Determinants of Capital Adequacy of Commercial Banks in Ethiopia

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APPROVAL OF BOARD OF EXAMINERS

As a member of the board of examiners of the Master Thesis open defense examination, we testify that we have read and evaluated the thesis prepared by Aradom Gebrehiwot and examined the candidate. We recommended that this thesis be accepted as fulfilling the thesis requirements for the Degree of Masters of Science in Accounting and Finance.

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DECLARATION

I, Aradom Gebrehiwot, declare that this thesis is a result of my own original effort and work, and that to the best of my knowledge, the findings have never been previously presented to the University of Addis Ababa or elsewhere for the award of any academic qualification. Where assistance was sought, it has been accordingly acknowledged in the text and a list of reference provided.

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ABBREVIATIONS

SIZE: Bank size

DAR: Deposit to Asset Ratio

LAR: Loan to Asset Ratio

LDR: Loan to Deposit Ratio

LPR: Loan Provision Ratio

ROA: Return on Asset

ROE: Return on Equity

GDP: Gross domestic product

INF: Inflation

NBE: National Bank of Ethiopia

CBE: Commercial Bank of Ethiopia

AIB: Awash International Bank S.C

DB: Dashen Bank S.C

WB: Wogagen Bank S.C

UB: United Bank S.C

NIB: Nib International Bank S.C

BOA: Bank of Abyssinia S.C

LIB: Lion International Bank S.C

CBO: Cooperative Bank of Oromia S.C

BIB: Berehan International Bank S.C

BUIB: Buna International Bank S.C

OIB: Oromia International Bank S.C

ZB: Zemen Bank S.C

AB: Abay Bank S.C

Abstract

This thesis aimed to see the determinant factors for capital adequacy using 14 selected banks operating in Ethiopia from 2011 to 2015. The paper conducted different estimation to see the relationship between the dependent variable, Capital Adequacy Ratio (CAR) and independent Variables which include Bank size (SIZE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Return on Asset (ROA), Return on Equity (ROE), Loan Loss Provision (LPR), and macroeconomic variables (gross domestic product and inflation).The OLS regression result show that DAR, ROE, LPR and ROA are significant at one % of significant level; Size is significant at 5% of significant level whereas LAR is significant at 10 % of significant level. The variables SIZE, DAR, LAR and ROE affect CAR negatively whereas ROA and LPR affects positively. Hence, it is recommended that to be sure that banks have adequate adequacy reserve, commercial banks and National Bank of Ethiopia should give attention to the risk associated with banks size, caring of banks loan and deposit, initiating to increase their return on their asset and to manage their equity return.

Introduction

This chapter introduces the research subject briefly and outlines the research background, incorporating the results and problems from past studies. The problem statement is given and research objectives have been clearly described and based on which hypotheses are formed. Apart from this, this chapter also presents significance of the study, scope and delimitation of the study, and organization of the paper.

1.1.Background of the study

Capital adequacy as a concept has been in existence prior to the era of capital regulation in the banking industry and there exist several literatures on the determination of capital adequacy ratio (CAR) as well as its determinants. The concept appeared in the middle of the 1970's because of the expansion of lending activities in banks without any parallel increase in its capital, since capital ratio was measured by total capital divided by total assets (Al-Sabbagh, 2004). This led to the evolution of international debt crisis and the failure of one of the biggest American banks, Franklin National Bank (Koehn and Santomero, 1980).These events forced regulatory authorities to stress more control procedures and to improve new criteria and methods to avoid bank's insolvency (Al-Sabbagh, 2004). In an effort to promote efficiency in the banking industry, to control weaknesses resulting from worldwide liberalization and deregulation, the Basel Capital Accord of 1988 (Basel I) which led to the endorsement of a new capital adequacy framework (Basel II) in 2004 (operational from 2007) marked the beginning of a new phase of re-regulation with an attempt to bring about an international harmonization of banking regulations (Bichsel and Blum, 2005).

The Basle Committee on Banking supervision (BCBS) have authority to strengthen regulation and improve the quality of banking supervision worldwide (Bank for International Settlement). The committee publish Basle Capital Accord, it decide to define minimum capital adequacy ratio in the amount of 8% of risk weighted assets is standardize international banks (Nuviyanti and Anggono, 2014).Using minimum capital adequacy ratios causes promotion instability and inefficiency of the financial system by decreasing the likelihood of insolvency in banks. In the aftermath of the 2007 financial crisis, there have been efforts by regulatory authorities to make banks stronger. To accomplish this, governments across the developed world are enforcing to strengthen their balance sheets by increasing capital, and if they cannot raise more capital, they

are told to decrease the amount of risk assets (loans) on their books (Abba, 2013).

Capital adequacy generally affects all entities. But as a term, it is most often used in discussing the position of firms in the financial section of the economy, and precisely, whether firms have sufficient capital to cover the risks that they confront (Abba, 2013). Therefore regulatory authorities used capital adequacy ratio as a significant indicator of "safety and stability" for banks and depository institutions because they view capital as a guard or cushion for absorbing losses (Abdel-Karim, 1964).

The National Bank of Ethiopia (NBE), as a central bank, control over the banking sector through issuance of directives pertaining formation and operation of a banking business. NBE has articulated in its Banks Directives No. SBB/50/2011 sub article 4 mentioned that all licensed banks shall at a minimum maintain capital to risk weighted assets ratio of 8% at all times. Thus, given the unique features of banking sector and environment in which they operate and also rapid expansion of banking institutions in Ethiopia, this study seeks to providing full information about the bank specific and macroeconomic determinants of CAR of commercial banks in Ethiopia by examining the untouched one, and replicating the existing in the Ethiopian context by using all commercial banks operating in the country from 2011-2015.

1.2. Background of the study area: Overview of Commercial Banks in Ethiopia

According to National Bank of Ethiopia, there are five principal events, which may conveniently be taken as dividing Ethiopian banking history into periods. The first event was establishment in 1906 of the Bank of Abyssinia, marking the advent of banking into the country. The second event was Italian occupation in 1936, when, following liquidation of the Bank of Ethiopia, a broad colonial banking network, extended to encompass all Italian possessions in the Horn of Africa and closely linked with the metropolitan financial system, was set up in the country. The third event was, in 1943, establishment of the State Bank of Ethiopia, marking the rebirth of the Ethiopian independent banking. The fourth event was the revolution of 1974, nationalized companies, the whole credit system being based on the central bank and three state-owned financial institutions. The fifth event was the collapse of socialist regime followed by a financial sector reform and liberalization according to Monetary and Banking Proclamation of 1994.

Monetary and Banking proclamation of 1994 established the national bank of Ethiopia as a judicial entity, separated from the government and outlined its main function. Monetary and Banking proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 laid

down the legal basis for investment in the banking sector. With the government's adoption of market-oriented economic management and the new thrust of the private sector as an engine of economic growth, a Proclamation for Providing the Licensing and Supervision of Banking Business was issued on January 31, 1994, which opened up the hitherto state monopoly of the banking industry for domestic investors. Following this, a directive was issued for the licensing and supervision of the banking business that came into force as of May 15, 1994. This directive, unlike those that followed, did not set the minimum paid-up capital needed to start a private banking business. It only required evidence of paid-up capital for a new banking business which included a certificate deposit in a blocked subscription account and evidence for valuation of contributions in kind.After six months of the issuance of this directive, the pioneer – Awash International Bank (AIB) – was licensed to operate as a private bank and it commenced business on February 13, 1995 with paid-up capital of 23.2 million Br. Noting this paid-up capital of a pioneer private bank, later directives were issued on the specific amount of paid-up capital requirement. Initially, 10 million Br was taken as the minimum capital requirement for the start-up of a banking business. Subsequently, Dashen (January 1, 1996), Abyssinia (February 15, 1996), Wegagen (June 11, 1997), United (September 10, 1998) and Nib International (October 1, 1999) banks were established with this set capital level requirement for undertaking a banking business.

Five years later, in June 1999, the National Bank of Ethiopia (NBE) underlining the need to raise the minimum capital requirement to establish a new bank and for new banks compete to successfully with the functioning banks, pushed up the minimum capital requirement to 75 million Br through a directive issued on June 1, 1999. And those banks whose paid-up capital level was found less than this amount were required to meet this new capital level within three years until end of June 2002.With this paid-up capital requirement for a banking business, ten more banks were established in succession, with Enat Bank being the 16th private bank to join the banking industry on March 5, 2013.

However, as more and more investors become interested in establishing new banks and starting banking operations with the first raised capital level, NBE felt the need for banks to have even higher capital; maintain an amount commensurate with the volume of their business, and absorb losses resulting from their operations. It again revised the minimum capital requirement. Through the directives issued on September 19, 2011, the minimum capital requirement was significantly

increased for the second time, from 75 million Br to 500 million Br, with all banks, including those under formation, subjected to meet the new higher capital level.

The fourteen operating private banks and the other two banks (Enat and Debub Global) that were under formation were then given five years and nine months to fulfill this capital level and jump their capital buffer to half billion Birr by June 2016. Furthermore, all commercial banks are expected to increase their minimum capital buffer by three fold and hold two billion Br by June 2020 and Banks are require to maintain a level of capital to risk weighted assets ratio of eight per cent at all times.

1.3.Statement of the Problem

Capital adequacy ratio (CAR) is an important risk-based measurement. The aim of the regulatory capital adequacy ratio is to prevent a bank's bankruptcy and the negative externality of a financial crisis. Besides this, the relationship between the capital adequacy ratio and macroeconomic and banking factors is very important taking into account that the bank capital serves as cushion in case the value of the bank's assets declines or its liabilities rise. There are a lot of academics and other financial institutions that have tried to investigate the main factors that determine the capital adequacy ratio. For instance, Williams (2011) studied the impact of macroeconomic variables on the CAR; he noted that macroeconomic variables such as inflation, real exchange rate, money supply, political instability, and Return on investment are significant determinants of regulatory capital., while Hortlund (2005) tested the impact of inflation on the capitalization of Swedish banks and demonstrated that inflation and the banks regulatory capital ratios were inversely related. Yuanjua and Shishun (2012) analyze the relationship between the capital adequacy ratio (CAR) and some internal banking variables they found a positive relationship between ROA and CAR but a negative relationship between CAR and ROE whereas Bateni et al., (2014) found positive relationship between Return on Equity (ROE) and capital adequacy ratio, in contrary to those results Shingjergji and Hyseni (2015) also found out that profitability indicators such as ROA and ROE do not have any influence on CAR in the Albanian banking system. Furthermore, Buyuksalvarci and Abdioglu (2011) concluded that leverage have a negative effect on capital adequacy ratio while Ahmed et al. (2009) concluded that leverage do have a positive impact on bank capital. Al-Sabbagh (2004) stated in his study deposits positively affected to CAR while Bokhari and Ali (2009) share of deposits is strongly negatively affected to CAR. However, the results of those studies were

inconsistent. This inconsistency of results might be attributable to the method of data analysis used by different researchers and difference in the economic condition of the countries in which banking sectors are operating.

In addition to the above facts, there has not been much research which is conducted to date on the determinants of capital adequacy ratios of commercial banks in Ethiopia except the study made by Bahiru (2014), and Yonas (2015) studied the determinants of capital adequacy ratio of commercial banks in Ethiopia but considering only bank specific factors. However, other than bank specific variables macroeconomic variables are also very important determinant factors which affect CAR (Dawit, 2015). Moreover, Dawit (2015) analyzed the determinants of capital adequacy ratio of commercial banks in Ethiopia. In those studies, both bank specific and macroeconomic variables were included but the study used only early established banks (senior banks) in the estimation (Banks established before 2005) and some bank specific variable is also missed such as loan to deposit ratio though it is very important determinants of CAR (Bateni, et al., 2014). There are eight banks established after 2008 as of the report from NBE, 2016. The inclusion of lately established banks in the estimation is very important to understand the challenges that infant and less experienced banks are facing in the banking industry. Besides, there are inconsistent results in literature regarding the effect of some variables on CAR, for example, Yonas (2015), Ali *et al.* (2006) and Khanal *et al.* (2003) found a negative relationship between ROE and CAR while Khrawish (2011) and Molyneux and Thornton (1992) found a positive relationship between ROE and CAR.

In light of the above facts and the research gaps, the aim of this study is to examine bank specific and macroeconomic determinants of Capital Adequacy Ratio of commercial banks in Ethiopia. To this end, this study tried to provide real information about the determinant factors affecting CAR of commercial banks.

1.4.Objective of the Study

The general objective of this study is to examine the effect of bank specific and macroeconomic determinants on capital adequacy ratio of Ethiopian Commercial Banks.

1.5. Hypothesis of the Study

In order to attain the objective of the study, the null hypotheses are developed based on review of relevant and related literatures on the CAR of commercial banks to be tested. This paper examined and tests whether the following Nine variables are significantly affect Capital Adequacy Ratio or

not. These hypotheses include:

H 1: Bank Size negatively affects CAR.

H 2: Deposit to Asset Ratio negatively affects CAR.

H 3: Loan to asset ratio negatively affects CAR.

H 4: Loan to deposit ratio positively affects CAR.

H 5: Loan loss provision negatively affects CAR

H 6: Return on asset positively affects CAR.

H 7: Return on equity positively affects CAR.

H 8: Real gross domestic product growth rate negatively affects CAR.

H 9: Inflation Rate negatively affects CAR.

1.6. Significance of the Study

The finding of this study which details with the determinants of CAR of commercial banks in Ethiopia is beneficial for different stakeholders such as banking sectors (commercial banks) and National bank of Ethiopia), and for other researchers as follows:

For National bank of Ethiopia, since such investigation has policy implication, the finding of this study might be used as a directive input in developing regulatory standards regarding banking capital regulations and making policy. In addition, this study will initiate the commercial Bank management to give due emphasis on the management of these identified variables. Furthermore, the finding of this study initiates the researcher for further studies. Last but not least, this study serves as a reference for other researchers in related area. Thus, it can minimize the literature gap in the area of study particularly in Ethiopia.

1.7. Scope and delimitation of the Study

This thesis is adjusted to fit its objectives of examining the determinants of CAR of commercial banks in Ethiopia within the limits of specified time and possibility. In this research 14 commercial banks found in Ethiopia namely Commercial Bank of Ethiopia (CBE), Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), and Abay Bank S.C (AB) that were registered by NBE before 2011. To this end, this study covers a panel data of these banks over the period 2010\11 to 2014\15. These years has

chosen because many private banks were on average started their operation during the year 2009/2010 (NBE report, 2012). Hence, to have a balanced data among banks the years between 2010\11 to 2014\15 used. Thus, this study is limited to both bank specific and macroeconomic determinants of CAR of Commercial banks in Ethiopia between the above mentioned periods.

1.8. Organization of the study

The rest of the chapter is organized as follows: The second chapter focuses on both theoretical and empirical review of related literature. The third chapter deals with the research methodology. Chapter four deals with data analysis and presentation and the fifth chapter contain the conclusion and recommendation of the study including the direction for further study.

2. Literature Review

The purpose of this chapter is to review the literatures related to bank capital adequacy and its determinants. The review has two sections. Section 2.1 presents a review of the theoretical aspects related to bank capital adequacy and its determinants. This is followed by the review of previous studies done on the determinants of capital adequacy in section 2.2 and Conclusions on the literature review and knowledge gaps in section 2.3. Finally, Conceptual frame works are presented in section 2.4.

2.1. Theoretical Review:-

Under the theoretical foundation, the capital structure theory, the capital buffer theory, Bank capital, Importance of bank capital regulation, the Basel capital accord, capital adequacy ratio, and Determinants of Capital Adequacy Ratio are presented.

2.1.1. Capital structure theory

The fundamental concept and theory of capital structure was introduced by Modigliani and Miller (1958). The seminal work of Modigliani and Miller showed that under the restrictive assumptions of perfect capital markets with no taxes, there would not be any difference between debt and equity financing in value maximization of any firm under the same risk class. However, Modigliani and Miller (1963) showed that under the existence of corporate taxes, the value of the firm would increase with the use of debt financing because of tax deductibility of interest expenses. Many researchers studied the issue of optimal capital structure under various assumptions following Modigliani and Miller (1958, 1963), and a number of finance theory on the subject were developed. Two of these traditional theories about the capital structure issue are the trade-off theory and the pecking order theory.

According to the trade-off theory, an optimal capital structure is achieved when the benefits of debt financing is equalized with the cost of bankruptcy costs (Frank and Goyal, 2005; Kim and Berger, 2008; Octavia and Brown, 2009).

The pecking order theory, on the other hand, argues that firms prefer using retained earnings as the first option to finance new investment opportunities. They prefer using debt financing as the second option and using equity financing as the last resort (Frank and Goyal, 2005; Fauzi *et al*., 2013). In other words, the pecking order theory argued that, due to informational asymmetry, the

retained earnings are preferred to debt and debt is preferred to equity in financing new investment opportunities (Frank and Goyal, 2005).

Concerns on capital structure of non–financial and financial institutions show some differences. Large firms in the non-financial sectors prefer higher debt ratio as their bankruptcy risk is low and the tax - shield of debt financing result with higher profit margins relative to the small ones. This situation is quite different for banks and other financial institutions. Since deposits are debts for the banks, generally they do not use other forms of debt in their capital structure (Nguyen and Kayani, 2013). Studies on financial institutions such as banks up until the last decade, accepted the idea that capital structure of banks is mainly determined by the regulations in order to increase the reliability of the international banking system (Aktas *et al*., 2015).

2.1.2. The capital buffer theory

In capital buffer theory, banks aim at holding more capital than recommended. Regulations targeting the creation of adequate capital buffers are designed to reduce the pro cyclical nature of lending by promoting the creation of countercyclical buffers (Milne and Whalley, 2001, Khawish, 2011).

The capital buffer is the excess capital a bank holds above the minimum capital required. The capital buffer theory implicates that banks with low capital buffers attempt to rebuild an appropriate capital buffer by raising capital and banks with high capital buffers attempt to maintain their capital buffer. More capital tends to absorb adverse shocks and thus reduces the likelihood of failure. Banks raise capital when portfolio risk goes up in order to keep up their capital buffer as sighted by (Marcus, 1984) which appear to relate to determinant of capital adequacy and performance of commercial banks (Mugwang'a, 2014).

2.1.3. Bank capital

The capital structure of financial institutions is determined mostly by the same departure point from the frictionless world of M&M that determine the capital structure of any other kind firms i.e. taxes, expected cost of financial distress, transaction costs and signaling behavior and agency problems arising from asymmetric information between shareholders and creditors and between owners and managers. However banks differ from other ordinary firms in two important respects that affect their capital structures. Firstly the presence of the regulatory safety net (i.e. deposit

insurance) that protects the safety and soundness of banks and likely lowers bank capital. Secondly the regulatory capital requirements raise the capital of some banks.

Recent assessment on the financial crisis conducted by the Basel Committee shows that banks entered the crisis with too little eligible capital and it is argued to be one of the main source of the crisis. Thus, this part of analysis will tend to define the bank's capital. It is due to the fact that there are different notions and distinction of capital. One well known distinction is between regulatory capital and economic capital (Nordam and Kontic, 2013).

2.3.1.1. Required regulatory capital

Required regulatory capital is calculated according to regulators' rules and methodologies by defining each bank minimum regulatory capital requirement (MRCR). In defining this capital regulators also clearly identify which components of the bank's balance sheet can be considered to be eligible as capital. Defining the regulatory capital is not easy as banks operate in diverse jurisdictions with very different banking structure and via different quantitative impact studies and have different definition of capital.

According to Berger *et al*.,(2007), in order to be qualified as regulatory capital, instruments have to fulfill three main characteristics. Firstly, claim that qualify as regulatory capital should be junior to those of the deposit insurer, so that they serve as a buffer to absorb losses before the government. Secondly, a financial instrument that counts as capital should be "patient money". It should not be redeemable without assured refunding by the same or other creditors or shareholders during the time period needed to evaluate a significant shock so that it can provide a stable source of funds during a possible panic run on the bank by other creditors. Finally, an instrument that counts as regulatory capital should reduce the bank's moral hazard incentives to exploit the protection of the safety net by undertaking excessive portfolio or leverage risk. Consequently "equity" is considered an instrument that meets these three criteria for regulatory capital.

2.3.1.2. Economic capital

Economic capital, on the contrary, represents an internal estimate of the capital needed to run the business that is developed by the bank itself. Consequently the required economic capital is defined as the amount of capital the bank considers necessary for running the business from its

point of view, independent of regulatory constraints. All capital above this level will be inefficient and costly capital as it does not produce any value (Nordam and Kontic, 2013).

2.1.4. Importance of Banks Capital Regulation

Banks play an important role in the global economy, and are the first category of institutions to be subject to internationally coordinated capital regulation. The failure of a large number of banks or the failure of a small number of large banks could result a chain reaction that may harm the stability of the financial system. As a result, lead to a global recession as what is happening in 2008. The typical textbook explained that there is no need to investigate banks' financing decisions because capital regulation determined the capital structure of a financial institution which is different from the non-financial firms. Thus, the decisions of the amount of capital that banks hold are made base on three most common reasons. First, bank capital aids to prevent bank failure. A bank maintains bank capital to reduce the chance of becoming insolvent. Banks will prefer to have a sufficient capital to act as cushion to absorb the losses. Second, the amount of capital affects returns for the equity holders of the bank. The higher the bank capital, the lower the return that the owners of the banks. Because there is a trade-off between the safety and the returns to equity holders, the bank managers had to set an optimal level of bank capital. Third, a minimum amount of bank capital is required by the regulators (Wen, 2007).

2.1.5. The Basel capital accord

The government restrictions on financial activities by banks have varied over time and countries. The Basel accords become the common and widely accepted set of global bank capital standard. Meant to harmonize international banking regulation, the accord stipulated minimum capital adequacy or capital requirements for banks (Wen, 2007).

The "Basle Committee" (centered in the Bank for International Settlements), which was originally established in 1974, is a committee that represents central banks and financial supervisory authorities of the major industrialized countries (the G10 countries). In 1998, the Committee approved to publish the first version of Basel Capital Accord, which mainly aimed to tighten the adequacy of capital. In order to prevent banks from excessive risk-taking, as regulators linked the required capital to the risk of the loan portfolio, according to the Basel Accord I (risk-based capital standard), banks are expected to hold a certain level of capital for risk-weighted assets. Particularly, banks are required to maintain a minimum capital ratio of 8%

of all risk-weighted assets. The appliance of 1988 Basel Accord enables banks to reach two main aims: ensuring an adequate level of capital in the international banking system and offering competitive environment for banks. In fact, there are over 100 countries applying the Basel framework to their banking system.

In accordance with the banking industry development, in June 2004, Basel Committee published the upgraded version of the Basel Accords. This document aims to ensure banks to mainly consider operating risks and make an adequate provision of capital against the risks. In the capital adequacy determination, Basel II adjusts risk conversion factors and risk- weighted assets calculation. Particularly, new total risk-weighted assets are computed as the sum of the credit-risk weighted assets with 12.5 times of market-risk capital charge and operation-risk capital charge combination. Basel II offers Standardized Approach and an Internal Rating Based (IRB) Approach for banks to choose. The former allows banks to assess the risk weights through external credit assessment institutions rating. In contrast, under IRB approach, a bank can develop its internal estimation system to assess borrower creditworthiness, with disclosure standards. The Basel Committee, with regard to the economic situation and the structure of banks' capital, decided that the new capital adequacy requirements should be gradually implemented from 2013 at the latest and finally enter into force in 2019. Through the process of Basel II to Basel III the objective is to Strengthen Bank-level, or Micro-prudential, Regulation through Increase in Regulatory Capital Requirements to 10.5% by 2019 Went (2011).

2.1.6. Capital adequacy ratio

Capital adequacy ratio (CAR), which is also defined as the Capital to Risk Weighted Assets Ratio (CRAR) ratio that determines the capacity of the bank in terms of meeting the time liabilities and other risks such as credit risk, is meant to become a cushion/buffer for potential losses, which protects the bank depositors or other lenders. Banking regulators in most countries define and monitor CAR to protect depositors and ensure that it can absorb a reasonable amount of loss and complies with statutory capital requirement, thereby maintaining confidence in the banking system. Capital adequacy ratio is measured by the ratio of total capital to total risk-weighted assets of a bank. The higher the capital adequacy ratio, the higher the level of soundness of bank. A high capital adequacy ratio means a bank could absorb losses without

becoming insolvent (Mpuga, 2002). Mathematically, the capital adequacy ratio is expressed as:

$$\textbf{CAR} = \frac{\text{Total Qualifying Capital}}{\text{Total Risk weighted Asset}}$$

Under Basel I and II accords, capital is divided into three levels or tier of capital as follows:

Tier 1 capital: This tier consists of instruments with the greatest capacity to absorb losses arising at any time. Tier 1 ratio is 4% of RWA and consists of 2% common equity capital and the rest perpetual securities that might be callable at specific dates. They have full discretion on coupon payments and the coupons are typically non-cumulative: equity capital; disclosed reserves etc.

Upper Tier 2: capital securities are usually perpetual but can be dated in certain cases. The coupon payment may be deferred, but they are cumulative: undisclosed reserves, general loss reserves, subordinate term debt.

Lower Tier 2: capitals are dated securities, potentially with a call date. If the coupons on these Securities are not paid; it is seen as an act of default.

Capital Adequacy Ratio (CAR) is basically similar to leverage in the most basic formulation, it is comparable to the inverse of debt to equity leverage formulation although CAR uses equity over assets instead of debt, and since assets are by definition equal to debt plus equity, a transformation is required. Thus unlike traditional leverage, CAR recognizes that assets can have different levels of risk as is being elaborated as follows:

2.1.6.1. Risk weighted assets (RWA)

The measurement for the numerator of the capital ratios is only half of the problem, perhaps as some scholars' claim, the easier half. It is due to the fact that the CAR depends on the ratio of Capital to the risk it should be prepared to absorb. Hence the denominator of a regulatory risk based capital ratio should measure the banks' risk exposure, or the variability of a bank's net worth. The higher the variability of the banks risk exposure, the higher capital must be to protect against the social costs of bankruptcy. However in reality, it is difficult to develop an accurate measure of risk exposure that is reasonably simple and can be uniformly applied across banks. The Basel Accord's risk-weighted assets denominator (RWA) focus on credit risk, reflecting the perception that credit risk poses the most serious threat to bank solvency (Mpuga, 2002).

Recognizing that different types of assets have different risk profile, CAR primarily adjusts for assets that are less risky by allowing banks to discount lower-risk assets. All assets and off balance sheet instruments are assigned risk weights of 0%, 20%, 50% or 100%, depending on the group to which the obligors belongs and the type of financial instrument. Thus, this general and standardized weight to the commercial loans for example (100% weight categories) trigger some problems in its application later on. The specifics of CAR calculation vary from country to country, but general approaches tend to be similar for countries that apply the Basel Accords. Government debt for example is allowed to have 0% risk weighting meaning that they are basically subtracted from the total assets for purposes of calculating the CAR (Nordam and Kontic, 2013).

2.1.7. Determinants of Capital Adequacy Ratio

The relationship between capital adequacy and other business factors guides the overall performance of a bank (Heffernan, 1996). Profit is the ultimate goal of commercial banks. All the strategies designed and activities performed thereof are meant to have a relationship that realize this grand objective (Murthy and Sree, 2003; Alexandru et al., 2008). The determinants of capital adequacy ratio can be classified into bank specific (internal) and macroeconomic (external) factors (Al-Tamimi, 2010; Aburime, 2005):

a. Bank size

Banks' size is important because of its relationship to bank ownership characteristics and access to equity capital. Bank access to equity capital may reflect a relative importance of bankruptcy cost avoidance or managerial risk aversion (Al-Sabbagh, 2004). In banking, level of risk is a relative concept. In order to understand in which level a bank takes risks, the asset size of a bank should also be taken into account. The general opinion is that asset size is inversely related to capital adequacy. Kleff & Weber (2008) assert that large banks could maintain less capital due to their advantage in covering their capital requirements from external sources relatively easily. They also claim that capital requirements of large banks are lower, because they have less investment opportunities and that their portfolios are diversified to a large extent. In a related work by Kristian (2010), it was found that large banks usually have smaller excess capital reserves than small banks. One explanation for this is the “too-big-to-fail” argument. That a government guarantee is implied, since regulatory authorities believes the failure of large banks

would have incalculable consequences for the society.

Wong (2005) asserts that risk management techniques of banks with large asset size are more developed than those of smaller banks. This provides some advantages to large banks in measuring the risks of borrowers through scale effect, and thus, they require less capital. Alfon et al (2005) claim that, the main reason for small banks to maintain higher capital levels than larger banks is their aim to finance their long run business strategy. Since it is more costly for small banks to adjust their capital in case of a sudden capital requirement, they choose to carry more capital.

b. Deposits - Deposit to Asset Ratio (DAR)

One of the factors that contribute in determining the CAR for the banks is funds deposited by the bank's clients. Deposits are cheap source of finance as compare to the external source of finance, such as bonds, loans from business angels and through syndications (Kleff & Weber, 2008). Hence the decrease in deposits trends will affect the increase in the cost of the borrowing through external sources; increase in the cost of alternative borrowing will reduced profit margin of the banks, more funds will be required to compensate the shortfall in profitability.

Yu Min-Teh (1996) defined adequate capital for banks as the level at which the deposit guaranteeing agency would just breakeven in insuring the deposits of individual banks with the premium the bank pays. Sharpe (1977) defined capital as a difference between assets and deposits, so the larger the ratio of capital to assets (or the ratio of capital to deposit) the safer the deposits. As capital was adequate, deposits were "safe enough". His idea was that if the value of an institution's assets may decline in the future, its' deposits will generally be safer, the larger the current value of assets in relation to the value of deposits. Dowd (1999) found in his study that the applying minimum capital standards on financial institutions can be seen as a means of reinforcing the safety of deposits and robustness of the banking system. When deposits increase, banks should be more regulated and controlled to guarantee the depositors rights, and to protect a bank from insolvency (Al-Sabbagh, 2004). If depositors cannot assess financial soundness of their banks, banks will maintain lower than optimal capital ratios. Optimal capital ratios are those that banks would have observed if depositors could have assessed their financial positions properly. Therefore, if depositors can assess a bank's capital strength, a bank will maintain a relatively strong capital positions because greater capital induces depositors to accept lower interest rates on their deposits.

c. Loans and Advances – Loan to Asset Ratio (LAR)

Commercial banks accept deposits and also lend money to the people who require it for various purposes. Lending of funds to traders, businessmen and industrial enterprises is one of the important activities of commercial banks. The major part of the deposits received by banks is lent out, and a large part of their income is earned from interest on such lending. Because loans are among the highest yielding assets a bank can add to its balance sheet, and they provide the largest portion of operating revenue. The ratio of total loans to total asset for banks is important because of its relationship with diversification and the nature of investment opportunity set. It measures the impact of loans in assets portfolio capital (Büyüksalvarc & Abdioğlu, 2011). This ratio represents a bank's aggressiveness in offering the loans which ultimately results in improved profitability. Higher ratio is assumed to be better as compared to lower one.

Thampy (2004) indicates that, since loans have the highest risk weight, a capital constrained bank would want to conserve its capital by allocating fewer assets to loans. This trend becomes more severe as the capital constraint becomes binding which is the case for banks with less than the required capital level. However, for banks with high capital adequacy ratios, there is little impact on loan growth. In capital constrained environment banks will reduce the supply of loans.

Hence the impact of higher capital standards on the supply of bank credit in the economy would have a greater impact in economies which have a bank dependent or dominated financial system as opposed to a capital markets dominated system (Mpuga, 2002).

d. Loan to Deposit (LTD)

Loan to deposit as proxy for risk profile. Loan to deposit determine distributing of credit and also fund collecting from third party funds. Related with previous research, Kasmir (2008) high value of loan to deposit ratio can be increase of bank profitability and affect to capital also capital adequacy ratio. Meanwhile Kleff & Weber (2003), decrease third of party fund consists of deposit, and saving will affect increase the cost to absorb risk so reduced profit ability and also capital after that also may reduce capital adequacy ratio.

e. Return on Assets (ROA)

Return on Assets (ROA) represents all assets owned by the bank and their ability in generating profits during a specific time period, in other words it explains the degree to which the bank succeeds in investing its assets and its efficiency in directing them towards profitable investment opportunities. This ratio measures the management efficiency in using the available resources

and its ability in realizing revenues from funds or resources available from various financing resources, therefore it reflects the effect of the bank financial and operation activities, meanwhile, this ratio was employed as a measure of banks performance in several previous studies of, which polios and Samuel (2000) study, and a direct relationship, between return on assets ratio and Capital adequacy, was documented.

f. Return on Equity (ROE)

Return on Equity (ROE) is a financial ratio that refers to how much profit a company earned compared to the total amount of shareholder equity invested or found on the balance sheet (Athanasoglou et al., 2005). ROE is what the shareholders look in return for their investment. A business that has a high return on equity is more likely to be one that is capable of generating cash internally. Thus, the higher the ROE the better the company is in terms of profit generation. It is further explained by Khrawish (2011) that ROE is the ratio of Net Income after Taxes divided by Total Equity Capital. It represents the rate of return earned on the funds invested in the bank by its stockholders. ROE reflects how effectively a bank management is using shareholders' funds. Thus, it can be deduced from the above statement that the better the ROE the more effective the management in utilizing the shareholders capital (Oloo, 2010).

g. Loss Loan Provision Ratio (LPR)

Loss loan provision defined as a valuation reserve against a bank's total loans on the balance sheet, representing the amount thought to be adequate to cover estimated losses in the loan portfolio (Thiam, 2009).The relationship between loan-loss provisions and capital is two of the most vital macro prudential policy tools by which supervisory authorities use to ensure banking stability is linked by the BASEL II framework, the developments of which have led to the use of loan loss provisions to cover expected losses, and capital to cover unexpected losses (BIS, 2009).From a conceptual point of view, loan loss reserves should cover expected losses, while capital is intended to provide an adequate buffer for unexpected losses. Thus, an inaccurate level of loan loss reserves has a direct impact on bank capital. The provision for loan losses is closely related to bank risks because general provisions can be included in supplementary capital, and specific provisions can be used as a deduction from risky assets. Therefore the loan loss provision is related to the regulatory capital adequacy ratio, which is probably related to capital management (Dong, et al., 2012). Loan loss provisioning policy is critical in assessing financial system stability, in that it is a key contributor to fluctuations in banks' profitability and capital

positions, which has a bearing on banks' supply of credit to the economy (Beatty & Liao, 2009). Bikker and Metzemakers (2005) show that provisioning levels vary significantly with the business cycle. During economic downturns, banks increase their loan loss provision, thereby magnifying the impact of the economic cycle on banks' capital (Laeven and Majnoni, 2003).

This pattern implies that banks' buffers need to be restored during downturns, meaning that fewer profits are available to supplement existing capital; possibly forcing banks to reduce lending. If provisions are not able to cover the whole spectrum of potential loan defaults once an economic downturn occurs, then, naturally, the bank will need to cover the excess loss from its capital. Banks with low capital levels may increase loan-loss provision levels in order to comply with the regulatory requirement and to mitigate solvency risk. Therefore, banks' level of loan loss provisions could have an important effect on banks' capital adequacy ratios decisions (Beatty & Liao, 2009).

h. Economic Growth – Gross Domestic Product (GDP)

Real Gross Domestic Products growth rate (GDP) is among the most commonly used macroeconomic indicators, as it is a measure of total economic activity within an economy. The gross domestic product growth rate, calculated as the annual change of the GDP, used as a measure of the macroeconomic conditions. Economic performance is generally being measured through Real Gross Domestic Products growth rate (GDP), a variable that has also become the de facto universal metric for 'standards of living' (Yanne, et al., 2007).

It is universally applied according to common standards, and has some undeniable benefits mainly due to its simplicity (Yanne, et al., 2007).Among the macroeconomic variables, economic growth and real interest rates seem to significantly affect the capital ratio of subsidiaries. The coefficient of GDP growth exhibits a positive and significant sign which is in line with the findings of (Schaeck & Čihák, 2007), who suggested that a high level of economic development requires sophisticated procedures for banking supervision.

In periods of positive economic growth, expectations are positive for banks as well as most other sectors of the economy and risks are relatively low. However, when economic growth rate is negative, banks may suffer sudden capital losses as a result of possible risk realizations. For this reason, banks generally tend to work with more capital in periods when expectations on the economy turn to negative. Having more capital may reduce the negative effects of the economic environment by signaling a strong capital structure. It may also limit the negative effects of

adjustment costs that tend to increase in these periods (Asarkaya & özcan, 2007)

i. Inflation (INF)

It is a situation in which the economies overall price level is rising. It represents sustained and pervasive increment in aggregate price of goods and services resulting decline in purchasing power of money. Accordingly, when inflation is high and unexpected, it can be very costly to an economy. At the same time, inflation generally transfers resources from lender and savers to borrowers since borrowers can repay their loans with birr that are worthless. It is determined as the general consumer price index. This indicates that, as inflation increase, the cost of borrowing gets more expensive and deteriorates the quality of loan portfolio.

Recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector (both banks and equity market) performance and therefore long-run real activity (Huybens & Smith, 1999). The common feature of these theories is that there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment.

According to (Adegbite, 2010), macroeconomic stability as an ingredient of financial stability requires that macroeconomic policies must be antitypical, dousing excessive trend in any direction, maintaining stable prices, ensuring that public sector deficits are minimal and external debt is sustainable. A stable macroeconomic framework is one where the level of national saving is high enough to prevent undue reliance on foreign borrowing. For macroeconomic stability needed to maintain financial stability, macroeconomic policy instruments must be adequate and consistent with the exchange rate regime if not inflation will erode banks' capital. The framework for maintaining financial stability requires that if the financial institutions are stable and macroeconomic is stable then nature of regulatory and supervisory policies should be preventive. If however the institutions are at the brink or border of stability and many any moment plunges into instability, then the nature of regulatory/supervisory policies should be

remedial. If however the institutions have become unstable already then the policies should be Resolution policies.

Hassan (1992) mentioned that banks had been exposed to standby letters of credit (SLC) and off-balance sheet activities, which has become a major concern to regulators. This means that macroeconomic variables such as inflation play a greater role in the determinants of capital adequacy in most developing countries.

2.2. Empirical Literatures

There are numerous studies which dealt with determinants of capital adequacy ratio of banking sector. Some studies were carried out focusing on a single country, while others on a panel of countries. To make this current research project more meaningful some references of previous studies from both panel countries and single countries are presented here. Determinants of capital adequacy ratio of commercial bank studies conducted in panel country are reviewed in section 2.2.1. This is followed by a review of determinants of capital adequacy ratio of commercial bank studies carried out on a single country in section 2.2.2. Finally, related studies conducted in the Ethiopian context are reviewed in section 2.2.3.

2.2.1. Panel Studies

Milia *et al*., (2014) examined the factors influencing the capital adequacy ratio (CAR) of foreign banks' subsidiaries. They use data from 340 subsidiaries of 123 multinational banks and test whether the subsidiaries' capital ratio depends on the parent banks' fundamentals. They also study the role of the economic conditions and regulatory environment in the bank's home country while determining the CAR of its foreign subsidiaries. Their results provide strong evidence that the CAR of subsidiaries operating in developing and developed countries do not depend on the same set of explanatory factors. They also find that the regulatory framework of a parent bank's home country affects the capitalization of its foreign subsidiaries in the host countries. Finally, they show that specific variables of the parent bank have a stronger effect on foreign banks that are closely related to the interbank market.

Rafet Aktas *et al.*, (2015) examined the impact of bank-dimensional and environmental factors on bank's capital adequacy ratio in South Eastern European (SEE) region. Size, profitability (ROA), leverage, liquidity, net interest margin (NIM), and risk are used as bank-dimensional explanatory variables in a feasible GLS regression model. On the other hand, economic growth

rate, inflation, real interest rate, Eurozone stock market volatility index, deposit insurance coverage, and governance indicator are added to the original model to control for environmental factors. Annual data from 71 commercial banks which belong to 10 different countries in SEE region for the period of 2007 – 2012 is used. This region mainly consists of the "transition economies" which are still experiencing the difficulties of turning into efficient market economies with high economic potentials. The results of our study show that among the bank dimensional explanatory variables size, ROA, leverage, liquidity, net interest margin and risk have statistically significant effects in determining CAR for the banks in the region. Among the environmental factors, economic growth rate, Eurozone stock market volatility index, deposit insurance coverage, and governance have statistically significant effects in determining CAR for the banks in the SEE region.

Alkadamani (2015) conducted a research paper on Capital Adequacy, Bank Behavior and Crisis: Evidence from Emergent Economies. Using a simultaneous equations model, this paper examined the impact of capital requirements on bank risk-taking during the recent financial crisis. It also explores the relationship between capital and risk decisions and the impact of economic instability on this relationship. By analyzing the data of 46 commercial banks between 2004 and 2014 from four Middle East countries, the study concludes a positive effect of regulatory pressure on bank capital and bank risk taking. The findings reveal also that banks close to the minimum regulatory capital requirements improve their capital adequacy by increasing their capital and decreasing their risk taking. Furthermore, the results show that economic crisis positively affects bank risk changes, suggesting that banks react to the impact of uncertainty by increasing their risk taking. Finally, the estimations show a positive correlation between banks profitability and increase in capital, indicating that profitable banks can more easily improve their capitalization through retained earnings rather than issuing new securities.

Wen (2007) examined the determinants of bank capital ratios in East Asia from 2004-2007. Eight explanatory variables were selected as the determinants of bank capital; six bank specific variables (loan loss reserve, net interest margin, liquidity, leverage, and SIZE), two country macro variables (real gross domestic product and BASE) and one regulatory factor (REG), and the dependent variable was capital ratio. To empirically test the determinants of bank capital ratio, a balanced panel of data from Asian banks' balance sheets and income statements for fiscal

years 2004-2007 were used. According to the findings of the study, there is a strong positive relationship between bank capital and bank risk taking behavior. Besides, the result shows capital requirement pressure does not have an influence of low capitalized banks. Liquidity, leverage and profitability show positive link with the bank capital which support most of the bank literature. Finally, the macro variables seemly do not influence the target capital level.

2.2.2. Cross sectional Studies

Yahaya et al., (2016) examined the financial performance and economic impact of capital adequacy ratio on regional banks in Japan. Five variables were employed that represent economic performance - unemployment rate, inflation rate, real exchange rate, money supply and gross domestic product, while financial performance of the regional banks consisted of six variables, namely the deposit-to-asset ratio, return on assets, return on equity, total assets, total deposits and total loans. 64 regional banks were evaluated over a period of 10 years from 2005 to 2014. Secondary data were composed of World Bank data and the individual financial statements of Japanese regional banks. The results show various signs of relationships between variables and it was slightly different from a study by Wen (2007). This was supported by the result tested by panel regression analysis and correlation analysis conducted in order to measure the relationship between capital adequacy and each variable. This paper among others gives a vast reference to depositor, banking institution and policy maker in not only maintaining but also need to improve the level of capital adequacy for a stable security to all parties.

Yuanjua and Shishun (2012) examined the relationship between the capital adequacy ratio (CAR) and some internal banking variables using regression analysis from 2005-2010. They use capital adequacy ratio as dependent variable while as independent variable they use: ROA, ROE, EPS, deposit loan ratio (DLR) and NPL. From the regression results the authors find a positive relationship between ROA and CAR but a negative relationship between ROE and CAR. In the same time is noticed a negative relationship between CAR and credit risk (NPL) and also liquidity risk (LDR).

Almazari (2013) on his research focused his attention on the relationship between capital adequacy ratio and the profitability of the commercial Saudi Arabia Banks. The author measures efficiency with the Capital Adequacy Ratio (CAR) and the Cost Iincome Ratio (CIR) while the profitability is measured by ROA and ROE. Studies have revealed that there is a positive

relationship between capital adequacy and profitability, while the relationship between cost income ratio and profitability is negative. The author also found a positive relationship between banks size and profitability. In this study the authors found a negative relationship between capital indicators and profitability in the Saudi banks.

Shingjergji and Hyseni (2015) examined the main banking determinants of the Capital Adequacy Ratio in the Albanian banking system after the global financial crises. In this study they use a regression model like the ordinary least squares analysis to test the relationship between the dependent and independent variables using quarterly data from the first trimester of 2007 until third trimester of 2014 with a total of 31 observations. As a dependent variable they used the capital adequacy ratio (CAR) while as independent variables they used: return on assets (ROA), return on equity (ROE), the non- performing loans (NPL) and bank size (Total Assets), equity multiplier (EM) and loan to deposit ratio (LTD). From the result they found out that profitability indicators such as ROA and ROE do not have any influence on CAR while NPL, LTD and EM have negative and significant impact on CAR in the Albanian banking system. The bank size has a positive impact on CAR meaning that large banks have higher CAR.

Dreca (2013) in the analysis of a data set of observation for 10 banks in a period of 6 years in B&H showed how Capital Adequacy Ratio (CAR) is influenced by many factors such as: capital structure, size of the bank, profitability indicators, participation of deposits and loans in total asset and leverage. Selected variables were chosen on the previous research and analysis is done through several methods and some diagnostics tests were performed in order to determine the most appropriate model that explains determinants of CAR. Results indicated that SIZE, DEP, LOA, ROA, ROE and LEV have significant effect on CAR. On the other hand LLR and NIM do not appear to have significant effect on CAR. Variables SIZE, DEP, LOA and ROA have negative effect on CAR, while variables LLR, ROE, NIM and LEV are positively related with CAR. All variables except LOA and ROA have expected signs. It is hard to distinguish which CAR is better higher or lower. From stability aspect, it is better to have higher CAR, but from profitability side lower CAR is more preferable. Therefore, the banks should decide which variable to use in order to reach targeted CAR level.

Büyükşalvarc and Abdioğlu (2011) examined the determinants of capital adequacy ratio (CAR) in Turkish banks using data from 2006 – 2011 for 120 observations. The capital adequacy ratio was used as a dependent variable while indicators that measure: banks size, deposits, loans, loan loss reserves, liquidity, profitability, net interest margin and leverage were used as independent variables. According to the regression results of this study, loans, loans loss reserves, leverage, ROA and ROE have a significant relationship with CAR while bank size, deposits, liquidity and net interest margin do not have effect on CAR in the Turkish banks.

Binh and Thomas (2015) examined the relationship between degree of capital adequacy, risks and profitability indicators of Vietnamese commercial banks through both theoretical and empirical studies. They use secondary data from 11 Vietnamese commercial banks during for 6 years (from 2008 to 2013). The data were mainly collected from officially published documents by Vietnamese reputational organizations. Most variables including capital adequacy ratio, risk ratios and profitability ratio during 2008 to 2012 were computed from banks' annual reports. While Capital Adequacy Ratio (CAR) was used as a dependent variable capital risk (CPR), credit risk (CR), interest rate risk (IR), liquidity risk (LR), owner's equity risky assets ratio (ER), asset turnover ratio (ATO), return on equity (ROE)and return on assets (ROA)were used as independent variables. The study employed the regression on dependent variables based on three ways: Pooled Regression, Fixed Effect Model, and Random Effect Model. The paper revealed that the adequate capital (CAR) has positive relationship with capital risk (CPR), owner's equity risky assets ratio (ER), asset turnover (ATO), and return on assets (ROA). In contrast, the capital adequacy level is inversely related to credit risk (CR), interest rate risks (IR), liquidity risk (LR), and return on equity (ROE).

Al-fawwaz and Alrgaibat (2015) examined the relationship between capital adequacy and its determinants in the Jordanian banking system for the period 2000-2013. The researchers adopted descriptive and analytical approaches to identify the capital adequacy of the Jordanian banking system depending on data obtained from the Amman Stock Exchange Market, the Central Bank of Jordan and the Jordanian Ministry of Finance for the period 2000 - 2013. The study showed that there is a statistically significant relationship between the capital adequacy and liquidity, credit risk, capital risk and investments in the securities portfolio. The researcher recommended the commercial banks to increase their strategic planning and management capacity to utilize any

rise in capital to increase profits. They should develop market and operational risk assessment methods to be included in the calculation of capital adequacy ratio of the commercial banks.

Al-Tamimi and Obeidat (2013) examined the most important factors that determine the Capital Adequacy of Commercial Banks of Jordan in Amman Stock Exchange for the period from 2000-2008 using Multiple Linear Regression Analysis and the Correlation Coefficient (Pearson Correlation). The dependent variable was capital adequacy and the independent variables were liquidity risks, credit risks, capital risks, interest rate risk, return on equity, return on assets, revenue power ratio. The result of the study showed the following: There is a statistically significant positive correlation between the degree of capital adequacy in commercial banks and the following independent factors: liquidity risk, and the rate of return on assets. In another hand, there is an inverse relationship with statistical significance between the degree of capital adequacy of commercial banks and factors independent of the rate of return on equity and interest rate risk.

Bokhari and Ali (2009) examined the determinants of capital adequacy ratio in the banking sector of Pakistan. Empirical analyses were conducted by applying statistical tools such as weighted average least square on the panel data from banking sector of Pakistan. Analyses were conducted based on the study of financial statements of 12 sample banks from banking sector of Pakistan; bank-level annual data were used for the period 2005-2009. The dependent variable is capital adequacy ratio while the independent variables are GDP growth rate, share of deposits, average capital adequacy ratio of the sector, portfolio risk and return on risk. The results had revealed that average capital ratio, capital ratio requirement, and portfolio risk level shows weak correlation while share of deposits and return on equity are strongly but negatively correlated with Capital Adequacy Ratio.

Aspal and Nazneen (2014) examined the determinants of Capital Adequacy Ratio in Indian Private Sector Banks. The study examined whether specific bank performance factors particularly Loan, Asset Quality, Management Efficiency, Liquidity and Sensitivity have an impact on capital adequacy requirements among private sector banks of India. The study highlighted the impact of some risks such as credit (loan), liquidity and sensitivity on the capital adequacy of Indian Private Sector Banks. The secondary data from the annual reports of relevant banks for a period of 5 years (2008-2012) have been analyzed.. Multiple linear regression

analysis is applied to explain the effect of explanatory variables; Lending (Total Advances to Assets Ratio), Asset Quality (Net NPA to Net Advances Ratio), Management Efficiency (Expenditure to Income Ratio), Liquidity (Liquid Asset to Total Asset Ratio) and Sensitivity (GAP = Risk Sensitive Assets - Risk Sensitive Liabilities) on the dependent variable Capital Adequacy Ratio (CAR). The results highlighted that capital adequacy ratio is negatively correlated with proxy variables of lending (loans), asset quality and management efficiency. However, liquidity and sensitivity are positively correlated. The regression results have revealed that Loans, Management Efficiency, Liquidity and Sensitivity have statistically significant influence on the capital adequacy of private sector banks. However, the independent variable asset quality has negligible influence on capital adequacy of Indian private sector banks. Moreover the study revealed that the Indian private sector banks maintain a higher level of capital requirement than prescribed by Reserve Bank of India. The study also found that Indian private sector banks have excessive funds to meet their obligation and have opportunity to give more advances to public by protecting owner's stake.

Bateni *et al*., (2014) examined the influential factors of Iranian banks' capital adequacy ratio. They used data collected from annual reports of the sample banks. The data were directly taken from the private banks' balance sheet statement, profit and loss statement and from notes to account. The study period is seven years from 2006 to 2012. The study focused on private banks in Iran which have access to their financial statements. After this selection, our final sample includes 6 banks. Panel data methodology is used in this study to analyze the relationships between bank specific variables [bank size (SIZE), Loan Asset Ratio (LAR), Return on Equity (ROE), Deposit Asset Ratio (DAR), Risk Asset Ratio (RAR), Return on Asset (ROA), Equity Ratio (EQR) and a dependent variable which is capital adequacy ratio (CAR)]. The results indicated negative relationship between bank size and capital adequacy ratio of banks and positive relationship between Loan Asset Ratio (LAR), Return on Equity (ROE), and Return on Asset (ROA), Equity Ratio (EQR), and Capital Adequacy Ratio (CAR). RAR and DAR do not have any impact on capital adequacy ratio.

Nuviyanti and Anggono (2014) examined the determinants of capital adequacy ratio based on risk based bank rating 19 commercial banks in Indonesia. The research involved the use of Multiple Linear Regression based on Ordinary Least Square estimation technique to determine

the effect of the independent variables; Good Corporate Governance measured by operating expense to operating income ratio and net interest margin, Risk Profile measured by non-performing loan ratio and loan to deposit ratio, Earning measured by return on asset ratio and return on equity. Secondary data were obtained from condensed financial statements conventional bank quarterly that derived from Bank of Indonesia covering 2008 to 2013.Using significant level of 5%, the result is obtained from correlation coefficient, T test and F test. The research found that operating expense to operating income ratio, loan to deposit ratio and return on equity ratio have negative significant effect with capital adequacy ratio. On the other hand, non-performing loan ratio and return on asset ratio have positive influence on capital adequacy ratio.

Karina and Anggono (2014), examined determinants and its effects towards capital adequacy ratio of Indonesian banks. Data are gathered from monthly financial statement of Indonesian banks during 2005-2014. Regression analysis is used in this study to analyze the relationships between independent variables; bank size (asset), deposits, credits, nonperforming loan, liquidity coverage ratio (LCR), profitability (ROA and ROE), and net interest margin (NIM) and a dependent variable which is capital adequacy ratio (CAR). The results of this study showed that assets, nonperforming loan, and ROA have positive effect towards the capital adequacy ratio, while ROE, NIM, credit, and deposit have negative effect. On the other hand, liquidity coverage ratios do not have any significant effect towards the capital adequacy ratio.

Mugwang'a (2014) examined the most important factors that determine Capital Adequacy of Commercial Banks in Kenya for the period 2009 – 2013 using Multiple Linear Regression Analysis and the Correlation Coefficient (Pearson Correlation). The target population comprised all registered commercial banks in Kenya in a five year period 2009 to 2013. Secondary data was used from Nairobi Securities Exchange for listed banks and management of banks that are not listed. The study showed that there existed a significant relationship between capital adequacy and capital risk. There was no existence of a significant relationship between capital adequacy and the following: liquidity risk, credit risk, interest rate risk, return on assets ratio, return on equity ratio and revenue power ratio. As showed in the findings of the study, the liquidity risk, credit risk, capital risk, interest rate risk, return on asset ratio, return on equity ratio and revenue power ratio combined with a relatively high effect on the Capital Adequacy and the changes that

occur within, as the percentage of the interpretation reached approximately eighty one percent. Since the P-value of the F-test is less than alpha, the overall conclusion of the study was that there is a significant relationship between the Liquidity Risky Assets, Credit Risks, Capital Risks, Interest Rate Risks, and Return on Asset Ratio, Return on Equity Ratio and Revenue Power Ratio and Capital Adequacy. On the basis of the findings the study recommended that report of financial statements and data should include rules and basis on which capital adequacy measurement is based, which will lead to raising banking and finance awareness that will enhance banks competitive positions with regional and international banks.

Abba *et al*., (2013) are examined the relationship between capital adequacy and banking risks. Three independent variables were used. These variables are risk-weighted asset ratio, deposit ratio and inflation rate. Twelve banks were sampled from the population of twenty-two banks in the Nigerian banking industry as of December, 2013. Secondary data were collected from the financial statements of the banks for a period of five years, from 2007 to 2011. Value at risk theory was adopted to estimate capital adequacy ratio of the banks. Changes in capital adequacy ratio are explained by changes in the independent variables, up to 35%. It was therefore, observed that there is a significant negative relationship between risk and capital adequacy ratio of banks, which means when risk level rises, capital adequacy ratio falls in the Nigerian banking industry. In line with these findings, the study recommended that Nigerian banks should adopt a risk-based approach in managing capital instead of the present practice of focusing on the paid-up capital and retained earnings as there is significant relationship between capital adequacy ratio and banking risks. Since the research also provided evidence of negative relationship between deposits and capital adequacy ratio, they also recommended that Nigerian banks should adopt pragmatic approaches to guarantee the safety of depositors money since increase in deposits does not necessarily result to increase in capital adequacy ratio.

Williams (2011) examined the relationship between capital base and some macroeconomic, financial structure and banking variables using an error correction model during 1980 – 2008 in Nigeria. As dependent variable the author used capital adequacy base while as independent variables: total loans, money supply, interest rate, inflation rate, demand deposit, political instability, exchange rate, liquidity risk, openness of the economy and investments were used. The author concluded that the money supply is a very important determinant of the CAR. The

real interest rate is negatively related to capital adequacy base meaning that an increase of real interest rate dampen the capital adequacy base. The real exchange rate is a significant determinant but its coefficient is not as expected while the deposit liabilities and liquidity risk are not statistically significant. The author found out that investments and political instability are correctly signed and statistically significant to explain the capital adequacy base in Nigeria.

Bouheni and Rachdi (2015) examined reactions of Tunisian commercial banks to regulatory pressure in terms of capital and risk decisions. They studied a sample containing the largest banks in Tunisia over the period 2000-2013, using a simultaneous equation model. The research revealed that interaction between capitalization and risk level is negative and not significant, indicating that an increase in capital is followed by a decrease in banking risk-taking. Moreover, return on assets (ROA) is positively associated with change in capital ratio, showing a weak institutional and regulatory level of Tunisian banks. Then, size is highly significant in the risk equation, which means that the more banks are large, the more they manage their risk. Thus, large banks have more experience in managing risk levels through diversification. Finally, they found a negative relationship between size and bank capitalization. This latter finding is mainly explained by the direct and easy access to major banks in capital markets, i.e. the largest banks are associated to low risk level.

2.2.3. Empirical Studies in Ethiopia

Bahiru (2014) examined the relationship between capital adequacy ratio and firm specific (profitability, deposits, loan loss reserve, leverage, net interest margin, size and liquidity) determinants of capital adequacy ratio of Ethiopian commercial banks. In order to investigate these issues a quantitative method research approach is utilized, by using documentary analysis. More specifically, the study used twelve years (2002 - 2013) data for eight banks in Ethiopia. The study used ordinary least square model to analyze the data. The findings showed that deposits, leverage, loan loss reserve and liquidity of the banks are important determinants of capital adequacy ratio of commercial banks in Ethiopia. However, management quality, profitability and size of banks are found to have no statistically significant impact on the capital adequacy ratio of banks in Ethiopia. The analyses indicated that the variables of deposits, liquidity, leverage and loan loss reserve were significantly related to capital adequacy

ratio. Therefore, banks should pay greater attention to these significant variables in determining their capital adequacy ratio.

Yonas (2015) examined the determinants of CAR in Ethiopian commercial banks. The study period covered the year 2004-2013 on which eight banks were selected based on availability of ten years data. The study used secondary data which is gathered from annual reports of the banks under study. Panel data regression is used in this study and analyzed relationships between bank specific variables: SIZE (Bank Size), DEP (Deposit ratio), LNTA (Loan to Total Asset), LIQ (Liquidity Position), ROA (Return on Asset), ROE (Return on Equity), NIM (Net interest margin) and LEV (Leverage) and the dependent variable which is CAR. In order to select the best model that fit for the study Hausman specification test has been made. And based on the result on which the probability is less than 5%, fixed effect model is selected as the best model for the study. The result of the fixed effect model for the study revealed that ROA, DEP and SIZE have a positive effect on capital adequacy and ROE and NIM have a negative effect on capital adequacy but LIQ, LNTA and LEV do not have significant effect on capital adequacy.

Dawit (2015) examined bank specific and macroeconomic determinant factors of Capital Adequacy Ratios of commercial banks in Ethiopia. To this end, the researcher collected secondary sources of panel data over the period 2002-2013 from eight senior commercial banks in Ethiopia selected based on purposive sampling. The research finding revealed that Bank size (SIZE), liquidity (LQR) and Non-Performing Loan (NPL) ratio had positive whereas Inflation (INF) had negative, but insignificant effect on CAR of commercial banks in Ethiopia. The share of deposit (DAR), Loan(LAR), Loan provision (LPR), Bank risk (RAR), Return on equity and Economic growth (GDP) had negative and statistically significant effect on Capital Adequacy ratios of commercial banks in Ethiopia. Furthermore, Return on Asset (ROA) and Net Interest Margin (NIM) had positive and statistically significant effect on CAR of commercial banks in Ethiopia. The finding of this study is significant as it revealed to bank managers the relevant factors to take into consideration when they make financial policies to maintain at least the expected required level of CAR. Based on the findings, the study recommended to the management of National Bank of Ethiopia to revise the existing minimum requirement based on Basel III accord and also to influence commercial banks in order to disclose all component of CAR in detail in their annual financial statement.

2.3. Summary and Knowledge gap

This chapter presented the theoretical foundation which deals with capital structure, the capital buffer theory, bank capital and importance of bank capital regulation. Further, Basel capital accord was discussed in detail. Lastly, capital adequacy ratio was discussed. Besides, empirical studies regarding the determinants of Capital Adequacy Ratio were also discussed. Then, the knowledge gap is identified and conceptual frame work is developed.

There are plenty of variables that affect the CAR of Commercial Banks. In this study, the researcher focused on both bank specific and macroeconomic determinants of CAR of commercial banks in Ethiopia. However, the variables that got more attention and included in this study were bank specific factors: Bank specific factors Bank size (SIZE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Return on Asset (ROA), Return on Equity (ROE), Loan Loss Provision (LPR), and macroeconomic variables (gross domestic product and inflation).

Plenty of studies were undertaken on determinants of CAR in different countries. For instance, Buyuksalvarci and Abdioglu (2011) studied the determinants of Turkish banks' capital adequacy ratio and its effects on financial positions of banks and found that bank size, deposits, liquidity and net interest margin do not appear to have any significant effect on capital adequacy ratio. Beside, Romdhane (2012) studied the determinants of the banks' capital ratio in an emerging country and found that the interest margin and the risk affect strongly the capital ratio. In addition, Abusharba et al. (2013) studied the determinants of the capital adequacy ratio in the Indonesian banking industry and found that profitability and liquidity are positively related to the capital adequacy requirements. The findings of prior empirical studies have provided varying evidence related to the determinants of capital adequacy ratio. Besides, most of the related literatures reviewed cover different studies made both in developing and developed countries' banking industries. Even if quite a number of studies have investigated the determinants of CAR, most of these studies have been done in developed countries. Thus, as to the knowledge of the researcher, there is still limited number of literatures in Ethiopian banking industry, with the exception of some studies made by Bahiru (2014) found that the variables of deposits, liquidity, leverage and loan loss reserve were significantly related to capital adequacy ratio. However, management quality, profitability and size of banks are found to have

no statistically significant impact on the capital adequacy ratio of banks in Ethiopia in his conducted on eight banks in Ethiopia. And Yonas (2015) investigated the determinants of CAR in Ethiopian commercial banks. The study period covered the year 2004-2013 on which eight banks. He found that ROA, DEP and SIZE have a positive effect on capital adequacy and ROE and NIM have a negative effect on capital adequacy but LIQ, LNTA and LEV do not have significant effect on capital adequacy but both are utilized only bank specific factors. In addition Dawit (2015) conduct his study on eight senior commercial banks in considered both bank specific and macro-economic factors. He found that deposit (DAR), Loan(LAR), Loan provision (LPR), Bank risk (RAR), Return on equity and Economic growth (GDP) had negative and statistically significant effect on Capital Adequacy ratios Furthermore, Return on Asset (ROA) and Net Interest Margin (NIM) had positive and statistically significant effect on CAR whereas Bank size (SIZE), liquidity (LQR) and Non-Performing Loan (NPL) ratio Inflation (INF) had insignificant effect on CAR of commercial banks in Ethiopia.

To summarize in the context of Ethiopia, the related study conducted by Bahiru (2014), Yonas (2015), and Dawit (2015) examined the determinants of CAR of commercial banks in Ethiopia, even if they tries to identify the effect of some bank specific and macro-economic variables accordingly, their study not considered new banks that are established after 2010 G.C. and also fails to include important variable that is not tested in Ethiopian context; such as Loan to deposit ratio. In general, the lack of sufficient research (based on the researcher best knowledge) on the determinants of CAR in the context of Ethiopia and the existence of new entrants in the industry which not considered in previous researches initiate this study.

This study therefore, seeks to fill this gap by establishing the link between Capital Adequacy Ratio and its determinants (bank specific and macroeconomic factors) in case of commercial banks in Ethiopia.

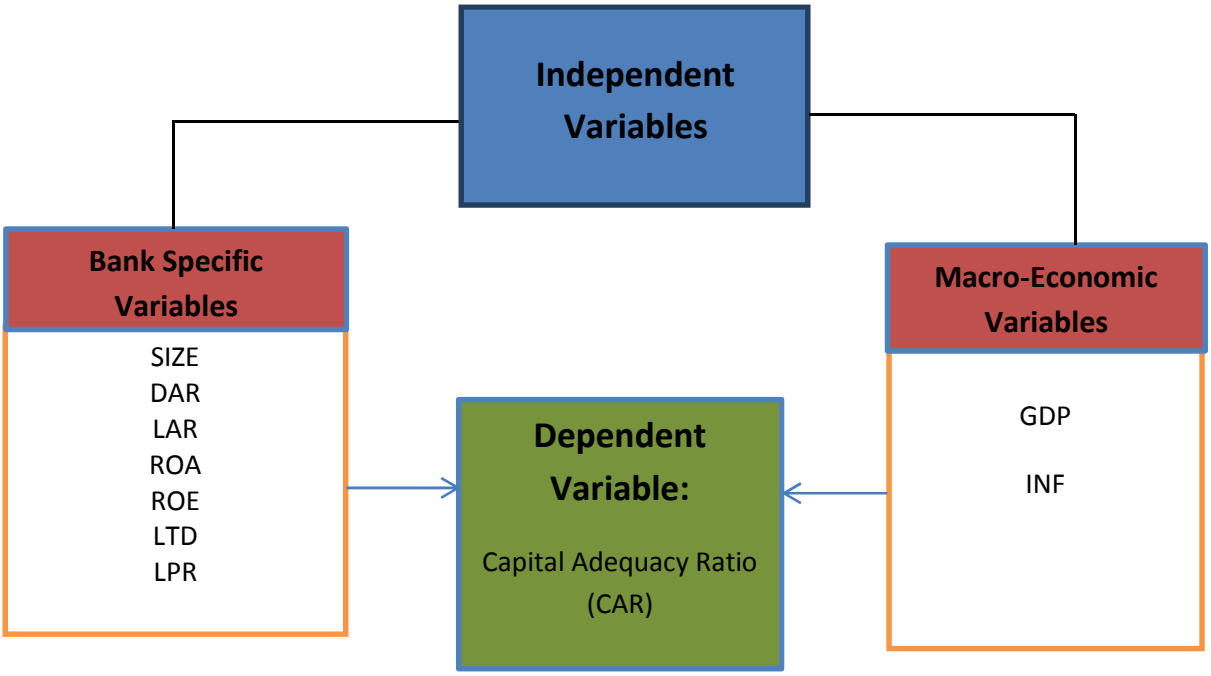
2.4. Conceptual Frame Work

The main objective of this study is to examine the determinants of CAR of commercial banks in Ethiopia. Based on the objective of the study, the following conceptual model is framed. As previously discussed in the related literature review parts, Capital Adequacy Ratio (CAR) is affected by both bank specific and macroeconomic factors. Bank specific factors Bank size (SIZE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD),

Return on Asset (ROA), Return on Equity (ROE), Loan Loss Provision (LPR) whereas macroeconomic factors are–Real Gross Domestic Products (GDP) and inflation rate (INF).

Thus, the following conceptual model is framed to summarize the main focus and scope of this study in terms of variables included. The Greene color part represents the dependent variables used in this study.

Figure 2.1 Conceptual Framework



Source: Dawit (2015) with modification on variable lists

3. Research Design and Methodology

In this chapter, the researcher concentrates on the methods that were adopted throughout the study to accomplish the research objectives. It includes the research design adopted to examine the determinants of Capital adequacy Ratio of Commercial Banks in Ethiopia, the type of data used and the sampling design employed to collect the data, the methods employed to analyze the data and the model specifications.

3.1.Research Design and Approaches

To achieve the objective of this study, Explanatory research design was adopted. Explanatory research design examines the cause and effect relationships between dependent and independent variables Kothari (2004). Therefore, since this study was examined the cause and effect relationships between Capital Adequacy ratio and its determinants, it is an explanatory research. The objective to be achieved in the study is a base for determining the research approach for the study. In case, if the problem identified is factors affecting the outcome having numeric value, it is quantitative approach (Creswell, 2003). Therefore, the researcher employed quantitative research approach to analyze the relationship between the bank related and macro-economic factors and Capital Adequacy ratios of the various banks in Ethiopia. Thus, the research was used a panel data from 2011 to 2015.

3.2. Population and Sampling Procedure

This study seeks to describe both internal and external factors that affect the Capital adequacy Ratio of Ethiopian commercial banks. Thus for the study populations are all Commercial banks in Ethiopia. According to NBE (2016), reports there are Seventeen Commercial Banks. Out of the Seventeen Commercial Banks, Commercial Bank of Ethiopia(CBE) is state owned bank whereas the remaining are private Banks such as; Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Addis International Bank S.C (AIB), Abay Bank S.C (AB), Enat Bank S.C (EB) and Debub Global Bank S.C (DGB). Among the non-probability, sampling techniques purposive sampling was used to select samples from the total population. Non-probability sampling technique is selected because

random sampling is not appropriate for the study. The total population is seventeen but for the study purpose, the sample size is fourteen. Out of those fourteen banks almost half of them started their operation on average around 2010 (NBE report, 2016). Hence, to include the newly established banks and considering having at least a five years panel data which is worthwhile for panel data estimation (Green, 1998), the study selects those banks which are operating since 2010 onward. Since the study covers a period of 5 years, there are banks with the age of less than 5 years that is why purposive sampling is used. The study includes all Commercial Banks, with 5 and above establishment year. The sample size is fourteen, which includes, Commercial Bank of Ethiopia(CBE), Awash International Bank S.C (AIB), Dashen Bank S.C (DB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), and Abay Bank S.C (AB).The researcher believes that the sample size is sufficient to make sound conclusion about the population as far as it covers around 82 % of the total population. Therefore, the matrix for the frame is 14*5 that includes 70 observations.

3.3. Data Source & Collection

Only secondary data is used for the study. Applying appropriate data gathering instruments help researchers to combine the strengths and amend some of the inadequacies of any source of data to minimize risk of irrelevant conclusion. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul, 2006). Data was collected from audited financial statements of each commercial banks included in the sample and various directives, journals and publications of NBE and MoFED & CSA for the macroeconomic data from 2010\11 to 2014\15. All data was collected on annual base.

3.4. Explanation of Variables and Research Hypotheses

Capital Adequacy Ratio is dependent variables used in this study. Besides, explanatory variables include in this study are described below.

Bank size (SIZE)

Bank Size is important factor influencing the capital and it is related with ownership

characteristics and access to the equity capital. Some research as it is mention in Büyüksalvarcı & Abdioğlu (2011) say that some banks want to keep good ratings so it has higher reserves and larger size, while in some larger banks the relationship between capital adequacy ratio and size is negative. It can be used in order to reduce risk exposure by asset`s diversification. Increase in deposits should be followed by the increase in capital requirements so that rights of the depositors are protected as well as to protect bank from insolvency. In the case if the depositors are not able to determine the position of the bank, financial soundness, the CAR will be lower than optimal. As stated in Büyüksalvarcı and Abdioğlu (2011), Asarkaya and Ozcan (2007) found the negative relationship between share of deposits and capital adequacy ratio. And also Bateni, Vakilifard & Asghari (2014) find a negative relationship between bank size and capital adequacy ratio for Iranian private banks. Therefore, this study hypothesizes negative relationship between SIZE and capital adequacy ratio (CAR) and bank size measured by the natural logarithm of the total assets.

H 1: Bank Size negatively affects CAR.

Deposit- DAR (Deposit to Asset Ratio):

A deposit is an account in bank's balance sheets in liabilities side. Deposits is an amount of money that kept by customer in bank in order to gain interest. This account becomes liabilities to bank because they need to pay interest to customer in order to replace customer's opportunity in using their money. In banking industry balance sheets, deposits usually divided into three kind of deposits which are demand deposits, saving deposits, and time deposits. An increase in bank deposits requires regulation to guarantee the rights of depositors and preserve the bank's solvency. The ratio of total deposits to total assets is used to measure the impact of deposits upon capital. According to Kleff and Weber (2008), deposits are generally considered cheaper sources of funds, with respect to credit and other similar financing instruments such as bond financing or securitization of loans. Based on the study by Asarkaya and Özcan (2007), in this study will expects deposits to have a negative effect on the CAR.

H 2: Deposit to asset ratio negatively affects CAR.

Loan to Asset Ratio (LAR)

Loan to Asset Ratio is important because of its relationship with diversification and the nature of investment opportunity set. It measures the impact of loans in assets portfolio on

capital. The study conducted by Dreca, (2013) indicates that banks may require more loans to invest in diversified nature of business. So banks transform more capital into loans. Due to this fact the balance of capital gets reduced and invested in loan. The reduction of capital brings the reduction of capital adequacy ratio of the banks .The idea is also supported by finding of Büyüksalvarc &Abdioğlu (2011).Thus, this study hypothesizes a negative relationship between LAR and capital adequacy ratio (CAR).

H 3: Loan to asset ratio negatively affects CAR.

Loan to Deposit Ratio (LTD)

The loan to deposit ratio (*LTD*) is used to asses a bank's liquidity indicator and is determined dividing the banks total loans by its total deposits. The relationship between LTD and capital adequacy ratio is expected to be positive because a high level of LTD means a higher liquidity risk that should compensated by a higher level of capital. In the same time a high level of LTD means higher profits which can be added as retained earnings to the level of capital and as result have higher capital levels. From above in this context the researcher expect a positive relationship between LTD and capital adequacy ratio.

H 4: Loan to deposit ratio positively affects CAR.

Loan loss Provision (LPR)

Banks with more loan loss reserves are more aggressive in their lending practices, and are willing to accept losses instead of negotiating concession with loan defaulters. This means, a positive effect could signal that banks voluntarily increase their capital to a greater extent in order to overcome their bad financial situation. This thought is also supported by the empirical study of (Büyüksalvarc & Abdioğlu, 2011), as LPR has positive relationship with CAR. Loan loss provision is a deduction item of accounting profits. The amount of its extraction not only influences the accounting profits, but also has certain maneuverability, while it is an estimate of the future loss that may occur. Therefore, commercial bank loan loss provisions may affect the earnings. The provision for loan losses is closely related to bank risks because general provisions can be included in supplementary capital, and specific provisions can be used as a deduction from risky assets. Therefore the loan loss provision is related to the regulatory capital adequacy ratio (Dong et al, 2012). With this context Blose (2001) found that provisioning of loan losses caused a decline in capital adequacy ratio and it is supported by finding of (Hassan, 1992; Al-

Sabbagh, 2004; Choi, 2000). Therefore, this study also hypothesizes negative relationship between LPR and capital adequacy ratio.

H 5: Loan loss reserve negatively affects CAR.

Return on Asset – ROA

Return on Assets (ROA) represents all assets owned by the bank and their ability in generating profits during a specific time period, in other words it explains the degree to which the bank succeeds in investing its assets and its efficiency in directing them towards profitable investment opportunities. This ratio measures the management efficiency in using the available resources and its ability in realizing revenues from funds or resources available from various financing resources. Most of the studies in the literature claim that ROA has a significant effect on the bank's CAR. Brown et al. (2010) and Gropp and Heider (2009) concluded that the most profitable banks tend to have relatively lower levels of regulatory capital, as compared to the less profitable ones. On the basis of these arguments, the study expects a positive relationship between ROA and CAR.

H 6: Return on asset positively affects CAR.

Return on Equity (ROE)

Return on equity ratio and expresses the return realized by owners in return of investing their funds in the bank, and it is one of the most important profitability ratios because owners and according to this ratio, decide to continue their investment in the bank or transferring their investments to other activities that yield suitable return. This model is being used since the 1970s in the united states by David Cohl, as a tool to assess the bank performance, through providing various forms that enable the analyst to evaluate bank's profits source and size for selected risks in including credit risks, liquidity risks, interest rate risks, capital risks and operational risks (Quraishi,2004), and this ratio can be measured as explained by Khrawish (2011) that ROE is the ratio of Net Income after Taxes divided by Total Equity Capital. It represents the rate of return earned on the funds invested in the bank by its stockholders.

According to existing literatures noticed a direct relationship between return on equity and capital adequacy (Molyneux and Thornton, 1992). In this study also expected positive relationship between ROE and Capital Adequacy Ratio.

H 7: Return on equity positively affects CAR.

Economic Growth–Real Gross Domestic Products Growth Rate (GDP)

Economic growth is the vital component which explaining the CAR (Capital Adequacy Ratio), in the positive economic growth period there is low risk and the banks retain low capital ratio and make more investments in other financial sectors, while when there is negative growth rate then banking may need the relatively high capital or may face sudden economic losses, to hedge that risk banks maintain high capital ratio. In accordance with most studies, such as Ruckes (2004) and Bokharia & Syed (2013), this study will expect a negative relationship between economic growth and capital ratios and The real gross domestic product growth rate (GDP), calculated as the annual change of the Gross Domestic products.

H 8: Real gross domestic product growth rate negatively affects CAR.

Inflation Rate (INF)

Inflation rate is a vital indicator for evaluating a country's economic level. In order to have an excellent economy, the government needs to control the prices of goods and services so as to positively regulate the cost of living for the consumer. According to some previous studies done by Harley (2011), Williams (2011), and Yahaya, Mansor & Okazaki (2016) found that Inflation is another important determinant of CAR. They identified that there are inverse relationship between inflation and capital adequacy ratio (CAR). Therefore; in this study the researcher will expect Inflation has negative effect on Capital Adequacy Ratio.

H 9: Inflation Rate negatively affects CAR.

Table 3.1. Summarizes all the Proposed Hypotheses for Empirical Testing

Independent Variables	Predicted Signs
SIZE	-Ve
DAR	-Ve
LAR	-Ve
LTD	+Ve
LPR	-Ve
ROA	+Ve
ROE	+Ve
GDP	-Ve
INF	-Ve

Notes: A positive sign "+ve" indicates direct impact; whereas a negative sign "–ve" indicates an inverse impact of explanatory variables on dependent variable.

3.5. Definition and Measurement of Variables

In this study, the researcher has used one dependent variable and nine explanatory variables. The definition and measurement of variables that the researcher employed in this thesis are detailed as follows:

3.5.1. Dependent Variable:

Capital Adequacy Ratio (CAR): Capital Adequacy defined as awareness of and caution from various types of risks that might face commercial banks in their operational processes which represents the dependent variable that can be expressed by the ratio of qualifying capital to risk adjusted (or weighted) assets.

$$\text{CRAR} = \frac{\text{Capital Funds (i.e. Tier I capital + Tier II capital)}}{\text{Risk Weighted Assets}} \times 100$$

All assets in the balance sheet, including off balance sheet items are given an artificial weight and their total is compared to the net worth of the Bank (Business Standard, 2012). Tier one capital, which absorbs losses without a bank being required to cease trading, and Tier two capital, which absorbs losses in the event of winding-up and so provides a lesser degree of protection to depositors (Business Standard, 2012).

Tier 1 capital: is the core measure of a bank's financial strength from a regulator's point of view. It consists of the types of financial capital considered the most reliable and liquid. Examples of Tier 1 capital are Permanent shareholders' equity; perpetual non-cumulative preference shares, Disclosed reserves and Innovative capital instruments.

Tier 2 Capital: is a measure of a bank's financial strength with regard to the second most reliable forms of financial capital, from a regulator's point of view. It consists of Undisclosed reserves, Revaluation reserves of fixed assets and long-term holdings of equity securities, General provisions/general loan-loss reserves; Hybrid debt capital instruments (a range of instruments which combine characteristics of equity capital and debt) and subordinated debt.

Risk weighted Assets: Funded Risk Assets i.e., on balance sheet items and Non- Funded Risk Assets, i.e., off - balance sheets items are ranked from less risky to more risky categories. The classification of risk weights is kept in 5 weights (0%, 10%, 20%, 50% and 100%).These weights were determined internationally by Basel Committee and adopted by all banks in the

world (Wagster & John, 1996).

3.5.2. Independent Variables:

In this study the explanatory variables categorized in to two such as Bank specific factors Bank size (SIZE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Return on Asset (ROA), Return on Equity (ROE), Loan Loss Provision (LPR) and macroeconomic factors are–Real Gross Domestic Products (GDP) and inflation rate (INF).These variables are adopted from previously done studies based on the extent of their effect on Capital Adequacy Ratio.

Bank size (SIZE)

Size is the measure of how large the firm's operational capacity is. Various studies have used a number of measures to capture the size of firms. Titman and Wessels (1988) and Benito (2003) use the log of total assets to measure size. Similarly, this study also finds that the log of total assets to be an appropriate measure of size.

SIZE = Natural Logarithm of TOTAL ASSETS = ln(Total Assets)

Deposit Asset Ratio (DAR)

Sharpe (1964) defined capital as a difference between assets and deposits, so the larger the ratio of capital to assets (or the ratio of capital to deposit) the safer the deposits. As capital was adequate, deposits were "safe enough". The deposit-to-asset ratio (DAR) is one that measures the ratio of deposits used to generate assets of the company. DAR is calculated as follows:

DAR= Total Deposits/ Total Assets

Loan to asset ratio (LAR)

The loan to assets ratio measures the total loans outstanding as a percentage of total assets. The higher this ratio indicates bank liquidity is low. The higher the ratio, the more risky a bank may be to higher defaults. LAR is calculated presented as below:

LAR= Total loan/ Total Assets

Loan to Deposit Ratio (LTD)

The formula for the loan to deposit ratio is exactly as its name implies, loans divided by deposits. The loan to deposit ratio is used to calculate a lending institution's ability to cover withdrawals made by its customers.

LTD= Total loan/ Total Deposit

Return on Assets (ROA)

ROA is the ratio of net income to total assets of a firm. It measures efficiency of the business in using its assets to generate after tax net income. We calculated ROA as:

ROA = Net Income after Tax/Total Assets

Return on Equity (ROE)

ROE measures the ability of a firm to generate net profits per unit of equity capital invested by shareholders in a firm (Brealey et al., 2011; Penman, 2009). We calculated ROE as:

ROE = Net Income after Tax/Total Equity

Loan loss Provision (LPR)

LPR is used to determine the impact of new provisions for possible loan losses and loans written off on bank's capital levels (Al-Sabbagh, 2004). Loan Loss provision measured as a ratio of loan loss provisions to total loans, presented as below:

LPR = Loan Loss Provision/Total Loans

Gross Domestic Product (GDP)

Gross domestic product (GDP) is the monetary value of finished goods and services produced within a country during a specific time period. GDP includes private and public consumption, investment and the difference between exports and imports. GDP is a vital statistic for measuring a country's economic level**.**

Inflation Rate (INF)

Inflation rate (INF) by definition recorded the changes of price level of goods and services that may affect the level of consumer purchasing power.

3.6.Data Analysis

The objective of this study is to examine the determinants of Capital Adequacy Ratios of Commercial Banks in Ethiopia. To achieve this objective the study used panel data which was collected through structured document review. Thus, the collected panel data was analyzes using descriptive statistics, correlations and multiple linear regression analysis. Mean values and standard deviations was used to analyze the general trends of the data from 2010\11 to 2014\15 based on the sector sample of 14 banks and a correlation matrix was also used to

examine the relationship between the dependent variable and explanatory variables. A multiple linear regression model and t-static was used to determine the relative importance of each independent variable in influencing CAR. For this study, the regression analysis known as OLS was used to estimate the relationship between CAR and its determinants. The multiple linear regressions model was run, and thus OLS conduct using STATA 12 econometric software package, to test the casual relationship between the CAR and its determinant and to determine the most significant and influential explanatory variables affecting the CAR of Commercial Banks in Ethiopian. Moreover, the diagnostic tests was undertaken in order to check the validity of the model and fulfill the assumption of the Classical Linear Regression Model. Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, normality, multicolinearity, autocorrelation and heteroscedasticity tests are made for identifying misspecification of data if any so as to fulfill research quality.

- **Test for Heteroscedasticity**

The homoskedasticity is one of the assumptions of the CLRM which states that the variance of the errors must be constant. If the errors do not have a constant variance, they are said to be heteroskedastic (Brooks, 2008).As noted in Woolridge (1999) Homoskedasticity fails whenever the variance of the unobservable changes across different segments of the population, which are Determined by the different values of the explanatory variables.

- **Test for Autocorrelation**

This is an assumption that the errors are linearly independent of one another (uncorrelated with one another). If the errors are correlated with one another, it would be stated that they are auto correlated.

- **Test for 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 ui are normally distributed or not. If the disturbances (ui) 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 β's.

- **Test for Multicollinearity**

The term Multicolinearity indicates the existence of exact linear association among some or all explanatory variables in the regression model. When independent variables are multi collinear, there is overlapping or sharing of predictive power. Thus, if multicolinearity is perfect, the regression coefficients of the independent variables are undetermined and their standard errors are immeasurable (Gujarati, 2004).

3.7.Model Specification

In this study, panel data was used. As noted in Brooks (2008), a panel keeps the same individuals or objects and measures some quantity about them overtime. A panel data could be analyzed using pooled OLS model, fixed effect model or Random effect model (Brooks, 208). The following multivariate ordinary least square (OLS) regression model is specified and used to see the extent relationship between the Capital adequacy Ratio (CAR) and its determinants in the selected commercial banks as adopted from Brooks (2008):

$Y_{it} = \beta o + \beta X_{it} + \varepsilon_{it}$

Where: - Y_{it} is the dependent variable for firm 'i' in year 't', β is the constant term, β is the coefficient of the independent variables of the study, X_{it} is the independent variable for firm 'i' in year 't' and ε_{it} the normal error term.

Thus, this study is based on the conceptual model adopted from Fawad and Taqadus (2013). Accordingly, the estimated models used in this study are modified and presented as follow;

$$\mathbf{CAR_{it}=\beta_0+\beta_1(SIZE)_{it}++\beta_2(DAR)_{it}++\beta_3(LAR)_{it}+\beta_4(LPR)_{it}+\beta_5(ROA)_{it}+\beta_6(ROE)_{it}+\beta_7(GDP)_{it}+\beta_8(INF)_{it}+\beta_9(LTD)_{it}+\varepsilon_{it}}$$

Where:

- $\boldsymbol{\beta_0}$ is an intercept,
  - $\mathbf{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9,}$ represent estimated coefficient for specific bank i at time t ,
  - $\mathbf{CAR_{it}}$: The capital adequacy ratio for bank i at time t,
  - $\mathbf{SIZE_{it}}$: Total assets for bank i at time t,
  - $\mathbf{DAR_{it}}$**:** The ratio of total deposit to total assets for bank i at time t,

- **LAR_{it}:** The ratio of total loans to total assets for bank i at time t,
- **LPR_{it}:** loan loss provision of bank i at time t,
- **ROA_{it}:** Return on assets for bank i at time t,
- **ROE_{it}**: Return on equity for bank i at time t,
- **LTDit:** Loan to deposit
- **GDP_{it}**: Real GDP growth rate of Ethiopia at time t,
- **INF_{it}**: The overall inflation rate in Ethiopia at time t,
- **t:** Time
- **ε_{it}:** the normal error term.

4. Data analysis and discussion

This chapter discusses the main findings from the descriptive and econometrics analysis on the relationship between capital adequacy and banking leverage and profitability variables, and macroeconomics variables.

4.1. The descriptive analysis

This part presents main findings on the relationship between capital adequacy ratio and bank specific variables and macroeconomic variables. The following table depicts the descriptive statistics for the main variables used in the discussion part.

Table 4.1: Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
car	overall	.1432961	.0365272	.090789	.2976	N =	70
	between		.0314964	.1079046	.20408	n =	14
	within		.019993	.0840561	.2368161	T =	5
size	overall	8.868414	1.285945	6.12443	12.7529	N =	70
	between		1.244865	7.464316	12.19324	n =	14
	within		.4402304	7.528529	9.834028	T =	5
dar	overall	.7547872	.0538366	.576478	.894281	N =	70
	between		.0385304	.702072	.823099	n =	14
	within		.0387279	.623117	.8619707	T =	5
lar	overall	.39982	.1346039	.005172	.887881	N =	70
	between		.1156827	.005501	.4633192	n =	14
	within		.0742396	.248984	.829691	T =	5
roa	overall	.0320631	.0117634	.008306	.099226	N =	70
	between		.0066178	.0183468	.0456838	n =	14
	within		.009855	.0123223	.0856053	T =	5
roe	overall	.0556804	.0870699	.008306	.49991	N =	70
	between		.0707171	.0183462	.2843554	n =	14
	within		.0535739	-.0441956	.4297714	T =	5
ltd	overall	.6148788	.1332382	.404914	1.09777	N =	70
	between		.1175107	.5220826	.996872	n =	14
	within		.068878	.4257502	.9353902	T =	5
lpr	overall	.0209848	.0139848	.0064814	.0883081	N =	70
	between		.0105326	.0104652	.0529118	n =	14
	within		.0095431	-.0141192	.0563812	T =	5
gdp	overall	3.832708	.2350346	3.43399	4.11087	N =	70
	between		0	3.832708	3.832708	n =	14
	within		.2350346	3.43399	4.11087	T =	5
inf	overall	2.607038	.602801	2.00148	3.50255	N =	70
	between		0	2.607038	2.607038	n =	14
	within		.602801	2.00148	3.50255	T =	5

Source: Data obtained from Commercial Banks and Own computation

The dependent variable CAR which is measured by capital to risk weighted asset show an average of 14.3 % and standard deviation of 3.6 % which is above the standard set by the Basel

accord in 1988 as well as the minimum requirement 8% which is set by national bank of Ethiopia. In the last five years the minimum and maximum CAR is 9.07% and 29.7 %. The standard of deviation in CAR between banks is 0.03 and the standard of deviation within banks within the given period is 0.019. As it can be seen the difference is too small which shows banks have a stable CAR in the five years. In general Ethiopian banks' capital adequacy has an ability to absorb any shock to their balance sheet. The banks in Ethiopia can also met the requirement that the Basel III set as a proposal that the banks Regulation to Increase in Regulatory Capital Requirements to 10.5% by 201 9.

Profitability of Ethiopian banks for this study has been measured by using return on asset and return on equity. The average ROA for the last five years for Ethiopian banks is 3.2% and standard deviation 1.1%. Profitable firms are stronger to face financial distress and stronger to continue more than unprofitable firms in the future (Michel S. et.al, 2015). The minimum ROA is 0.008 and the maximum is 0.099, this indicates there is almost no gap in profitability between Ethiopian banks. But we can say that most Ethiopian banks are said to be strong in their profitability. The banks can met the minimum standards that is set by the Basel accord which indicate the minimum return on asset to be equal or greater than 1% are banks in better performance. The other measurement used for the study to measure profitability is return on equity. ROE measures how well banks can generate profit by using shareholders equity. The average returns on equity for the last five years are 5.56 % with standard deviation of 8.7 %. The minimum and maximum ROE is 0.8 % to 49.91 % consequently. The standard of deviation between banks in ROE is 7% while the within standard of deviation is 5%. This gap also shows Ethiopian banks have gap in using their shareholders equity. The higher the ratio is the better performance of the banking industry.

Bank size with an average of 88% and standard of deviation 1.28, 1.24 and 0.44 for the overall, between and within effect, implies that banks size is stable during the last five years but there is huge gap between banks size.

This paper used to leverage ratios: LAR and DAR. The average DAR is 75% and LAR is 39% implies that banks have enough liquidity and their borrowing is higher than their lending. However, the standard of deviation for LAR which is 13% is higher than DAR which is 5.3%

implies that there is higher gap in LAR among banks which is evidenced by the between standard of deviation which is 11.5% but for DAR it is 3.8%.

The loan to deposit ratio (LTD) is used to calculate a lending institutions ability to cover withdrawals made by its customers. A bank that accepts deposits must have a certain measure of liquidity to maintain its normal daily operations. If the ratio is lower than 1, the bank relied on its own deposit to make loan to its customer, without any outside borrowing. If the ratio is too low, banks may not be earning an optimal return and if it is too high banks may not have enough liquidity to cover any unforeseen funding requirements. For this study, the average LTD is 0.61 with a standard deviation of 0.13 and which sounds good.

LPR ratio that measured by Loss loan provision to total loan, has an average of 2.0% and standard deviation 1.3%. This indicates that on average Ethiopian banks held 2.0% of their loan as Loan Provision. Besides the within and the between banks deviation is insignificant. The last two variables are macroeconomic variables which are GDP and inflation. Both variables are in logarithmic format. As we can see the average GDP is 3.8 and Inflation is 2.6 with the between banks standard of deviation is 0 implies that all banks are facing the same scenario during the study period.

Normality of the variables

Before any regression analysis checking the skewness and kurtosis is necessary. The skewness measures how well the data is symmetry and the kurtosis measures pickiness or flatness of the distribution. The skewness and kurtosis measures for the data are presented in table 4.2.

Table 4.2: Checking for Normality of the data

stats	car	size	dar	lar	roa	roe	ltd	lpr	gdp	inf
skewness	1.126974	.8540817	-.60589	-1.041026	2.429888	3.566912	1.87831	3.29478	-.5808058	.442427
kurtosis	5.690383	4.399038	4.320372	8.075352	16.4964	15.42649	6.74023	15.26265	2.173074	1.447489

Source: Data obtained from Commercial Banks and Own computation

The result showed that in average all variables are well skewed with a value between -3 and +3 and kurtosis is also registered a value between 3 and 10 for most of the variables. This implies that, on average all variables have normal distribution and hence conclusions can be drawn.

Decomposition of Banks

All studies that was conducted previously they used only old banks in their estimation of CAR (Bahiru, 2014; Yonas, 2015 and Dawit, 2015). However, studying the determinant factors for newly established banks is very important from different perspective. First, to increase competition in the banking industry we should know be able to know the major obstacles that newly established banks are facing. Second, without understanding the effect of the inclusion of newly established banks in the regression result decrease the robustness of our finding and it will be difficult to make conclusion. This is just because of the fact that the newly established banks are almost are equal in number with the old banks, so drawing conclusion based on only the old banks about Ethiopian banking industry is misleading. Hence, the study tried to decompose the fourteen banks in to two parts: OLD banks and new banks. The old banks are those banks which are used in aforementioned papers which are established before 2005. And the new established banks include banks which are established between 2005 and 2010. In the following table conclusion has been made for the same year, 2011 to 2015 for all banks

Table 4.3: Decomposition of banks to new and old banks

esta	car	size	dar	lar	roa	roe	ltd	lpr	gdp	inf
new bank	.156701	7.836365	.7349525	.3422037	.0286264	.0287382	.5836418	.0194046	3.832708	2.607038
	.0412159	.6569455	.053319	.1593216	.0098881	.0100153	.0725537	.0200185	.2373389	.6087109
	.2976	9.16271	.815244	.504344	.048527	.048527	.745469	.0883081	4.11087	3.50255
	.09456	6.12443	.576478	.005172	.008306	.008306	.433555	.0064814	3.43399	2.00148
OLD Bank	.1332424	9.642451	.7696633	.4430323	.0346406	.075887	.6383066	.02217	3.832708	2.607038
	.029249	1.082108	.0498432	.0933367	.0124987	.1111804	.1618034	.0066835	.2363225	.606104
	.192177	12.7529	.894281	.887881	.099226	.49991	1.09777	.0454195	4.11087	3.50255
	.090789	7.82428	.642807	.307174	.018311	.018311	.404914	.0122261	3.43399	2.00148
Total	.1432961	8.868414	.7547872	.39982	.0320631	.0556804	.6148788	.0209848	3.832708	2.607038
	.0365272	1.285945	.0538366	.1346039	.0117634	.0870699	.1332382	.0139848	.2350346	.602801
	.2976	12.7529	.894281	.887881	.099226	.49991	1.09777	.0883081	4.11087	3.50255
	.090789	6.12443	.576478	.005172	.008306	.008306	.404914	.0064814	3.43399	2.00148

NB: first row shows mean, second row standard of deviation, third row maximum and fourth row minimum.

Source: Data obtained from Commercial Banks and Own computation

For the variable CAR, the new banks (15%) have higher average than old banks (13%) though the variation is higher in new banks. Old banks (9.6) have higher size compared to the new banks (7.8) on average which implies that old banks are stronger than the new banks in their asset holding due to their period of establishment it earlier. In terms of their profitability measures (ROE and ROA) old banks (3.4% and 7.5% respectively for average ROA and ROE) are more profitable than new banks (2.9% and 2.9% respectively for average ROA and ROE) in both measures but there is high standard of deviation in old banks which implies there are some banks within the old bank category which are earning higher profit margin compare to others. In terms of liquidity measures (DAR, LAR, LTD) old banks have higher average values compared to their counterparts. However, new banks have high volatility in their liquidity in the study periods and

among banks. This implies that, they are facing difficulties in adjusting their deposit and loan. The last macroeconomic variables (GDP and inflation) are registered the same for both old and new banks since they are not bank variant variables. Generally, we can see that there are a number of differences among the new established banks and the old banks; hence we need to see whether the difference among them is statistically significant or not using a t test.

Table 4.4: mean test for CAR between old and new banks

```
. ttest car, by(esta)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
new bank	30	.156701	.007525	.0412159	.1413108	.1720913
OLD Bank	40	.1332424	.0046247	.029249	.1238881	.1425967
combined	70	.1432961	.0043658	.0365272	.1345865	.1520057
diff		.0234587	.0084192		.0066585	.0402588

```
    diff = mean(new bank) - mean(OLD Bank)                    t =   2.7863
Ho: diff = 0                                     degrees of freedom =       68

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9965         Pr(|T| > |t|) = 0.0069          Pr(T > t) = 0.0035
```

Source: Data obtained from Commercial Banks and Own computation

The result from the above table indicates that there is a statistical significant difference between the car between old banks and new banks with a p – value of 0.0035 we reject the null hypothesis which says making conclusion only with old banks is possible. Hence, we need to include new banks in order to make some conclusion on the determinants factors of CAR.

4.2. Correlation analysis

The correlation analysis is aiming to see the extent of strength or weakness relationship among variables. Correlation analysis could have three important advantages. First, it tells whether the relationship between the dependent variable is positive or negative. Second, it tells whether the relationship is strong or not. Third, it tells about whether there is multicolinarity problem or not.

Table 4.5: Correlation analysis

	car	size	dar	lar	roa	roe	ltd	lpr	gdp	inf
car	1.0000									
size	-0.3078	1.0000								
dar	-0.3957	0.4948	1.0000							
lar	-0.3718	0.4267	0.4123	1.0000						
roa	0.1284	0.4980	0.2811	0.3724	1.0000					
roe	-0.1637	0.2429	0.0568	0.3606	0.5893	1.0000				
ltd	0.0559	0.6403	-0.0405	0.1519	0.5708	0.3467	1.0000			
lpr	0.0323	0.1601	0.1632	0.1025	-0.1095	-0.0064	-0.0194	1.0000		
gdp	-0.0249	0.3011	0.2164	0.2909	0.5742	0.1942	0.2792	-0.0282	1.0000	
inf	0.0036	-0.2580	-0.2318	-0.2032	-0.4532	-0.1141	-0.1866	-0.0384	-0.8462	1.0000

Source: Data obtained from Commercial Banks and Own computation

The correlation table 4.3 shows that there is a negative correlation between CAR and size, dar, lar, roe and gdp variables, whereas there is a positive relationship between CAR and roa, ltd, inf and lpr. Besides, the correlation between all variables one another is less than 0.6 on average, which implies that, there will not be multicolinarity problem.

4.3. Econometrics analysis

This paper is aiming to see the extent relationship between the dependent variable, Capital Adequacy Ratio (CAR) and independent Variables which include Bank size (SIZE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Return on Asset

(ROA), Return on Equity (ROE), Loan Loss Provision (LPR), and macroeconomic variables (gross domestic product and inflation). Using a panel data collected from 14 private and government owned banks for the year 2011 to 2015. The study regress the fixed effect model and the random effect model and checked for the significance of the covariance between the unobserved heterogeneity and the exogenous variable (please see appendix A, B and C, for the fixed effect and random effect estimation).

Table 4.6: Hausman test for fixed effect and random effect

```
. hausman f r
```

	Coefficients			
	(b) f	(B) r	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
size	-.0401386	-.0172323	-.0229064	.0125751
dar	.0530034	-.039606	.0926094	.0683067
lar	-.1449971	-.0729146	-.0720824	.1183989
roa	1.436441	1.092308	.3441333	.6842565
roe	-.0043894	-.0029733	-.0014161	.0020817
ltd	.1481234	.0868012	.0613221	.0752198
gdp	.0002295	-.0251344	.0253639	.0189699
inf	-.0078989	-.0080607	.0001618	.0013984

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

           chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =        4.12
         Prob>chi2 =      0.8463
```

Source: Data obtained from Commercial Banks and Own computation

The Hausman test with a P-Value of 0.84, we fail to reject the null hypothesis which says fixed effect is not the appropriate model or in another word there is no correlation between the exogenous variable and unobserved heterogeneity variable. Hence random effect model is the appropriate model given that there is an evidence of significant differences across banks. If there is no evidence of significant difference across banks then a Random effect will not be efficient. In the situation where there is no significant difference among banks, a simple OLS model becomes efficient and consistent estimate than the random effect model. To check

whether a random effect or a simple OLS model is appropriate the paper conducts Breusch-Pagan Lagrange multiplier (LM) test.

Table 4.7: Breusch-Pagan Lagrange multiplier (LM) test for random effect

```
Breusch and Pagan Lagrangian multiplier test for random effects

        car[bank,t] = Xb + u[bank] + e[bank,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     car |   7.30e+10       270229.2
                       e |   3.12e+09       55822.79
                       u |          0              0

        Test:   Var(u) = 0
                                 chibar2(01) =     0.00
                              Prob > chibar2 =   1.0000
```

Source: Data obtained from Commercial Banks and Own computation

The test result of LM with a P-Value of 1, we reject the null hypothesis which says random effect is the correct model and conclude that random effects is not appropriate. This implies that there is no evidence of significant differences across banks; therefore we can run a simple OLS regression. Before OLS regression the study has cheeked weather error terms are normally distributed or not using skewness and kurtosis as presented in table 4.2. The following table depicts three OLS regression: only with old banks, only with new banks and with all banks together.

Table 4.8: OLS regression

Dependent variable: CAR	Regression with Old Banks	Regression with New Banks	Regression with all Banks
	Coef. (St. error)	Coef. (St. error)	Coef. (St. error)
SIZE	-.001(.006)	-.011 (.029)	-.011 (.004)**
DAR	-.374 (.079)***	127 (.224)	-.236 (.087)***

LAR	-.045(.066)	-.008(.053)	-.053 (.029)*
ROA	3.096(.548)***	9.402(11.436)	2.793(.498)***
ROE	-.208(.033)***	-4.922 (11.652)	-.200 (.049)***
LTD	-.066(.046)	.204(.129)	.010 (.042)
LPR	.452(.557)	1.317 (.437)***	.673 (.242)***
GDP	-.022(.028)	-.169 (.068)**	-.039(.028)
INF	-.007 (.008)	.015 (.019)	-.003 (.010)
Cons	0.498(0.144)	0.497(0.254)	.505 (.142)
Number of Banks	8	6	14
Number of Observation	40	30	70
R2	77%	61%	54%
Prob > F	0.000	0.0095	0.0000

Values in brackets are standard of errors. *** 1% significant level, ** is 5% significant level and * 10% significant level

Source: Data obtained from Commercial Banks and Own computation

As we can see from the above table in the three regressions, all independent variables together are significantly affects the dependent variable which is represented by Prob > F which is less than 1% and concluded that all the three models are correct. The R2 measure for all the models are also higher than 50% and implies that independent variables have the power to explain the variation occurred in dependent variable. Regarding to individual significant level, there are three variables (DAR, ROA, ROE) which affect the dependent variable for old bank regression, 2 variables (LPR, GDP) for new bank regression and six banks for the overall banks regression (size, DAR, LAR, ROA, ROE and LPR). As we can see the inclusion of new banks in to the overall regression results the significant variables which were three for regression only with old banks increased to six variables.

Unlike previous studies (Bahiru, 2014; Yonas, 2015 and Dawit, 2015), this paper found that LPR and GDP are the two variables which are affecting newly established banks though it is found to be a significant variable affecting CAR for the overall regression and for the new bank regression. Given that, there are many significant variables for the overall bank regression model and all significant variables which were found to be significant in the regression with old banks are also significant in the overall regression model, the study discusses the findings with the last model.

$$CAR_{it}=0.505-0.011(SIZE)_{it}-0.236(DAR)_{it}-0.053(LAR)_{it}+2.79(ROA)_{it}-0.200(ROE)_{it}-+0.010(LTD)_{it}+0.673(LPR)_{it}-0.039(GDP)_{it}-0.003(INF)_{it}$$

Before the discussion part, post estimation tests are presented to be sure that the selected model is consistent and efficient. The study undertakes post estimation tests of model specification, multicoliniarity test and hetroscdasticity test. For an OLS estimates to be BLUE (best linear unbiased estimates) the aforementioned tests should have to be satisfied.

The first test is, model specification test, which checks the existence of measurement error, omitted variable and inclusion of irrelevant variable in our estimates. The test result confirms that there is no problem of model specification with a P-Value of 0.44, where we fail to reject the null hypothesis which says there is no omitted variable problem (model specification problem).

4.9: Model specification test

```
Ramsey RESET test using powers of the fitted values of car
       Ho:  model has no omitted variables
                  F(3, 65) =      0.91
                  Prob > F =      0.4402
```

Source: Data obtained from Commercial Banks and Own computation

The second post estimation test is multicoliniarity test. This test is conducted to check whether there is serial correlation among independent variables or not using Variance inflation factor (VIF). The result of VIF is 2.74 is lower than the critical value of 10. Hence, there is no problem of multicolinarity problem.

4.10: Multicolinearity test

```
. vif
```

Variable	VIF	1/VIF
gdp	4.38	0.228184
inf	3.69	0.271020
size	3.43	0.291336
roa	3.36	0.297307
ltd	3.19	0.313605
dar	2.16	0.463968
roe	1.80	0.554141
lar	1.55	0.643195
lpr	1.12	0.891601
Mean VIF	2.74	

Source: Data obtained from Commercial Banks and Own computation

The third test estimate test is heteroskedasticity test which is given in the following table

4.11: heteroskedasticity test

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	65.54	43	0.0150
Skewness	19.09	8	0.0144
Kurtosis	1.78	1	0.1817
Total	86.42	52	0.0019

Source: Data obtained from Commercial Banks and Own computation

The Cameron & Trivedi's decomposition for the test of heteroskedasticity shows that, there is no heteroskedasticity problem; with a P-value of 0.015 we reject the null hypothesis of heteroscedasticity. Hence, our regression is homoscdesticity or has a constant variance.

Discussion and interpretation of coefficients

The econometrics result on table 4.4 shows that six independent variables affect capital adequacy ratio significantly. These variables are SIZE, DAR, LAR, ROA, ROE and LPR.

The first variable size affects capital adequacy ratio negatively and which is significant at 5% of significant level. A one unit increase in bank size decrease CAR by 0.011 units. This implies that an increase in the size of banks is also associated with the rise in risk. Some research as it is mention in Büyüksalvarcı & Abdioğlu (2011) say that some banks want to keep good ratings so it has higher reserves and larger size, while in some larger banks the relationship between capital adequacy ratio and size is negative. The negative sign indicates large banks have easier access to capital markets and can therefore operate with lower amounts of capital or that they feel less pressure to increase their capital ratios because of a " too-big-to-fail". Moreover, the negative coefficient is consistent with the notion that smaller banks are less diversified than their larger counterparts and therefore hold larger capital buffer.

The second variable deposit to asset ratio (DAR) affects capital adequacy ratio negatively. This account is liabilities to bank because they need to pay interest to customer in order to replace customer's opportunity in using their money. Similar with other study such as Asarkaya and Özcan (2007), the paper found a negative relationship between CAR and DAR. Hence, the coefficient of DAR can be interpreted as an increase in deposit to asset ratio by one birr results a decrease in capital adequacy ratio by 0.26 birr. A negative relationship could mean deposits in banks are not necessarily guaranteed by increase in capital adequacy ratio. This might be the result of banks' wrong assumption of considering deposit as cheaper and less risky source of funds and the reduction of their capital adequacy ratio in line with their assumption. In the case of our country usually depositors of the sample Ethiopia banks are not in a position to evaluate the financial position and soundness of their bank, so due to this fact the CAR is negatively related with DAR. Furthermore, the negative result is also put the sample banks in trouble, in that their deposits are not guaranteed by an increase in banks' capital ratio

The third variable is Loan to Asset Ratio (LAR) which is a ratio of total loans to total assets for bank. This is important because of its relationship with diversification and the nature of

investment opportunity set. It measures the impact of loans in assets portfolio on capital. The study conducted by Dreca, (2013) indicates that banks may require more loans to invest in diversified nature of business. So banks transform more capital into loans. Due to this fact the balance of capital gets reduced and invested in loan. The reduction of capital brings the reduction of capital adequacy ratio of the banks. Table 4.3 also showed a negative relationship between LAR and CAR. The result is also supported by the finding of Büyüksalvarc &Abdioğlu (2011). The coefficient can be interpreted as follows, an increase is loan to capital ratio by 1 percent results a decrease in capital adequacy ratio by 6%. Negative sign of LAR can be explained in way that the sample Ethiopia banks in order to provide more loans transform more capital into loans which result in a high degree of leverage. Due to this, when the amount of capital is decreases in turn the level of CAR are also decreases. leaving the CAR not to increase in line of an increase to the size of the loan.

The fourth important determinant of CAR is Return on Assets (ROA) which represents all assets owned by the bank and their ability in generating profits during a specific time period, in other words it explains the degree to which the bank succeeds in investing its assets and its efficiency in directing them towards profitable investment opportunities. Similar with the findings of Brown *et al*. (2010) and Gropp and Heider (2009), who concluded that the most profitable banks tend to have relatively lower levels of regulatory capital, as compared to the less profitable ones, table 4.1 confirmed this positive relationship. An increase in return to asset by 1 percent results an increase in CAR by 222 percent. Return on Assets represent all assets owned by the bank and their ability in generating profits during a specific time ; and this positive sign implies that more profitable banks tend to have more capital relative to their assets.

The fifth variable which affects CAR is Return on equity ratio (ROE) which expresses the return realized by owners in return of investing their funds in the bank, and it is one of the most important profitability ratios because owners and according to this ratio, decide to continue their investment in the bank or transferring their investments to other activities that yield suitable return. There are different empirical findings on the effect of ROE on CAR. Molyneux and Thornton (1992) noticed a direct relationship between return on equity and capital adequacy. However, this study and a study by Bokhari and Ali (2006), Yonas (2015) and Dawit (2015) found a negative relationship between CAR and ROE. The negative sign contrary to the expected positive relationship between profit and capital adequacy and it implies that,

commercial banks in Ethiopia in order to meet the regulatory requirement level of capital; they are forced to increase their equity. And as cost of equity is high it drive the cost to increase which in turn leads to a reduction in net profit. Therefore arise of capital make the return on equity lower.

The sixth variable which is significantly affects capital adequacy is Loss Loan Provision (LPR) which were the provisions held for gross loans. It has proven to be highly significant with the CAR. The reserves held by the bank act as a buffer against the delinquent advances. The positive relationship implies that the capital base of the financial institutions is strengthened with the amount of provisions bank hold. Hence, a one unit increase in LPR increases CAR by 0.673. The results were in conformity with previous empirical finding (Büyükşalvarcı & Abdioğlu, 2011; Mili et al., 2014; Masood & Ansari, 2016).

Finally, the regression result showed that the variable loan to deposit affects CAR positively, GDP and Inflation affects negatively. However, all the three variables has found to be insignificant determinants and hence has no effect on CAR. This result is also similar with the findings of Dawit (2015) who studied the determinant factors of Capital Adequacy ratios of commercial banks in Ethiopia using eight banks from the year 2002 to 2013.

5. Conclusion and Policy Implication

This paper aimed to see the determinant factors for capital adequacy ratio using 14 selected banks operating in Ethiopia from 2011 to 2015. The paper conducted different estimation to see the relationship between the dependent variable, Capital Adequacy Ratio (CAR) and independent Variables which include Bank size (SIZE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Return on Asset (ROA), Return on Equity (ROE), Loan Loss Provision (LPR), and macroeconomic variables (gross domestic product and inflation). Fixed effect and random effect models were not accepted after hausman and Breusch-Pagan Lagrange multiplier (LM) tests respectively. The test results showed that there is no significant difference between banks. Hence, this paper used OLS model to determine factors affecting capital adequacy ratio. The paper did all pre and post estimation tests to be sure that the model is appropriate.

The result from the OLS regression result showed that DAR, ROE, LPR and ROA are significant at one percent of significant level; LAR is significant at 10 percent of significant level whereas Size is significant at 5 percent of significant level. Hence, this paper recommends that to be sure that banks have adequate adequacy reserve, commercial banks and National Bank of Ethiopia should give special emphasis on Banks loan, deposit and their return on equity and asset so that they could achieve the minimum requirement set by central bank. Therefore, it is recommended that:

- Banks with large dimensions or size should have sufficient capital reserves in order to maintain their good rating. Moreover, they should focus on the associated risks while increasing their size.
- Banks should also take care of their loan management, because the aggressive lending tends to increase the non-performing loans and it badly hurts the capital of the bank. When a loan is defaulted by a borrower not only the capital is impaired, profitability is also hurt and in addition the extension of credit to the deserving borrowers is also restricted due on concentration of bad loans in a particular segment.
- Banks should give attention to their deposit management, Since the share of deposit (DAR) had negative and significant relation with CAR i.e. as deposit increase the ratio of capital to the risk weighted asset decrease significantly. And as most of the Ethiopian commercial

banks set their CAR to the minimum requirement, there is a need of deposit insurance to safeguard their depositors and investors who request more guarantees; especially those commercial banks whose deposit size have been increasing. To this end the depositor should also properly follow the status of their bank by giving some consideration to the financial information disclosed by the banks.

- In line with the hypothesis; ROA had positive and significant effect on CAR of Ethiopian commercial banks. This implies that the return originated from all asset of the bank will enhance the capital adequacy of the bank. So banks should increase their ROA to increase their CAR, whereas ROE had negative and significant effect on CAR of Ethiopian commercial banks. This implies that commercial banks in Ethiopia in order to meet the regulatory requirement level of capital, uses equity as sources. This has negative impact on ROE. So the study recommended to the banks to find other cheaper source of finance other than equity.
- Banks especially new banks should builds up a realistic and futuristic level of loan loss provision focuses on the optimal composition of the asset mix in order to minimize the risk associated with them and prudent lending practices by maintaining a healthy credit portfolio. It will lead the Banks to have a healthier and resilient capital base along with a smooth income stream.
- Finally, the study sought to investigate firm specific and macroeconomic factors that influence Capital adequacy ratio of commercial banks in Ethiopia. However, the variables used in the statistical analysis did not include all factors that can affect capital adequacy ratio of commercial banks in Ethiopian. Thus, future research could incorporate factors such as, capital to deposit ratio, revenue power, interest rate risk, and Money supply along with variables of the current study in all existing commercial banks.

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Appendix

Appendix A

```
. xtreg car size dar lar roa roe ltd lpr gdp inf, fe

Fixed-effects (within) regression               Number of obs      =        70
Group variable: bank                            Number of groups   =        14

R-sq:  within  = 0.2403                         Obs per group: min =         5
       between = 0.2709                                        avg =       5.0
       overall = 0.2317                                        max =         5

                                                F(9,47)            =      1.65
corr(u_i, Xb)  = -0.7472                        Prob > F           =    0.1281

------------------------------------------------------------------------------
         car |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        size |  -.0424579     .01492    -2.85   0.007    -.0724731   -.0124426
         dar |   .0319907   .1329625     0.24   0.811    -.2354953    .2994766
         lar |  -.1123875   .1802842    -0.62   0.536    -.4750724    .2502975
         roa |   .8751819   1.035957     0.84   0.402    -1.208895    2.959259
         roe |   .0682936   .1931104     0.35   0.725    -.3201945    .4567817
         ltd |   .1197255   .1030536     1.16   0.251    -.0875917    .3270426
         lpr |   .3137395   .3159387     0.99   0.326    -.3218472    .9493261
         gdp |   .0190559   .0332858     0.57   0.570    -.0479065    .0860183
         inf |  -.0072163   .0083257    -0.87   0.390    -.0239655    .0095328
       _cons |   .3743323    .148895     2.51   0.015     .0747941    .6738704
-------------+----------------------------------------------------------------
     sigma_u |  .04164318
     sigma_e |    .021114
         rho |  .79549989   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(13, 47) =     3.69                 Prob > F = 0.0005
```

Source: Data obtained from Commercial Banks and Own computation

Appendix B

```
Random-effects GLS regression                   Number of obs      =        70
Group variable: bank                            Number of groups   =        14

R-sq:  within  = 0.1438                         Obs per group: min =         5
       between = 0.6608                                        avg =       5.0
       overall = 0.5039                                        max =         5

                                                Wald chi2(9)       =     28.67
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0007
```

car	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
size	-.0166931	.0059648	-2.80	0.005	-.0283838	-.0050024
dar	-.1288814	.0936371	-1.38	0.169	-.3124067	.054644
lar	-.0421009	.0429426	-0.98	0.327	-.1262669	.0420651
roa	2.090404	.624149	3.35	0.001	.8670943	3.313713
roe	-.1472683	.0760137	-1.94	0.053	-.2962525	.0017158
ltd	.0590624	.0500209	1.18	0.238	-.0389767	.1571016
lpr	.3913377	.2564553	1.53	0.127	-.1113054	.8939808
gdp	-.0339355	.0255927	-1.33	0.185	-.0840963	.0162253
inf	-.0058956	.0085246	-0.69	0.489	-.0226035	.0108124
_cons	.4475296	.1314205	3.41	0.001	.1899502	.705109
sigma_u	.0171069					
sigma_e	.021114					
rho	.39629927	(fraction of variance due to u_i)				

Source: Data obtained from Commercial Banks and Own computation

Appendix C: OLS regression for all banks

Source	SS	df	MS	Number of obs =	70
				F(9, 60) =	7.84
Model	.049742209	9	.005526912	Prob > F =	0.0000
Residual	.042319997	60	.000705333	R-squared =	0.5403
				Adj R-squared =	0.4714
Total	.092062206	69	.001334235	Root MSE =	.02656

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
size	-.0110092	.0046063	-2.39	0.020	-.0202232	-.0017952
dar	-.2366944	.0871868	-2.71	0.009	-.4110941	-.0622947
lar	-.0530657	.0296172	-1.79	0.078	-.1123088	.0061775
roa	2.793228	.4984696	5.60	0.000	1.79614	3.790316
roe	-.2004454	.0493281	-4.06	0.000	-.2991163	-.1017745
ltd	.0100421	.0428502	0.23	0.816	-.075671	.0957553
lpr	.6731658	.2421198	2.78	0.007	.188854	1.157478
gdp	-.0399841	.0284772	-1.40	0.165	-.096947	.0169789
inf	-.0039231	.0101882	-0.39	0.702	-.0243026	.0164563
_cons	.5055763	.1421728	3.56	0.001	.2211883	.7899643

Source: Data obtained from Commercial Banks and Own computation

Appendix D: OLS regression only with old banks

Source	SS	df	MS	Number of obs =	40
				F(9, 30) =	11.49
Model	.025861252	9	.002873472	Prob > F =	0.0000
Residual	.007503411	30	.000250114	R-squared =	0.7751
				Adj R-squared =	0.7076
Total	.033364662	39	.000855504	Root MSE =	.01581

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
size	-.0012228	.0065707	-0.19	0.854	-.014642	.0121964
dar	-.374908	.0791023	-4.74	0.000	-.5364565	-.2133595
lar	-.0452738	.066246	-0.68	0.500	-.1805662	.0900186
roa	3.096199	.5485129	5.64	0.000	1.975986	4.216411
roe	-.2085037	.0333242	-6.26	0.000	-.2765609	-.1404466
ltd	-.0660872	.0464951	-1.42	0.166	-.1610427	.0288684
gdp	-.0222414	.0287667	-0.77	0.445	-.0809908	.036508
inf	-.0073896	.0082305	-0.90	0.376	-.0241986	.0094194
lpr	.4528977	.5579825	0.81	0.423	-.6866546	1.59245
_cons	.4988654	.1446012	3.45	0.002	.2035504	.7941804

Source: Data obtained from Commercial Banks and Own computation

Appendix E: OLS regression with NEW Banks

Source	SS	df	MS		
Model	.030097863	9	.003344207	Number of obs =	30
Residual	.019165817	20	.000958291	F(9, 20) =	3.49
Total	.04926368	29	.001698748	Prob > F =	0.0095
				R-squared =	0.6110
				Adj R-squared =	0.4359
				Root MSE =	.03096

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
size	-.0119288	.0295375	-0.40	0.691	-.073543	.0496854
dar	.1271733	.2243139	0.57	0.577	-.3407372	.5950838
lar	-.0087963	.0533045	-0.17	0.871	-.1199875	.1023949
roa	9.402412	11.43076	0.82	0.420	-14.44173	33.24656
roe	-4.922645	11.65233	-0.42	0.677	-29.22897	19.38368
ltd	.2040379	.1293654	1.58	0.130	-.0658135	.4738894
lpr	1.317979	.4372567	3.01	0.007	.4058776	2.230081
gdp	-.1699733	.0685275	-2.48	0.022	-.3129192	-.0270273
inf	.0158289	.0199852	0.79	0.438	-.0258594	.0575172
_cons	.4976591	.2540247	1.96	0.064	-.0322271	1.027545

Source: Data obtained from Commercial Banks and Own computation

Appendix F: Lists of public and private Commercial Banks in Ethiopia

S.N	Name of bank	Year of establishment	Ownership
1	Commercial Bank of Ethiopia (CBE)	1963	Public
2	Awash International Bank S.C (AIB)	1994	Private
3	Dashen Bank S.C (DB)	1995	Private
4	Bank of Abyssinia S.C (BoA)	1996	Private
5	Wegagen Bank S.C (WB)	1997	Private
6	United Bank S.C (UB)	1998	Private
7	Nib International Bank S.C (NIB)	1999	Private
8	Cooperative Bank of Oromia S.C (CBO)	2005	Private
9	Lion International Bank S.C (LIB)	2006	Private
10	Oromia International Bank S.C (OIB)	2008	Private
11	Zemen Bank S.C (ZB)	2009	Private
12	Bunna International Bank S.C (BIB)	2009	Private
13	Berhan International Bank S.C (BBI)	2010	Private
14	Abay Bank S.C. (AB)	2010	Private
15	Addis international Bank SC. (AdIB)	2011	Private
16	Debub Global Bank S.C. (DGB)	2012	Private
17	Enat Bank S.C. (EB)	2013	Private

Source: NBE annual report 2015/16