and macroeconomic factors used in the study had the greatest influence on determinants of credit growth of commercial banks of Ethiopia whilst loan loss provisions 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 4.7.

Table 4.7- Summary of actual and expected signs of explanatory variables on the dependent variables

Classification	Hypothesis	Predicted Sign	Actual sign and significance
Bank-Specific Variables	Volume of Deposit(H1)*	Positive and sign.	Positive and sign.
	Capital Adequacy (H2)*	Positive and sign.	Positive and sign.
	Liquidity position (H3)*	Negative and sign.	Negative and sign.
	Investment portflio(H4)*	Negative and sign.	Negative and sign
	Credit Risk (H5)*	Negative and sign.	Positive and sign.
	NetInterest Margin(H6)*	Negative and sign.	Negative and sign.
Industry-Specific Variables	Market concentration Competition(H7)*	Negative and sign.	Negative and sign.
Macroeconomic variables	Economic Growth(H8)**	Positive and sign.	Negative but insig.
	Inflation(H9)**	Positive and sign.	Positive and sign.

   *Reject null and ** accept null hypothesis.

Sign-statistically significant

Insign- 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

5.   SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1.   Introduction

The study established the factors that determine credit growth in Ethiopia banking sector during the period from 2002-2014. Findings indicated that bank credit is influenced by, volume of deposit, capital adequacy, liquidity position, investment portfolio, credit risk, net interest margin and market concentration. This chapter outlines the summary and conclusions of the study in accordance with the study outcomes. It also renders an insight on policy recommendations and suggestions for future studies.

5.2.   Summary of the Study

The thrust of the study was on credit behavior/growth drivers of commercial banks operating in Ethiopia. The hypothesis of the study was that bank credit behavior/growth is influenced by bank specific, industry specific and macroeconomic factors. The research employed the models proposed for the determination of credit behavior drivers such as (Hussain and Junaide, 2012 ; Amidu, 2013; Olokoyo, 2014) models.

The major factors identified from literature as determinants of bank credit behavior/growth are of three categories: (i) individual bank-specific factors such as bank volume of deposit, capital of the bank, bank liquidity; bank investment portfolio, bank credit risk and net interest margin (ii) factors specific to the banking sector/industry such as the degree of competition or market concentration (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 credit behavior. Some of the studies argue that the main determinants of credit growth 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 bank credit; particularly in developing countries like Ethiopia. Therefore, there is a continuous debate on the key determinants of credit behavior in a country. In addition, credit to GDP in Ethiopia is low compared to standard. 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 bank credit behavior.

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 deposit growth, capital adequacy, liquidity position, credit risk, net interest margin and market concentration had a significant effect on the determination of credit behavior /growth in Ethiopian banking sector. The impact of credit risk proxied by loan loss provision(LLP) on credit behavior /growth could not be established because it might be due to the inadequacy of the proxy i.e LLP used to represent the variable to accurately reflect its perceived effects or perhaps provision for non performing loans might not be adequately and properly accounted.

Generally, seven findings out of nine were in line with literature which postulates that bank specific variables and industry/market specific variables except macroeconomic variables have an impact on bank credit growth. 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.

• During the study period volume of deposit has increased significantly influencing the increase in credit growth of banks operating in Ethiopia. The increase in deposit, among other factors is because of the increase in branch outreach in more geographical area, use of E-banking services and marketing efforts in recent times. However, it is difficult to rely on mere increase of deposit due to possible bank run out risk.

- About capital of the banks, the study showed that bank credit increases when increasing the level of capital. In many of the observation in the study, Ethiopian banks achieved the minimum regulatory capital adequacy requirement that the tendency to trade-off between solvency and loan supply is found out to be less likely. Hence, increased bank capitalization has increased in credit supply that banks need to keep on capitalization as same also insures financial stability of the sector.

- Liquidity position of Ethiopian banks impacted credit Behaviour negatively. The high liquidity position of Ethiopian banks in most of the study period among other factors, could also be attributable to macro-prudential measures of increased liquidity requirements, reserve requirements and credit limit. Hence, during these periods of prudential measures that resulted in high liquidity, Ethiopian banks lending was decreased.

- In regarding to investment portfolio which is proxied by investment to total asset, the study showed that credit volume increases when investment decreases. Ethiopian government banks investment is mainly in government bonds while also private bank engaged in obligatory investment in bonds which is of long term nature ie illiquid nature as loan and that trade-off between investment and credit supply is evident.

- Concerning to loan loss provision, credit growth reacts positively towards the increase of nonperforming loans denoted by loan loss provision. The result indicate volume of credit increases as the quality of loans declines and the proxy LLP also needs to be examined for it might have failed to represent non performing loan adequately or perhaps banks might not be properly and adequately provide for NPLs.

- Concerning the degree of market concentration the credit supply reacts positively towards the decrease in concentration or increase in competition pressure. Ethiopian banking system market concentration has decreased during majority of the study period due to entry of newly established banks(number of banks increased by 125%) and growth of existing ones. Though further effort is need to enhance competitions. Overall the decrease in concentration resulted in increase in credit growth.

- Economic growth is insignificant to influence bank credit behavior which is unexpected result of the study. It could be because the real economic growth didn't significantly affect credit growth which is inflated in value by the high level of inflationary episode the country has gone through.

- Bank credit Behavior reacts positively towards the increase in inflation although insignificant. Since the country has experienced double digits inflation in the study period that results in higher costs of doing business which leads to higher nominal credit.

5.4 Recommendations

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

5.4.1 Improving Deposit Mobilization with Robust Risk Management

Recently banks are more aggressive towards deposit mobilization by expanding branch outreach in more geographical areas and through the use of E-banking services and same contributed to credit Behaviour. However, the mere increase in deposit doesn't guarantee its sustainability due to inherent risk of deposit run out. Ethiopian banks due to the composition (more of demand deposit) of their deposit mix, need to actively manage their deposits portfolios in terms of demand, time and saving deposits which are of very different nature of volatility and risk of run out. Diversifying deposit source in terms of demography and other segmentations and the need to emplace robust risk management strategies in this regard is necessary.

5.4.2 Bank Capital Enhancement

Bank capitalization is one of the effective mechanisms of ensuring financial stability while increasing credit supply. Bank capitalization is well known regulatory mechanism in other countries, prescribed in Basel accords since 1988; the NBE has also given consideration of same in Ethiopian banking sector since 1995. Hence, NBE shall keep on fostering compliance with capital requirements (like directive no SBB/24/95 and SBB/50/2011) as same enhances credit growth and other performances while insuring stability of the banking sector.

In the part of commercial banks, they need to work on enhancing their capital as increased bank capitalization also enables to increase in bank size which is advantageous from performance as well as risk management perspective. In raising their capitals banks may also consider faster growth strategies like merger and acquisition and the like as organic incremental growth may not lead to the desired level of capacity.

5.4.3 Effective Liquidity Management

Commercial banks had had high level of liquidity in some periods of the study partly because of regulatory and other external factors and such excess liquidity adversely impacted credit Behavior. Recently excess liquidity is improved and thus, commercial banks shall continue increase performance i.e achieve credit growth while also managing liquidity risk on one hand. NBE shall also keep its liquidity requirements sustainably for some period as frequent changes in requirements causes difficulty in planning in the part of the commercial banks.

5.4.4 Decreasing Cost of financial Intermediation.

Ethiopian banks need to work on decreasing the cost of financial intermediation which is high and constantly increased during the study period. Intermediation margin can be narrowed through improved efficiency, innovation and other ways but increasing lending prices as increasing lending rate is deterrent to credit growth among other adverse consequences. Especially an increase in the intermediation cost amplifies the credit access problem of medium and small enterprises. Though liberalized, the regulator needs to continuously watch out the pricing of loans and advances to the welfare of the economy as a whole.

5.4.5 Improving bank Competition with enhanced supervision.

In Ethiopia the commercial banking sector concentration has decreased during majority of the study period. Still the regulator need to develop competition in the commercial banking sector so as efficiency, innovation and credit supply are enhanced and intermediation costs are minimized. In instilling competition in the industry NBE may consider increasing the contestability of the sector such as through relaxing barriers to entry. Competition in the banking industry could also

be enhanced through the establishment/development of capital markets and alternative/substitute financing mechanisms such as lease financing.

On the other hand, however, competition unless supervised and regulated very well could lead to excessive risk taking behavior. Dell'Ariccia and Robert Marquez (2006) recognize that strategic competition among banks decrease information asymmetries across banks and gives rise to slack lending standards resulting in expansion of credit with poor loan portfolios and lower profits which in turn cause financial instability. Hence, the NBE needs to augment competition enhancement policies with strengthened supervision and risk management mechanisms.

5.5 Suggestions for Future Studies

The prime focus of this research was identifying credit behavior drivers in the case of commercial bank in Ethiopia using selected variables. However, there are other bank industries and macroeconomic specific variables that were not included in this study. Thus, future researchers are recommended to undertake similar study by considering additional macroeconomic variables like money supply, real interest rate, and industry structure variables such as ownership and qualitative aspects of credit management capabilities and the like. Such researches are useful to validate findings of the current study. Moreover, cross country comparative research providing evidence on credit behavior drivers of Ethiopian banks with a peer country would give much cleared picture and it would be beneficial to benchmark relevant experiences.

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APPENDIX

Appendix 1: Normality Test

Series: Standardized Residuals	
Sample 2002 2014	
Observations 104	
Mean	2.55e-18
Median	-0.004698
Maximum	0.164587
Minimum	-0.141050
Std. Dev.	0.057753
Skewness	0.243305
Kurtosis	3.181056
Jarque-Bera	1.168142
Probability	0.557624
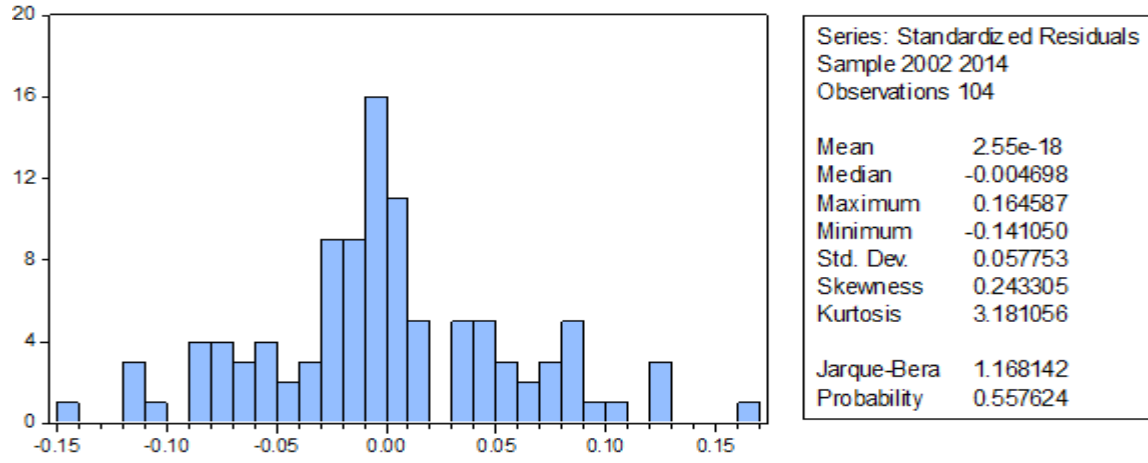
Appendix 2: Fixed Effect Regression Outputs

Dependent Variable: LOG(VOL)

Method: Panel Least Squares

Date: 05/28/16   Time: 13:37

Sample: 2002 2014

Periods included: 13

Cross-sections included: 8

Total panel (balanced) observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.814460	0.169064	4.817464	0.0000
LOG(VOD)	0.903900	0.022436	40.28762	0.0000
CAR	1.278167	0.298461	4.282519	0.0000
LIQR	-1.657617	0.080112	-20.69117	0.0000
IAR	-0.802076	0.126196	-6.355788	0.0000
LLP	1.415097	0.219846	6.436768	0.0000
NIM	-2.903416	0.940429	-3.087331	0.0027
HHI	-0.432861	0.211891	-2.042851	0.0441
GDP	-0.119174	0.203990	-0.584215	0.5606
INF	0.105218	0.065032	1.617948	0.1093

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.997472	Mean dependent var	3.257621
Adjusted R-squared	0.997007	S.D. dependent var	1.148661
S.E. of regression	0.062840	Akaike info criterion	-2.548012
Sum squared resid	0.343551	Schwarz criterion	-2.115755
Log likelihood	149.4966	Hannan-Quinn criter.	-2.372892
F-statistic	21.45507	Durbin-Watson stat	1.608497
Prob(F-statistic)	0.000000		

Appendix 3: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.394313	Prob. F(2,92)	0.0969
Obs*R-squared	5.145409	Prob. Chi-Square(2)	0.0763

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/28/16   Time: 13:40
Sample: 1 104
Included observations: 104
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.021235	0.151079	-0.140558	0.8885
LOG(VOD)	-0.003791	0.014716	-0.257582	0.7973
CAR	0.002504	0.231635	0.010809	0.9914
LIQR	0.002080	0.072033	0.028873	0.9770
IAR	0.033291	0.109512	0.303991	0.7618
LLP	0.001526	0.173993	0.008771	0.9930
NIM	0.227400	0.615602	0.369395	0.7127
HHI	0.016751	0.184930	0.090582	0.9280
GDP	0.069139	0.201372	0.343341	0.7321
INF	0.001259	0.064818	0.019426	0.9845
RESID(-1)	0.235659	0.108262	2.176741	0.0321
RESID(-2)	-0.018056	0.106873	-0.168948	0.8662

R-squared	0.049475	Mean dependent var	-8.82E-16
Adjusted R-squared	-0.064175	S.D. dependent var	0.060761
S.E. of regression	0.062681	Akaike info criterion	-2.593364
Sum squared resid	0.361454	Schwarz criterion	-2.288242
Log likelihood	146.8549	Hannan-Quinn criter.	-2.469750
F-statistic	0.435330	Durbin-Watson stat	1.980400
Prob(F-statistic)	0.936239		

Appendix 4: Heteroscedasticity Test: White

Heteroskedasticity Test: White

F-statistic	1.319944	Prob. F(54,49)	0.1631
Obs*R-squared	61.63112	Prob. Chi-Square(54)	0.2219
Scaled explained SS	42.60725	Prob. Chi-Square(54)	0.8685

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/28/16   Time: 14:17
Sample: 1 104
Included observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.260925	5.345036	0.610085	0.5446
LOG(VOD)^2	0.006826	0.003997	1.707793	0.0940
LOG(VOD)*CAR	0.298766	0.112073	2.665826	0.0104
LOG(VOD)*LIQR	-0.004114	0.028668	-0.143512	0.8865
LOG(VOD)*IAR	-0.075506	0.052401	-1.440937	0.1560
LOG(VOD)*LLP	0.167129	0.069579	2.402011	0.0201
LOG(VOD)*NIM	-0.310842	0.197329	-1.575246	0.1216
LOG(VOD)*HHI	0.153147	0.075133	2.038342	0.0469
LOG(VOD)*GDP	0.047069	0.061479	0.765606	0.4476
LOG(VOD)*INF	0.046074	0.019758	2.331848	0.0239
LOG(VOD)	-0.140451	0.062096	-2.261840	0.0282
CAR^2	2.499868	1.104619	2.263104	0.0281
CAR*LIQR	-0.254473	0.306948	-0.829045	0.4111
CAR*IAR	-1.806494	0.652124	-2.770171	0.0079
CAR*LLP	3.597939	1.818414	1.978614	0.0535
CAR*NIM	-4.779140	3.143766	-1.520196	0.1349
CAR*HHI	2.260202	1.141350	1.980289	0.0533
CAR*GDP	0.083833	0.897337	0.093425	0.9259
CAR*INF	0.021631	0.241495	0.089569	0.9290
CAR	-2.261278	1.045055	-2.163788	0.0354
LIQR^2	0.045009	0.101512	0.443391	0.6594
LIQR*IAR	0.232801	0.197134	1.180929	0.2433

LIQR*LLP	-0.339123	0.419078	-0.809214	0.4223
LIQR*NIM	-2.254367	0.962441	-2.342342	0.0233
LIQR*HHI	-0.444135	0.392775	-1.130761	0.2637
LIQR*GDP	-0.003369	0.333084	-0.010114	0.9920
LIQR*INF	-0.013008	0.123109	-0.105664	0.9163
LIQR	0.391651	0.326597	1.199188	0.2362
IAR^2	0.269015	0.200844	1.339426	0.1866
IAR*LLP	-1.942916	0.692264	-2.806612	0.0072
IAR*NIM	1.627014	1.709386	0.951812	0.3459
IAR*HHI	-0.951620	0.515805	-1.844924	0.0711
IAR*GDP	-0.100338	0.389546	-0.257578	0.7978
IAR*INF	-0.340318	0.138508	-2.457035	0.0176
IAR	0.810513	0.414793	1.954019	0.0564
LLP^2	1.884527	0.808710	2.330288	0.0240
LLP*NIM	3.823213	3.148308	1.214371	0.2304
LLP*HHI	1.703599	0.763952	2.229982	0.0304
LLP*GDP	0.476370	0.457214	1.041896	0.3026
LLP*INF	0.020585	0.298766	0.068899	0.9454
LLP	-1.988531	0.742669	-2.677548	0.0101
NIM^2	9.483598	21.51357	0.440819	0.6613
NIM*HHI	-2.342182	56.35116	-0.041564	0.9670
NIM*GDP	119.1504	154.5230	0.771085	0.4444
NIM*INF	6.988272	18.81076	0.371504	0.7119
NIM	-11.85816	45.91052	-0.258289	0.7973
HHI^2	-3.205308	3.773278	-0.849476	0.3997
HHI*GDP	40.08343	37.42486	1.071038	0.2894
HHI*INF	4.197861	2.221221	1.889889	0.0647
HHI	-2.057988	9.439343	-0.218022	0.8283
GDP^2	17.26718	15.16252	1.138807	0.2603
GDP*INF	23.89648	16.40107	1.457007	0.1515
GDP	-33.43978	31.88393	-1.048797	0.2994
INF^2	1.600616	0.851590	1.879562	0.0661
INF	-5.348305	3.413317	-1.566894	0.1236

R-squared	0.592607	Mean dependent var	0.003656
Adjusted R-squared	0.143643	S.D. dependent var	0.004780
S.E. of regression	0.004423	Akaike info criterion	-7.698749
Sum squared resid	0.000959	Schwarz criterion	-6.300274
Log likelihood	455.3350	Hannan-Quinn criter.	-7.132186
F-statistic	1.319944	Durbin-Watson stat	2.378414
Prob(F-statistic)	0.163113		