



**ST. MARY'S UNIVERSITY  
SCHOOL OF GRADUATE STUDIES**

**DETERMINANTS OF CAPITAL ADEQUACY RATIO:  
AN EMPIRICAL STUDY OF PRIVATE COMMERCIAL BANKS  
IN ETHIOPIA**

**BY**

**KIDIST TESFALEM MENGISTAB**

**ID.NO-SGS/0305/2007B**

**JAN, 2018**

**ADDIS ABABA, ETHIOPIA**

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**A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF  
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**JAN, 2018**

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**APPROVED BY BOARD OF EXAMINERS**

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**Dean School of Graduates**

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**Signature**

**ABEBAW KASSIE GUALU (Phd)**

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**Advisor's Name**

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**Signature**

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**External Examiner**

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**Signature**

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**Internal Examiner**

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**Signature**

## DECLARATION

I hereby declare, that the thesis report entitled, “*Determinants of capital adequacy ratio: An empirical study on private commercial banks in Ethiopian*” written and submitted by me to Accounting and Finance MBA department (St. Mary’s university), in partial fulfillment of the requirements for the degree of **MASTERS OF BUSINESS ADMINISTRATION (MBA)**. This is my original work and conclusions drawn are based on the material collected by me.

I further declare that this work has not been submitted to this or any other university for the awards for of any other degree, diploma or equivalent course.

Declared by:

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Name

**St. Mary’s University Addis Ababa**

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Signature

**Jan 2018**

## STATEMENT OF CERTIFICATION

This is to certify that Kidist Tesfalem has carried out this research work on the topic entitled *“Determinants of capital adequacy ratio: -An empirical study on private commercial banks in Ethiopian”* under my supervision. This work is original in nature and it is sufficient for submission for the partial fulfillment for the award of Master of business administration in Accounting and Finance.

---

Advisor  
St. Mary's University Addis Ababa

---

Signature  
Jan 2018

**St. Mary's University**

**School of Business**

This is to certify that the thesis prepared by Kidist Tesfalem, entitled: *“Determinants of capital adequacy ratio: - An empirical study on private commercial banks in Ethiopian”* and submitted in partial fulfillment of the requirements for the Degree of Masters of business administration in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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\_\_\_\_\_  
**Dean, Graduate Studies**

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**Signature**

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**Advisor**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**External Examiner**

\_\_\_\_\_  
**Signature**

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**Internal Examiner**

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**Signature**

## Abstract

Capital adequacy rules are safety controller for regulators and banks' clients/shareholders to reduce expected risks faced by commercial banks .These rules are applied compulsory by all banks internationally. Applying these rules will achieve rational management and governance. This paper examines empirically the determinants of Capital Adequacy Ratio of Private commercial Banks in Ethiopia. The study period covered the year from 2011 to 2016 on which thirteen Private Commercial Banks are selected based on availability of six years data. The study use secondary data which is gathered from annual reports of the banks under study. Panel data regression is used in this study to analyze relationships between the dependent and independent variables. The dependent variable is Capital Adequacy ratio (CAR) and independent variables are selected from internal and external factors. Internal variables are Bank size (SIZE), ,Return on Asset (ROA), Return on Equity (ROE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Loan Loss Provision (LPR) , Leverage (LEV), Revenue power ratio and Equity Ratio (EQR) and external variables are–Real Gross Domestic Products (GDP) and inflation rate (INF). 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%, random effect model is selected as the best model for the study. The result of the random effect model for the study reveals that Size, Return on Asset, GDP and Inflation had negative and significant impact. On the other hand return on Equity, Loan Loss Provision and Equity Asset Ratio had positive and significant impact. The result indicates that Deposit Asset Ratio, Loan to Deposit, Leverage, Revenue Power and Loan Asset Ratio were have no significant impact on Capital adequacy ratio of private commercial Banks in Ethiopia. Except Return on Asset and Loan Loss provision shows the expected sign.

**Key Words:** -*Capital Adequacy Ratio (CAR); Commercial Banks; Risk Based Capital*

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## **List of acronyms and abbreviations**

SIZE: Bank size

DAR: Deposit to Asset Ratio

EQR: Equity 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

RP: Revenue Power Ratio

GDP: Gross domestic product

INF: Inflation

NBE: National Bank of Ethiopia

AIB: Awash International Bank S.C

DB: Dashen Bank S.C

WB: Wegagen 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: Berhan 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

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1 Background of the study

Capital adequacy ratio for banking sector is an important issue that accepted a considerable attention in finance literature .It can be defined as a measure of a bank's risk exposure. Bank's risk is classified into credit risk, market risk, interest rate risk and exchange rate risk these are applied in the computation of capital adequacy ratio. Capital adequacy ratio (CAR) as an important measure of "safety and soundness" for depository institutions so regulatory authorities used. Due to the reason that they view capital as a buffer or cushion for absorbing losses (Stolz 2002)

However, the concept of capital adequacy ratio appeared in the mid 1970's. It has been widely observed in 1970s at the time of capital adequacy ratios of many banks decline significantly. For instance in 1974 the subsequent failure of the two international banks i.e., Long Island's Franklin National Bank in United states of America and Bankhaus Herstatt in Germany then in 1974 the banking crises seem to have increase in number and severity. Jablecki(2009), the frequent occurring of bank failures persuade to shift in to stricter bank capital regulation. Besides, bank failures exposed the technical weakness and flaws of capital requirement which failed to link bank capital with their asset portfolio risk.

This results in , the need for putting a capital requirement that is sensitive and linked to the risks in the banks' asset portfolio came to the attention of regulators. Then, in 1988 the Basel Risk Based Capital Standard came as the first attempt to related banks' capital with asset. Originally the initiative that lead to the development of the 1988 Basle risk-based capital standard, also called as Basel I, was to standardize bank capital regulation across the G10 countries (Jacques and Nigro, 1997). According to Tarbert (2000), the need for the standardization was in response to the growing international and cross border banking activities where by banking became international in their scope while regulation was at the national level. Consequently the Basel Accord was signed by the G10 countries and its intention was only to internationally active banks (Stolz, 2004).

The standard undertakes this, by explicitly relating capital to risk whereby broad categories of on- and off- balance sheet assets are allocated with separate risk weights. According to

(Santos,2000)the standard contain four risk weight categories: 0% for government securities like treasury bills which are considered to have no default risk: 20% for assets with low credit risk: 50% for assets with moderate credit risk, and 100% for higher credit risk assets such as commercial loans. After assigning assets to the appropriate risk-weight category, the bank computes its total risk weighted assets as the sum of the value of the asset multiplied by its equivalent risk weight. The standard also offers two definitions of capital as Tier 1 and Tier 2. Tier 1 is mainly comprised of common stock while Tier 2 includes certain types of preferred stock, loan loss provision and subordinated debt. As a final step banks must separately hold 4% Tier 1 and 2 capitals to the total risk weighted assets and a combined 8% capital of the total risk weighted assets.

### **1.1.1 Modern Banking in Ethiopia**

The establishment of Abyssinian bank in 1905 was the starting of modern banking in Ethiopia Even if the modern banking started in 1905,the monetary and banking law was applicable after separated the function of commercial and central banks that create National Bank of Ethiopia and Commercial in 1963. The National Bank of Ethiopia with more power and duties started its operation in January 1964. Following the incorporation as a share company on December 16, 1963 as per proclamation No.207/1955 of October 1963, Commercial Bank of Ethiopia took over the commercial banking activities of the former State Bank of Ethiopia. It started operation on January 1, 1964 with a capital of Eth. Birr 20 million (NBE, 2009).

After ten years of establishment of commercial bank, the country policy changed and declared socialism in 1974. Due to the change of policy and philosophy the government extended its control over the whole economy and nationalized all large corporations. The financial sector under the socialist regime organized only 3 banks which are the National Bank of Ethiopia (NBE), the Commercial Bank of Ethiopia (CBE), and the Agricultural and Industrial Development Bank (AIDB).

In 1991 after the fall of the socialism police, the government declared a liberal economy system. Then the second Monetary and Banking proclamation established in1994, the with the objective of the proclamation are National Bank of Ethiopia as a judicial entity separated from the government and outlined the banks main functions. Furthermore, the proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 came into force and laid down the legal basis for investment in the banking sector as of May 15, 1994. (NBE, 2009).

After six months of the issuance of this proclamation, the pioneer – Awash International Bank (AIB) – was licensed to operate as a private bank and it began business on February 13, 1995 with paid-up capital of 23.2 million Br. At that time the requirement to start the banking business is evidence of paid-up capital including certificate of deposit in a blocked subscription account and evidence for valuation of contributions in kind. However after the establishment of the pioneer banks the regulatory body (NBE) issued directives 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) issued a directive underlining the need to raise the minimum capital requirement to establish a new bank and compete successfully with the functioning banks, pushed up the minimum capital requirement to 75 million Br. And those banks whose paid-up capital level was found less than 75 million Br 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 maintain a level of capital commensurate to withstand adverse operational result with the volume of their business. It again revised the minimum capital requirement. Through the directives issued on September 19, 2011 and declared the minimum capital required to obtain banking business license shall be birr 500 million 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) banks 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 moreover required to maintain a level of capital to risk weighted assets ratio of eight percent at all times. In line with this, Licensing and Supervision of Banking Business Directives No. SBB/50/2011 sub article 4 articulated 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 private banks, and replicating the existing in the Ethiopian context by using private commercial banks operating in the country after the issuance of above mentioned directive.

## **1.2 Statement of the problem**

In Ethiopia, during the last two decades, the private banking sector has playing an important role in economic development through mobilization of funds from inside and outside the country. As banks dominate the financial sector in Ethiopia, the process of financial intermediation in the country depends heavily on banks. To strength the financial position of private banks the regulatory authority adjusts its capital regulation from time to time. As discussed previously in the introduction part of this chapter National Bank of Ethiopia issued directive on the capital adequacy of Banks. In line with this the banking sector is mainly regulated for protecting depositors' fund, ensuring safety and stability of the banking system, protecting safety of banks that means to limit credit to a single borrower, and limiting or encouraging a particular kind of lending because of expected impact on the economy. Even if the private banks are increased in number from the previous time they face a lot of challenges to operating their activities. For instance in key areas of banking operations; collecting deposits, providing loans, foreign exchange dealing as well as the repeated government intervention in the decision making process of banks are the major challenges. In relation to this, Simenes (2012) examine the challenges and prospects of private commercial banks in his study viewed beyond their internal and global challenges private banks faces a lot of challenges from the regulatory body as well as the public banks specifically Commercial Bank of Ethiopia. The objectives of private banks are making profit and growth. In relation to this the banks growth and profitability had its own impact on banks' capital adequacy, due to the government intervention in their discussion making creating a challenge to private banks growth and the efficiency of the sector as a whole for instance the NBE Bill applicable only in the private bank. All private banks required purchasing NBE Bills to the amount of 27% of the disbursement towards loans and advances. The Bills have a maturity period of 5 (five) years and bear interest at the rate of 3% per annum, payable on annual basis. Due to this, the private banks loan disbursement and profitability affected compared to the public banks. As shown previous studies Almazari (2004), Buyukşalvarc and Abdioğlu (2011), Dreca (2013) ,Bateniet *al.*, (2014) and Alajmi and Alqasem (2015) loan and profitability indicators (ROA & ROE) have significant impact in determine capital adequacy. On the other hand, banking sector has controlled by

the government banks for a long period of time and still now the larger market share is under the hands of government owned banks. This is also one of the reasons that many customers still choose government owned banks for decades, another challenge for private banks. Due to the above reason the researcher believes that the inclusion of government banks in this research does not clearly show the real determinates of capital adequacy of private banks.

On the other hand, as per the researcher knowledge in Ethiopia, there are some studies conducted to determinants of capital adequacy ratios of commercial banks in Ethiopia. In relation to this Bahiru (2014), and Yonas (2015) conducted studies on the determinants of capital adequacy ratio of commercial banks in Ethiopia. Under their investigation they considered only bank specific factors. But beyond bank specific variables macroeconomic variables are also have significant impact on determining the capital adequacy ratio as shown from observations of Bokhari& Syed, (2013), Asarkaya&özcan, (2007)Yahaya et al., (2016), Williams (2011).In line to this, Dawit (2015) analyzed the determinants of capital adequacy ratio of commercial banks in Ethiopia. In his study he incorporated bank specific and macroeconomic variables however the study sample focused on banks established before 2005 and lack to incorporating of some important bank specific variables such as loan to deposit ratio, revenue power ratio and equity ratio which determine capital adequacy ratio .The study conducted by Aradom (2017) in his study tried to incorporate missed areas on the determinants of capital adequacy ratio of Ethiopian Commercial Banks and the study focused on 14 commercial banks of Ethiopia including eight banks established after 2008. Even if he include infant banks in his study separately analyzed the old and the new ones. Due to this the result, we couldn't view the real impact of the on private banks. In the same way the study lack to incorporating some important internal variable such as revenue power ratio and equity ratio which determine capital adequacy ratio. In addition to this, there are inconsistent results in the literature for instance Bahiru (2014); Wen (2007), Buyuksalvarci and Abdioglu (2011), Dreca (2013), Polat and Al-khalaf (2014), and RafetAktaset al., (2015) found leverage has significant impact on capital adequacy ratio. On the other hand studies conducted recent by Yonas (2015) and Thoa & Anh (2017) found Leverage does not have significant effect on CAR. Ali *et al.* (2006),Khanalet *al.* (2003) ,Dawit (2015),Yonas (2015) and Aradom (2017)identified a negative relationship between ROE and CAR while Thornton (1992), Khrawish (2011) and Molyneu, found a positive relationship between ROE and CAR.Dreca (2013) showed that Loan Loss Reserve does not have significant effect on CAR while Bahiru(2014) and Aradom (2017) found there is significant relationship between Loan Loss Reserve and CAR. Beside inconsistent results found between the previous studies which need a detailed investigation on the



area. In addition to this the researcher considers prior researcher recommendation and adds two internal variables in to this study. Finally as per the researcher knowledge there are no prior studies made which considers only Ethiopian private commercial banks. Due all the above reasons, the researcher was initiated to investigate the determinants of capital adequacy in the context of private banks and will get the real determinants. Therefore, in light of the above facts and the research gaps, the aim of this study is to examine internal and macroeconomic determinants of capital adequacy ratio of only Private commercial banks in Ethiopia. To this end, this study tried to provide real information about the determinant factors of CAR in the case of private commercial banks.

### **1.3 Research questions**

Based on the discussion the research questions of the study are presented below.

- What are the factors that determine capital adequacy of private commercial banks in Ethiopia?
- To what extent do those factors explain the variation in Capital Adequacy Ratio?

### **1.4 Objective of the study**

The general objective of the study will be examining major determinants of capital adequacy of private commercial banks in Ethiopia. The study specifically will be achieving the following objectives:

- To identify the internal and external variables determinants of capital adequacy ratio
- To identify the determinants which are significantly affecting capital adequacy ratio,

### **1.5. Hypothesis of the Study**

The following hypotheses were also formulated for investigation. Hypotheses of the study stands on the theories related to a bank's capital adequacy ratio that has been developed over the years by banking area researcher's and past empirical studies related to a bank's capital adequacy ratio. The results from the literature review (to be established in the next chapter) would be used to establish expectations for the relationship of the different determinants. Hence, based on the objective, the present study sought to test the following twelve hypotheses:

Hypothesis 1: Bank Size has negative impact on Capital Adequacy Ratio.

Hypothesis 2: Return on asset has positive impact on Capital Adequacy Ratio.

Hypothesis3: Return on equity has positive impact on Capital Adequacy Ratio

Hypothesis 4: Deposit to Asset Ratio has negative impact on Capital Adequacy Ratio.

Hypothesis 5: Loan to asset ratio has negative impact on Capital Adequacy Ratio.

Hypothesis6: Loan to deposit ratio has positive impact on Capital Adequacy Ratio

Hypothesis7: Loan loss provision has negative impact on Capital Adequacy Ratio

Hypothesis 8: Leverage has positive impact on capital adequacy Ratio.

Hypothesis9: Revenue Power has positive impact on capital adequacy Ratio.

Hypothesis 10: Equity Ratio has positive impact on capital adequacy Ratio.

Hypothesis11: Real gross domestic product growth rate has negative impact on Capital Adequacy Ratio.

Hypothesis12: Inflation Rate has negative impact on Capital Adequacy Ratio.

## **1.6 Significance of the study**

This study is expected to provide empirical evidence on the determinants of capital adequacy in private commercial banks in Ethiopia. The result developed from the study will have the following benefit:-

- The study took into consideration the factors influencing the Capital adequacy ratio of Banks which are in control of Banks. The internal factors which have contributed to the computation of adequacy of capital can be reduced as the same are in the control of the management and they know how to manipulate them. Moreover the macroeconomic factors in which the Banks operate and have no control upon them and the same are not accounted for.
- The results of the study will be important for all stake holders to imagine the contribution of the internal factors in deriving a sustainable capital ratio. On the basis of the results at the institutional level particularly the financial institution's management at the Board level can devise strategies to promote the prudent practices and identify investments in least risky assets.
- The regulatory authorities can also identify the factors which negatively affect the capital adequacy and can initiate remedial measures to control them. In Ethiopia the banking industry is emerged now. Therefore a new investor interested in setting up or acquiring a banking company can also lend support from the findings in order to understand the elements influencing the capital adequacy ratio of the Banks.
- The result of the study will be of a benefit to future researchers who will make use of the findings to conduct further research work in the area of capital adequacy.

## **1.7 Scope of the study**

The scope of the study is restricted to evaluate determinants of capital adequacy ratio of private commercial banks. In line to this, for the purpose of this study the researcher considers thirteen private commercial banks i.e, Awash International bank (AIB), Bank of Abyssinia (BOA), Dashen Bank (DB), Nib international Bank (NIB), United Bank (UB) and Wegagen Bank (WB), Lion International Bank (LIB), Cooperative Bank of Oromia (CBO),Berhan International Bank (BBI),Buna International Bank (BUIB) ,Oromia International Bank (OIB), Zemen Bank (ZB) and Abay Bank (AB).

The study's period covers relevant data of years 2011 to 2016. This period is chosen due to the availability of relevant data and yet considered reasonably long enough to provide adequate observation, analysis and investigation in this study.

## **1.8 Organization of the study**

The study is organized as follows. Chapter one deals with back ground of the study, problem statement, research question, specifies the objectives and purpose of the study, hypothesis the significance and benefits gained from this research as well as scope of the study. Chapter two present a review of the literature, with a focus on the theoretical, empirical literature and it describes prior studies in Ethiopia, Summary and knowledge gap. Chapter three introduces the research methodology, which in turn includes research design, population and sampling techniques, source of data and data collection instrument, analytical tools and methods,and model specification and variable description. Chapter four present the data analysis &interpretation, results discussions of the study. Finally, the conclusions and recommendations based on the study findings discussed under chapter five.

# CHAPTER TWO-LITERATURE REVIEW

## 2. INTRODUCTION

*This chapter deals with the literature on the determinants of capital adequacy. The first part of this chapter emphasis on the theoretical arguments. Under the theoretical framework issues like the need for financial intermediation, the importance of bank Capital, banking regulation and capital regulation and the two capital theories that is capital structure and the capital buffer theories are discussed. The second part of this chapter introduces about empirical evidences that establish the framework for investigating the determinants of capital adequacy from Europe countries, Asian and Middle East countries, Africa countries and related empirical studies in Ethiopia. Finally, this chapter provides summary and knowledge gap and conceptual frame work.*

### 2.1 Theoretical Literature

#### 2.1.1 The Need for Financial Intermediation

The traditional economic theories disregard financial intermediations due to their assumptions of complete and frictionless market with symmetric information from the outset which leave no room for financial intermediation. In such an ideal market creditors and borrowers can directly transact without the need for any financial intermediary. However, the world we live in is quite different from that envisioned in the traditional theories and evidences the increasing influence of financial intermediaries' in the economy (Santos, 2000).

Bryant (1980) and Diamond and Dybvig (1983) explain why banks and their intermediation function exist. In the modern economy banks are the main financial intermediaries for both depositors and borrowers. The existence of banks highly depends on their liquidity provision. Because liquidity is one of the valuable functions they provide to depositors who face uncertainty regarding their future consumption pattern. Therefore, depositors keeping their money with banks are insured on the liquidity of their deposit to meet shocks in their consumption need. In addition to this, banks are valuable as providers of monitoring services because they act as delegated monitors to investors and thus avoid the duplication of monitoring costs (Diamond, 1984). On the other hand banks lend depositors money to borrowers and relieve depositors from the screening, selection and monitoring of borrowers' in the face of borrowers superior information regarding their investment. Hence, information asymmetry drives the need for liquidity and monitoring services of banks arising from depositors' incomplete information regarding their future consumption shock and prospects of borrowers' investment.

## **2.1.2 The importance of Bank Capital**

Banks are crucial and it is vital to ensure their proper functioning. The banking industry is constantly changing and it is important in keeping keen eye on their changes and effect on the public as well as the economy. Due to its importance to the economy different studies justify the role of bank capital and importance of capital structure. Modigliani and Miller (M&M) propositions on capital structure and acknowledging the existence of government guarantees for bank demand deposits, Miller (1995) argues that bank capital structure is irrelevant in a “perfect” world with full information and completes contracts. The decision to increase the leverage within a bank’s capital structure will increase the expected earnings per share on equity, but will be just enough to compensate the shareholders for the risks added by leverage.

Weakening some of the M&M assumptions (i.e. on taxes, expected costs of financial distress, transaction costs and asymmetric information problems) leads to the additional conclusion, namely that the capital structure of banks may matter. The information acquisition function of banks creates asymmetric information problems between bank management, shareholders, and lenders. A signaling equilibrium may exist in which banks that expected to have better future performance have lower capital (Ross, 1977).

In line with this ,Stein (1998) explain that asymmetric information creates adverse-selection problems where the inability of investors to distinguish the good banks from the bad leads to banks having difficulties in issuing long term equity. High cost of equity issuance affects bank capital structure decisions since greater bank capitalization can only be obtained at some increased cost.

Berger et al (1995) explain that by relaxing the M&M assumptions and incorporating a safety net such as deposit insurance, government unconditional payment guarantees and access to the discount window may explain optimal market capital 'requirements' for banks. The safety net reduces market capital requirements by protecting banks from potential market discipline.

## **2.1.3 Banking Regulation and Capital Regulation**

Both depositors and borrowers value the liquidity service offered by banks. Depositors value liquidity because they don’t know for sure when they will need to decrease their holding of financial assets to finance their consumption or transfer in to other form of asset. Similarly, borrowers want to have continuous source of funding to mitigate uncertainty regarding their future added funding need.

Therefore, banks will be there to assure the liquidity need of both parties, which technically result in banks' balance sheet with short term liquid liability used to finance less liquid medium to long-term asset (Diamond and Rajan (1998)).

The main problem is that banks never know with certainty how many borrowers will default or how many depositors will need to make withdrawals at a given point in time. If many borrowers happen to default simultaneously or if a large number of depositors decide to withdraw cash at the same time, the bank will face a situation of capital deterioration and risk not being able to repay all of the depositors. At the extreme, the bank will become insolvent and a bank run will ensue. Ultimately, contagion of bank failures will create a systemic crisis in the economy. Therefore, as Hellmann et. Al. (2000) put it, banking crises are important not just because of the devastation that they bring to one particular sector of the economy, but because typically the shock waves affect the entire economy.

The situation presented above in the literatures as the manifestations of market failures such as externalities, market power or asymmetry of information demanded regulation of the banking business and the bank capital. Goodhart et al (1998) assesses the need for bank regulation and provides several rationales. The two major justifications demanded for banking regulation in the reviewed literatures are the risk of a systemic crisis and the inability of depositors to monitor banks (Santos (2000)).

Another common rationale for banking regulation comes in the works of Dewatripont and Tirole (1993a, 1993b) which build on the problems that the separation of ownership from management raises for corporate governance. Their argument is that banks, like most businesses, are subject to moral hazard and adverse selection problems. Therefore, it is important that investors monitor them. Monitoring, however, is expensive and requires, among other things, access to information. Furthermore, it is wasteful when duplicated by several parties. In the case of banking, this is complicated by the fact that bank debt is mainly held by unsophisticated depositors without the necessary information to perform efficient monitoring. In addition, because most of them hold only a small deposit they have little incentive to perform any of the functions that monitoring a bank would require. This free-riding problem creates a need for a private or public representative of depositors. That need can be met by a regulation that mimics the control and monitoring that depositors would exert if they had the appropriate information, were sophisticated and fully coordinated.

From the discussion above on the two major theoretical arguments it can be deduced that the rationale behind the regulation of banks are to ensure the solvency of individual banks and there by the stability of the system. The regulation takes different forms Rosenbluth and Schaap (2002) classifies the diverse regulatory measures taken by bank regulators in two major groups which are structural and behavioral. The structural aspect of bank regulation constitutes those actions intended to influence entry, ownership, products or activities of the banks etc. The behavioral aspect of the regulations constitutes those tools used to influence the behavior of banks towards prudential conduct of banks. The tools used to influence the risk management behavior of banks include among others capital requirements, liquidity and reserve requirements, loan valuation and loss provisioning etc.

One of behavioral regulation, bank capital regulation is one of the key instruments of modern banking regulation with aim to provide both a capital buffer during adverse economic conditions, as well as a mechanism aimed at preventing excessive risk (Rochet, 1992). This regulation becomes an increasingly important tool to the safety of the public's saving, to the public's confidence in the financial system and to the limit on how much risk exposure banks can accept. In this role capital also serves protect the government's deposit insurance system from serious losses. The capital regulation by the bank regulatory called as capital requirement sets a framework on how banks must handle their capital in relation to their assets. Globally, Basel Committee on Banking Supervision influences each country's capital requirements.

### **2.1.3.1 Development of minimum capital adequacy ratios**

In 1974 the Basel Committee established and it represents central banks and financial supervisory authorities of the major industrialized countries (the G10 countries). The committee concerns itself with ensuring the effective supervision of banks on a global basis by setting and promoting international standards. Its principal interest has been in the area of capital adequacy ratios. In 1988 the committee issued a statement of principles (Basel Capital Accord) dealing with capital adequacy ratios. The development of 1988 Basle risk-based capital standard, also called as Basel I, were to standardize bank capital regulation across the G10 countries (Jacques and Nigro, 1997). The need for the standardization, as discussed by Tarbert (2000), was in response to the growing international and cross border banking activities where by Banking became international in its scope while its regulation was national level. Accordingly the Basel Accord was signed by the G10 countries and was intended to apply only to internationally active banks (Stolz, 2002).The capital regulation rules recommended by the Basel Accord are minimum to be implemented by banks globally in across

country with the aim to ensure a sound and stable financial environment. Accordingly, by 1999 Basle I framework formed part of the regime of prudential regulation not only for international banks but also for strictly domestic banks in more than 100 countries, including developing countries (Hussain & Hassan, 2005).

The committee established a structure that made regulatory capital to be more sensitive to differences in risk profiles of on and off-balance-sheet exposures among banks, while lowering the disincentives to holding liquid, low risk assets (Jackson, April 1999). Accordingly the standard accomplishes this, by explicitly linking capital to risk whereby broad categories of on- and off- balance sheet assets are assigned with separate risk weights. After assigning assets to the appropriate risk-weight category, the bank calculates its total risk weighted assets as the sum of the value of the asset multiplied by its corresponding risk weight. The standard also provides two definitions of capital as Tier 1 and Tier 2.

Tier 1 capital is capital which is permanently and freely available to absorb losses without the bank being obliged to cease trading. Tier 1 capital is important because it safeguards both the survival of the bank and the stability of the financial system. This should not be less than 4%, Basle Capital Accord. It consists of the ordinary share capital (or equity) of the bank; and audited revenue reserves, current year's losses, future tax benefits, and intangible assets.

Tier 2 capital is capital which generally absorbs losses only in the event of a winding-up of a bank, and so provides a lower level of protection for depositors and other creditors. It comes into play in absorbing losses after tier one capital has been lost by the bank. A tier 2 capital is subdivided into upper and lower tier 2 capitals. According to Basle Capital Accord, Upper tier two capitals has no fixed maturity, while lower tier 2 capital has a limited life span, which makes it less effective in providing a buffer against losses by the bank. It comprises unaudited retained earnings, revaluation reserves and general provisions for bad debts, perpetual cumulative preference shares and perpetual subordinated debt

In line to this to calculate capital adequacy ratio the measurement for the risk weighted asset 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.

### **2.1.3.2 Capital adequacy ratio and its significance**

Capital adequacy ratio for banking organizations is an important issue that has received a considerable attention in finance literature. According to Al-Sabbagh (2004), capital adequacy is defined as a measure of bank's risk exposure. Banks risk is classified into credit risk, market risk, interest rate risk and exchange rate risk that are included in the calculation of capital adequacy ratio. Therefore regulatory authorities used capital adequacy ratio as an important measure of "safety and soundness" for banks and depository institutions because they view capital as a buffer or cushion for absorbing losses. Deposit Money Banks licensed by the Central Bank are required to submit to their quarterly disclosure statements which include a range of financial and prudential information. A key part of these statements is the disclosure of the banks' "capital adequacy ratios" (CAR).

The capital adequacy is a conception that resulted from the idea of rearranging the existing capital structure of banks so as to reorganize the banking industry against widespread financial distress. Adequate capital creates a placement for advanced standards in any business establishment, (Ezike&Oke, 2013).

The school of thought further argues that the implementation of the capital adequacy ratio partially regulate the money supply expansion for the entire economy. Mpuga (2002), as quoted in Williams (2011) added that the inadequacy of minimum capital standards in accounting for risks in banks assets portfolio is one of the major factors leading to bank failures. Therefore, capital adequacy is relevant in sustaining and promoting economic growth as agreed upon by the quoted scholars. As explained by Schanz et al (2010), the minimum requirement (hard floor) serves as security to the bank. Whatever fluctuations that may take place the banks will remain sound.

As discussed in the above section of the literature Basel committee agreed on the minimum capital requirement and the Capital to Risk (Weighted) Assets Ratio (CRAR) is a ratio of a bank's capital to its risk. It is a measure of the amount of a bank's core capital expressed as a percentage of its risk-

weighted asset (Berger et al., 1995). The NBE keep track of a bank's CAR to ensure that it can absorb a reasonable amount of loss and complies with statutory Capital requirements as these ratios are a measure of the amount of a bank's capital in relation to the amount of its credit exposures. They are usually expressed as a percentage. For instance, a capital adequacy ratio of eight (8) percent means that a bank's capital is eight percent of the size of its credit exposures (Alfon et al., 2004). The purpose of having minimum capital adequacy ratios is to ensure that banks can absorb a reasonable level of losses before becoming insolvent, and before depositors funds are lost (Harley, 2011). Accordingly applying minimum capital adequacy ratios serves to promote the stability and efficiency of the financial system by reducing the likelihood of banks becoming insolvent. A bank becoming insolvent may lead to loss of confidence in the financial system, causing financial problems for other banks and perhaps threatening the smooth functioning of financial markets (Soludo, 2009). Therefore, the application of minimum capital adequacy ratios by the central bank assists in maintaining a sound and efficient financial system. It also gives some protection to depositors. In the event of a winding-up, depositors' funds rank in priority before capital, so depositors would only lose money if the bank makes a loss which exceeds the amount of capital it has. Hence, Alashi (2002) observed that the higher the capital adequacy ratio, the higher the level of protection available to depositors.

### **2.1.3.3 Minimum capital adequacy ratios and its limitations**

The minimum capital adequacy ratios that supervisory authorities are encouraged to apply according to the Basel Capital Accord are: the first one is 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. The second one 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 and 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 Capital Adequacy Ratio (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, Capital Adequacy Ratio (CAR) recognizes that assets can have different levels of risk. The minimum total capital (i.e. tier 1 plus tier

2 less certain deductions) to total risk weighted credit exposures should not be less than 8 percent. Akerlof (1990) observed that having a Capital Adequacy Ratio (CAR) above the minimum recommended level is not a guarantee that the bank is "safe" as Capital Adequacy Ratio (CAR) are concerned primarily with credit risks. There are also other types of risks which are not recognized by Capital Adequacy Ratio (CAR), for instance inadequate internal control systems could lead to large losses by fraud, or losses could be made on the trading of foreign exchange and other types of financial instruments. Furthermore, Capital Adequacy Ratio (CAR) is only as good as the information on which they are based. For instance, if inadequate provisions have been made against problem loans, then the Capital Adequacy Ratio (CAR) will overstate the amount of losses that the bank is able to absorb. Therefore, Capital Adequacy Ratio (CAR) should not be interpreted as the only indicators necessary to judge a bank's financial soundness. In this regard, Tarbert (2000), also noted that many nations, have modified the regulatory capital definition and also made special provisions to raise the 8% ratio either in specific cases or on a universal basis. There seems a consensus that the 8% figure may not be trustworthy because "regulatory measures of 'capital' may not represent a bank's true capacity to absorb unexpected losses.

The limitations of the 1988 Accord led the Basel Committee on Banking Supervision to release a first consultative package on a new, more risk-sensitive accord in June 1999 and a second revised version in January 2001. Whereas the old accord focused on capital regulation, the new proposal consists of three mutually reinforcing pillars: minimum capital requirement, supervisory review process, and market discipline. Nevertheless, the calculation of minimum capital requirements is still the focus. Basle I like risk based standard is assumed to promote solvency of banks and stability of financial system mainly by linking the required amount of bank's capital to a measure of the bank's risk-weighted assets. However, in practice the requirement may not work as intended.

As discussed above the limitation of the Basle standard section above, the literatures have not yet reached at conclusive answers as to the effectiveness of the Basle I or its national variety. On the other hand, due to the observed weakness in the standard it was replaced in 2006 by Basle II standard, 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).

#### **2.1.4. 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; Fauziet *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 (Aktaset *al.*, 2015).

### **2.1.5 The Capital Buffer Theory**

The buffer theory attempts to dynamically explain why banks in practice hold a capital level above the regulatory minimum. According to this theory there are costs both of altering the level of capital and allowing capital to fall below the minimum required levels (Peura and Keppo, 2006). The buffer theory predicts that banks will maintain a level of capital above the required minimum called as a buffer of capital (VanHoose, 2007). The capital buffer theory distinguishes the long from the short run relationships between capital and risk taking and the impact of regulatory capital from observed bank capital.

In their analysis Milne and Whalley (2001) shows 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) were able to distinguish the long from the short run relationships between capital and risk taking and the impact of regulatory capital. Accordingly, Milne and Whalley (2001) found that the short run relationship between capital buffer and risk depends on the degree of bank capitalization. For banks near their desired level (highly capitalized banks), they predicted a positive relationship, while for banks approaching the regulatory required level, they predicted a negative relationship. However, Milne and Whalley (2001) also noted that the long run relationship between the capital buffer and risk either positive or negative.

To sum up the discussion, 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).

### **2.2 Empirical Literature**

This section discussed review of the previous studies made on the determinants of capital adequacy from both developed, emerging and developing countries. Moreover, most of the studies undertaken on bank capital consider both internal and external factors to examine the determinants of capital

adequacy ratio. So, the studies conducted in related to bank's capital adequacy are reviewed as follows.

## **2.2.1 Related Empirical Studies**

### **2.2.1.1 Empirical Evidences from Europe countries**

The literatures begin with Al-Sabbagh (2004) analyzed determinants of capital adequacy ratio (CAR), by studying the financial statements of a sample of 17 banks in Jordan Using correlation coefficients and regression analysis. He investigated by compare the periods before and after the implementation of the Basel capital adequacy ratio standard. The period from the implementation of the standard covered from 1985-1994. As the result shown most Jordanian banks are devoted to meet a minimum 8% capital adequacy ratio, on the other hand some banks have higher than 8%. The dependent variables used a model are nine which are expected to affect CAR. As shown from the finding of the study the relationship between bank's size and CAR is negative. On the other hand CAR was positively affected by ROA, loan to assets ratio (LAR), and equity ratio (EQR). The finding of the two periods shown CAR has a positive relation to risky assets ratio (RAR) in the period [1985-1994], however the relation becomes negative over the period [1995-2001]. In line with this, CAR is negatively affected by deposits assets ratio between [1985-1994] and positively affected by a size of banks' deposits in a period from (1995-2001]. CAR is negatively affected by loan provision ratio (LPR), and positively affected by dividend payout ratio (DR) over the period [1995-2001]. Based on the results he concludes that banks in Jordan should maintain or increase their capital adequacy ratio (CAR) to enhance the safety of the banking system, and the safety of the depositors.

Similarly, Al-Tamimi and Obeidat (2013) used the nine years (2000 to 2008) data of Commercial Banks of Jordan. In their study, they examine the determine of Capital Adequacy by using Multiple Linear Regression Analysis and the Correlation Coefficient (Pearson Correlation). The independent variables are liquidity risks, credit risks, capital risks, interest rate risk, return on equity, and return on assets and revenue power ratio over the dependent variable capital adequacy ratio. Finally the found liquidity risk and the rate of return on assets are statistically significant positive correlation with capital adequacy. On the other 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. In line to this there is an inverse relationship is not statistically

significant between the degree of capital adequacy in commercial banks and factors independent capital risk, credit risk, and the revenue power ratio.

Buyukşalvarc and Abdioglu (2011) examined the determinants of capital adequacy ratio (CAR) in Turkish banks by using secondary data over a period from 2006 to 2011 with 120 observations. They used bank size, deposits, loans, loan loss reserves, liquidity, profitability, net interest margin and leverage as independent variables over dependent variables capital adequacy ratio. Finally they found loans, loans loss reserves, leverage, ROA and ROE have a significant relationship with CAR whereas bank size, deposits, liquidity and net interest margin do not have effect on CAR in the Turkish banks.

In the same year Ahmet and Hasan (2011), has done study on the Turkish banks to investigate the determinants of Turkish banks' capital adequacy ratio and its impact on financial position of selected 24 banks. The study take nine explanatory variable namely SIZE, DEP, LOA, LLR, LIQ, ROA, ROE, NIM and LEV and dependent variable capital adequacy ratio. In order to see the effect of bank specific variable on capital adequacy ratio multivariate Panel regression model has been applied. Based on the finding Size, DEP, LIQ and NIM have no any significant impact on capital adequacy ratio. But on the other hand LOA, ROE and LEV have a negative impact while LLR and ROA have a positive impact on CAR

Shingjergji and Hyseni (2015) investigated on the main banking determinants of the Capital Adequacy Ratio in the Albanian banking system after the global financial crises used 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.

RafetAktaset al., (2015), examine the impact of bank-dimensional and environmental factors on bank's capital adequacy ratio in South Eastern European (SEE) region using panel data 71 commercial banks which belong to 10 different countries over a period from 2007 to 2012. The bank dimension variables used in their studies are size, profitability (ROA), leverage, liquidity, net interest margin (NIM), and risk and feasible GLS regression model and environmental variables are economic growth rate, inflation, real interest rate, Euro zone stock market volatility index, deposit insurance coverage, and governance. Finally they found 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. On the other hand from the environmental factors, economic growth rate, Euro zone stock market volatility index, deposit insurance coverage, and governance have statistically significant effects in determining CAR for the banks in the SEE region.

### **2.2.1.1 Empirical Evidences from Asian and Middle East countries**

Wen (2007) investigates the determinants of bank capital ratios in East Asia banks' balance sheets and income statements using a balanced panel data of during a period 2004 to 2007. For his study the variables affect the dependent variable capital ratio or independent variables are loan loss reserve, net interest margin, liquidity, leverage, and SIZE as banks specific variables and real gross domestic product and BASE macro-economic variables and one regulatory factor (REG). Finally the finding of the study shown, 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. On the other hand, Liquidity, leverage and profitability shown positive link with the bank capital .The result shown target capital level not influenced by micro economic variables.

The study by Bokhari and Ali (2009) was conducted on the Pakistan banking sector with the objective of examining the determinants of capital adequacy ratio on Pakistan banks during the period from 2005 to 2009 using the financial statement data of 12 sample banks under statistical tools such as weighted average least square on the panel data from banking sector of Pakistan. In their study capital adequacy ratio as a dependent variable and independent variables are GDP growth rate, share of deposits, and average capital adequacy ratio of the sector, portfolio risk and return on risk. They found 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.



Ansari & Masood (2016) investigated the determinants of capital adequacy ratio of Pakistani banks over a period from 2008- 2014 and the data of 14 Commercial Banks. In their study used bank specific factors ROA (Return on Assets), ROE (Return on Equity), LAT (Loan to Asset ratio), LLR (Loan Loss Reserves), NPL (Non-Performing Loans), DAR (Deposit Asset Ratio), EAR (Equity Asset Ratio) and Ownership concentration with a level of more than 10%, 25% and 50% was analyzed by using Fixed Effect Method and the validity was tested by Hausman test. As shown from the finding of the study Random Effect Model is better suited in this case. The results revealed that the LAT and ownership concentration of more 50% had a significant but a negative impact on the CAR. The EAR, DAR, LLR had a significant and positive impact the determination of CAR, whereas the Size of the Bank, ROA, ROE and NPL had no impact on CAR.

Ho and Hsu (2010) examine the relation between firms' financial structures and their risky investment strategy in Taiwan's banking industry. Their first result demonstrates that the restrictions on capital adequacy ratio have indeed affected firms' risky investment strategies, as market share and leverage are positively related. Second, the firm performance is significantly and positively related to firm size, leverage and financial cost. Finally, the regression results shown that financial structures for banking firms are positively related to the states of business cycle.

Dreca (2013) examine the influencing factors of banks' capital adequacy ratio in ten selected banks of Bosnian and Herzegovina over a period of six years data. The main variables identified in the study are: capital structure, size of the bank, profitability indicators, participation of deposits and loans in total asset and leverage. Finally the result shows SIZE, DEP, LOA, ROA, ROE and LEV have significant effect on CAR. On the other hand LLR and NIM have insignificant effect on CAR. variables SIZE, DEP, LOA and ROA have negative effect on CAR and LLR, ROE, NIM and LEV are positively related with CAR. As shown from the result all variables except LOA and ROA have expected signs. Finally they conclude that it is hard to distinguish which CAR is better higher or lower. On one side from stability, 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.

Aspal and Nazneen (2014) examine determinants of capital adequacy ratio of Indian private banks over a period from 2008 to 2012. They used independent 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 ( $GAP = Risk\ Sensitive\ Assets - Risk\ Sensitive\ Liabilities$ ) over the dependent variable capital adequacy ratio. They found

variables lending (loans), asset quality and management efficiency are negatively correlated with capital adequacy ratio and 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. However, the independent variable asset quality has negligible influence on capital adequacy. 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.

Nuviyanti and Anggono (2014) examined the determinants of capital adequacy ratio based on risk based bank rating of 19 commercial banks in Indonesia. 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 nonperforming loan ratio and loan to deposit ratio, Earning measured by return on asset ratio and return on equity used multiple Linear Regression based on Ordinary Least Square estimation technique. The secondary data were obtained from condensed financial statements conventional bank quarterly that derived from Bank of Indonesia over a period from 2008 to 2013. The result obtained from correlation coefficient, T test and F test shows significant level of 5%. They 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.

Similarly in a study on the determinants and its effects towards capital adequacy ratio of Indonesian banks Karina and Anggono (2014), investigated the relationships between independent variables such as 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) and regression analysis used to analyze the data gathered from monthly financial statement of Indonesian banks over a period from 2005 to 2014. They found from the study assets, nonperforming loan, and ROA have positive effect towards the capital adequacy ratio and 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.

Bateniet *al.*, (2014) focused their investigation on the influencing factors of Iranian private banks' capital adequacy ratio based on the data taken from the private banks annual balance sheet, profit and

loss statements and from notes to account over a period from 2006 to 2012. The study focused on the six selected sample private banks and to analyze the relationship between the dependent variable capital adequacy and independent variables such as Bank Size, Loan Asset Ratio, Return on Equity, Deposit Asset Ratio, Risk Asset Ratio, Return on Asset, Equity Ratio used panel data methodology. Finally they found that there is a negative relationship between bank size and capital adequacy ratio and the relationship between Loan Asset Ratio (LAR), Return on Equity (ROE), and Return on Asset (ROA), Equity Ratio (EQR), and Capital Adequacy Ratio (CAR) shows positively related. On the other hand RAR and DAR do not have any impact on capital adequacy ratio.

Binh and Thomas (2015) investigated the Vietnamese banks capital adequacy relationship with risk and profitability by using secondary data sources of 11 commercial banks over a period from 2008 to 2013. They used capital adequacy as dependent variable and 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. For analyzing the data applied the regression on dependent variables based on three ways: Pooled Regression, Fixed Effect Model, and Random Effect Model. Finally the result shown capital adequacy (CAR) has positive relationship with capital risk (CPR), owner's equity risky assets ratio (ER), asset turnover (ATO), and return on assets (ROA). On the other hand, capital adequacy level is inversely related to credit risk (CR); interest rate risks (IR), liquidity risk (LR), and return on equity (ROE).

Recently Thoa & Anh (2017) examine the determinants of capital adequacy ratio in Vietnamese banks over a period from 2011 to 2015. The dependent variable was Capital Adequacy Ratio (CAR) and it influenced by independent variables asset of the bank SIZE, loans in total assets LOA, leverage LEV, net interest margin NIM, loans lost reserve LLR, Cash and Precious Metals in total assets LIQ. Finally they found NIM and LIQ have significant effect on CAR. On the other hand, SIZE and Leverage insignificant effect on CAR. Variables NIM, LIQ have positive effect on CAR, while variables LLR and LOA are negatively related with CAR.

Yahaya et al., (2016), investigated the financial performance and economic impact of capital adequacy ratio on regional banks in Japan. They used secondary data from world Bank and sixty four individual Japanese regional banks financial statements over the period from 2005 to 2014. In their studies include 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. 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. The results show institution and policy maker is not only maintaining but also need to improve the level of capital adequacy for a stable security to all parties.

Almazari (2013) examine Saudi Arabia commercial Banks capital adequacy ratio and the profitability relationship. In his study efficiency is measured used the Capital Adequacy Ratio (CAR) and the Cost Income Ratio (CIR) and profitability is measured by ROA and ROE. They found between capital adequacy and profitability there is positive relationship, on the other hand the relationship between cost Income ratio and profitability is negative. In line with this, he found a positive relationship between Banks size and profitability and a negative relationship between capital indicators and profitability in the Saudi banks.

Polat and Al-khalaf (2014) empirically explain some bank internal factors that influence the capital adequacy ratio (CAR) of listed banks in the Kingdom of Saudi Arabia (KSA). The data used covering a period from 2008 to 2012 for the Saudi Arabian Banks that are listed in Saudi Arabian Stock Market, Tadawul. In line with this the determinants of capital adequacy of these bank specific variables are ROA, NPL, LTD, LEV, SIZE, DPO and LOA. As shown from the finding of the study except NPL all other variables other variables have significant effect on CAR. Depending on the model type the results vary. Fixed effect, robust estimation and least squared dummy regression (LSDR) results shows that loans to assets ratio has negatively significant while leverage and the size of the banks have positively significant in determining CAR. In GLS estimation they found that in addition to earlier model results, loan to deposit ratio has negatively significant and the return on assets has positively significant on CAR. Their analysis also shows that there are significant bank specific effects in panel data structure while no time effect is found.

Alajmi and Alqasem (2015) studied the effects of seven internal factors of five conventional Kuwaiti banks on capital adequacy ratio (CAR). The five factors are: Loans to Assets, Loans to Deposits, Non-Performing Loans to Total Loans, Return on Assets, Return on Equity, Dividend Payout and Total Liability to Total Assets over a period from 2005 to 2013. The fixed effect model result shows, variables DIVIEDEND, LAR, LDR, NPLLR, and ROE do not have any impact on capital adequacy ratio. On the other hand, SIZE and ROE has a significant and negative relationship with capital adequacy ratio. Similarly the random effect model results indicated that CAR is adversely affected by

bank's SIZE (total liability to assets), and ROA has a significant and negative relationship with capital adequacy ratio, However, Loan to Deposit Ratio (LDR) showed a significant and positive relationship with capital adequacy ratio. On the other hand, dividend payout, loans to assets, Non-Performing Loans to Total Loans and Return on equity do not have significant effect on CAR under random effect model.

Alkadamani (2015) investigated Capital Adequacy, Bank Behavior and Crisis: Evidence from Emergent Economies used data from 46 commercial banks of Middle East countries over a period from 2004 to 2014. The study used simultaneous equations model. It explores the relationship between capital and risk decisions and the impact of economic instability on this relationship. By analyzing the data, 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.

### **2.2.1.3 Empirical Evidences from Africa countries**

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 to 2013, using a simultaneous equation model. The research shown 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.

Williams (2011), examine the relationship between capital base and some macroeconomic, financial structure and banking variables using an error correction model over a period from 1980 to 2008 in

Nigeria. In his study capital adequacy used as dependent variable and total loans, money supply, interest rate, inflation rate, demand deposit, political instability, exchange rate, liquidity risk, openness of the economy and investments were used as independent variables. Finally he found money supply is the main determinant of the CA and 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 result for investments and political instability are correctly signed and statistically significant to explain the capital adequacy base in Nigeria.

Abba *et al.*, (2013) investigated the relationship between capital adequacy and banking risks of twelve sample Nigerian banks using secondary data. The variables risk-weighted asset ratio, deposit ratio and inflation rate used as independent variable over the dependent variable capital adequacy. Capital adequacy ratio of the banks estimated through implementing value at risk theory and the result shows changes in capital adequacy ratio are explained by changes in the independent variables, up to 35%. The result revealed the relationship between capital and risk inversely related or significantly negative that means when risk level rises, capital adequacy ratio falls in the Nigerian banking industry. Finally 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 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.

Olarewaju & Akande (2016) examine the determinants of capital adequacy ratio of Nigerian deposit money banks over a period from 2005 to 2014. The data analyzed by using descriptive and fixed effect panel regression. The descriptive analysis result shown that the mean and median values are within the minimum values and the standard deviation shown the expected growth rate deviation for each of the identified determinants of capital adequacy. From the analysis of panel data using Cross-Sectional Specific fixed effect estimations, it is discovered that a direct relationship exists among ETA, ROA and Size while an inverse linear relationship that exists among ROE, CR, DEP and LIQ are statistically significant in determining the level of capital adequacy among the deposit money banks in Nigeria. The study recommends the need for all these affected banks to gear up and invest

more on the significant factors that can lead to improvements in their capital adequacy in order to achieve viability, sustainability and stability in the long run.

El-Ansary and Hafez (2015) examine the influence factors of capital adequacy ratio (CAR) in the Egyptian commercial banks. The study covers 36 banks during the period from 2004-2013 and examined the relationship between CAR as dependent variable. The independent variables are earning assets ratio, profitability, and liquidity, Loan loss provision as measure of credit risk, net interest margin growth, size, loans assets ratio and deposits assets ratio. Furthermore, they are investigated determinants of CAR before and after the 2007- 2008 international financial crises. The results vary according to the period understudy. For the whole period 2003 to 2013 results revealed that liquidity, size and management quality are the most significant variables. Before the period 2008 results show that asset quality, size and profitability are the most significant variables. After the period 2009 results show that asset quality, size, liquidity, management quality and credit risk are the most significant variable that explain the variance of Egyptian banks' CAR. Capital adequacy rules are safety valve for regulators and banks' clients/shareholders to reduce expected risks faced by commercial banks especially for cross border transactions as these rules are applied compulsory by all banks internationally. Applying these rules will achieve rational management and governance.

Mugwang'a (2014) investigates determinants of Capital Adequacy in Kenya Commercial Banks used secondary data from Nairobi Securities Exchange over a period from 2009 to 2013 using Multiple Linear Regression Analysis and the Correlation Coefficient (Pearson Correlation). The result shown there is significant relationship between capital adequacy and capital risk. On the other hand, the result shown there is insignificant relationship between capital adequacy and 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.

#### **2.2.1.4 Related Empirical Studies in Ethiopia**

All the above empirical evidences discussed about other countries in the world apart from that the researcher attempted to find related empirical evidences on determinants of capital adequacy ratio of Ethiopian banking business.

Bahiru (2014); examine the determinants of capital adequacy ratio of commercial banks in Ethiopia using secondary data of eight public and private banks over a period from 2002 to 2013. The investigation focused on the relationship between the dependent variable capital adequacy and the independent variable profitability, deposits, loan loss reserve, leverage, net interest margin, size and liquidity. The data analyzed by using ordinary list square method. The result revealed deposits, leverage, loan loss reserve and liquidity of the banks are important and significant determinants of capital adequacy ratio. On the other hand, the result for independent variables management quality, profitability and size statistically insignificant impact on the capital adequacy ratio of banks in Ethiopia. Finally based on the results the researcher recommends, banks should pay greater attention to these significant variables in determining their capital adequacy ratio.

Yonas (2015), examine the determinants of capital adequacy ratio of commercial banks. Based on the availability of data selected eight sample banks over a period from 2004 to 2013. Accordingly to analyzed relationships between the dependent variable capital adequacy and 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) used panel data regression and Hausman specification test model has been made. After testing the models finally selected fixed effect model as the best model for the study due to the result on which the probability is less than 5%. Finally as the result of the fixed effect model for the study shown 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), on his study titled determinant of Capital Adequacy Ratios of commercial banks in Ethiopia examined bank specific and macroeconomic variables by using secondary source of panel data over the period 2002 to 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.

Recently Aradom (2017), investigated on the determinant of capital adequacy in Ethiopian banking sector by using the data from 14 selected banks over a period from 2011 to 2015. In line with this to examine 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.

## **2.2.2. Determinants of Capital Adequacy Ratio**

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

### **2.2.2.1. Internal determinants of capital adequacy**

#### **2.2.2.1.1 Capital adequacy ratio**

Capital adequacy ratio (CAR), defined as the Capital to Risk Weighted Assets 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

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

#### **2.2.2.1.2 Bank size**

Banks' size is important variable of capital due to 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 believe 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.

### **2.2.2.1.3 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 working 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. ROA is expected to have positive relationship with capital adequacy ratio because a bank is anticipated to have to raise asset risk in order to get higher returns in most cases. Gropp and Heider (2007) indicated a positive relationship between ROA and capital relative to assets.

### **2.2.2.1.4 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).

### **2.2.2.1.5 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 deposit.

#### **2.2.2.1.6 Loans and Advances – Loan to Asset Ratio (LAR)**

As financial intermediary 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)

#### **2.2.2.1.7. 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. Kleff & Weber (2003), decrease of third 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.

#### **2.2.2.1.8. 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 Metzmakers (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).

#### **2.2.2.1.9 Leverage**

Leverage which proxy by the total equity to total liability. Leverage allows a financial institution to increase the potential gains or losses on a position or investment beyond what would be possible through a direct investment of its own funds whenever an entity's assets exceed its equity base, its balance sheet is said to be leveraged. Ahmet and Hasan, (2011), states that highly leveraged banks hold less equity than low leveraged banks.

#### **2.2.2.1.10 Revenue Power Ratio**

Revenue power ratio (RP) is based on the relationship between operations profits and assets contributing to its realization, in measuring profitability, Revenue power is defined as the ability of certain investment to generate a revenue in turn of its use, or it is the institution's ability to generate profits for the use of its assets in its basic activity, put in other terms, it is the ratio of operations profits to institution assets (Abu- Zeiter, 2006). This ratio is better than profits as a measure for judging the institution efficiency, since profit is an absolute number that does not indicate the realized investments, while revenue power finds out this relationship, which in turn facilitates comparison with revenues from other time periods and institutions, in addition to identifying that institutions Performance will take, it is also a measure of the institution's operational performance efficiency, therefore, when it is computed, we should be confined on the assets actually participating in the institution's typical operation a long with profits generated from operation of these assets before tax, and other expenditures and revenues (Abu Zeiter, 2006). Total revenues include credit interests, net commissions, profits of financial assets and tools, and other operational revenues, in addition, literature indicates a positive relationship between Revenue power ratio and capital adequacy (Abu-Zeiter, 2006).

#### **2.2.2.1.11. Equity Ratio (EQR)**

The EQR (Equity to Asset ratio) variable has also proven its significance and affirmative relation with the capital sufficiency. This shows that how much of the assets are financed by the owners capital. If the reliance on owners capital will be more than the focus from the depositors will be deviated as the Banks will tend to hold lower capital. The positive relationship has been established and it is also

significant. This implies that the more reliance on capital instead of financing on the basis of deposits provides a sound financial base for the bank. The results are in conformity with the earlier work done by (Berger, 1995), (Batani et al., 2014) and Masood (2016).

## **2.2.2.2. External determinants of capital Adequacy**

### **2.2.2.2.1 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)

#### **2.2.2.2.2 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 worsens 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 enquires 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.

### **2.3. Summary and Knowledge gap**

The safety and soundness of the banks play an important role and have also great impact on the country's economy. As shown in the theoretical as well as empirical review, after the Basel I accord capital adequacy ratio is internationally accepted and crucial tool to prevent collapse of banks through its risk based standard. It also revealed that capital adequacy can be affected by different factors such as internal and macroeconomic factors. While this study focused on some of the internal and macro-economic factors. Due to the variation of the environment and data included in the analysis the results



of various studies differ significantly. Under this sub topic discussed about the knowledge gap identified and conceptual frame work is developed.

The review of the literature reveals the existence of many gaps of knowledge in respect of the factors affecting bank capital adequacy, particularly in the context of Ethiopia. As per the review of the literature most of the empirical studies that have been conducted with the aim of identifying factors affecting bank capital adequacy ratio belong to European, Middle East, Asian and African countries. As shown from 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 the number of studies has investigated the determinants of CAR, most of these studies have been done in other countries. The empirical literatures and knowledge gaps in Ethiopia as follows.

The study of Bahiru (2014) examined the determinants of capital adequacy of commercial banks in Ethiopia. His study fails to disclose the knowledge gap that exists in the area as far as it limits its scope only in case of eight commercial banks of the country and from the point of view of the theories and previous empirical studies reviewed above also failed to include some important macro-economic variables that are untouched in Ethiopian. In addition to this, the study failed to include recently joined banks and disclose important variables Return on Equity, Equity ratio and Revenue Power Ratio.

Similarly Yonas (2015) investigated the determinants of capital adequacy ratio in Ethiopian commercial banks. His study fails to disclose the knowledge gap that exists in the area as far as it limits its scope only in case of eight commercial banks of the country and from the point of view of the theories and previous empirical studies reviewed above also failed to include some important macro-economic variables that are untouched in Ethiopian. In addition to this, the study failed to include recently joined banks and disclose important variables Equity ratio and Revenue Power Ratio.

In addition Dawit (2015) conduct his study on eight senior commercial banks in considered both bank specific and macro-economic factors. Even if, his study includes macro-economic variables failed to include recently joined banks and disclose important variables Equity ratio and Revenue Power Ratio.

Recently Aradom (2017), investigate on determinants of capital adequacy in Ethiopian banking sector including newly established banks which are operating since 2010 onward and considering banks having at least a five years panel data. The total number of banks selected for the study was 14 over a period from 2011 to 2015. He found from the result that DAR, ROE, LPR and ROA, Size, LAR is significant. The variables SIZE, DAR, LAR and ROE affect capital adequacy ratio negatively whereas ROA and LPR affects positively. In his study failed to disclose important variables Equity ratio and Revenue Power Ratio. On the other hand he suggested other researchers to test revenue power ratio.

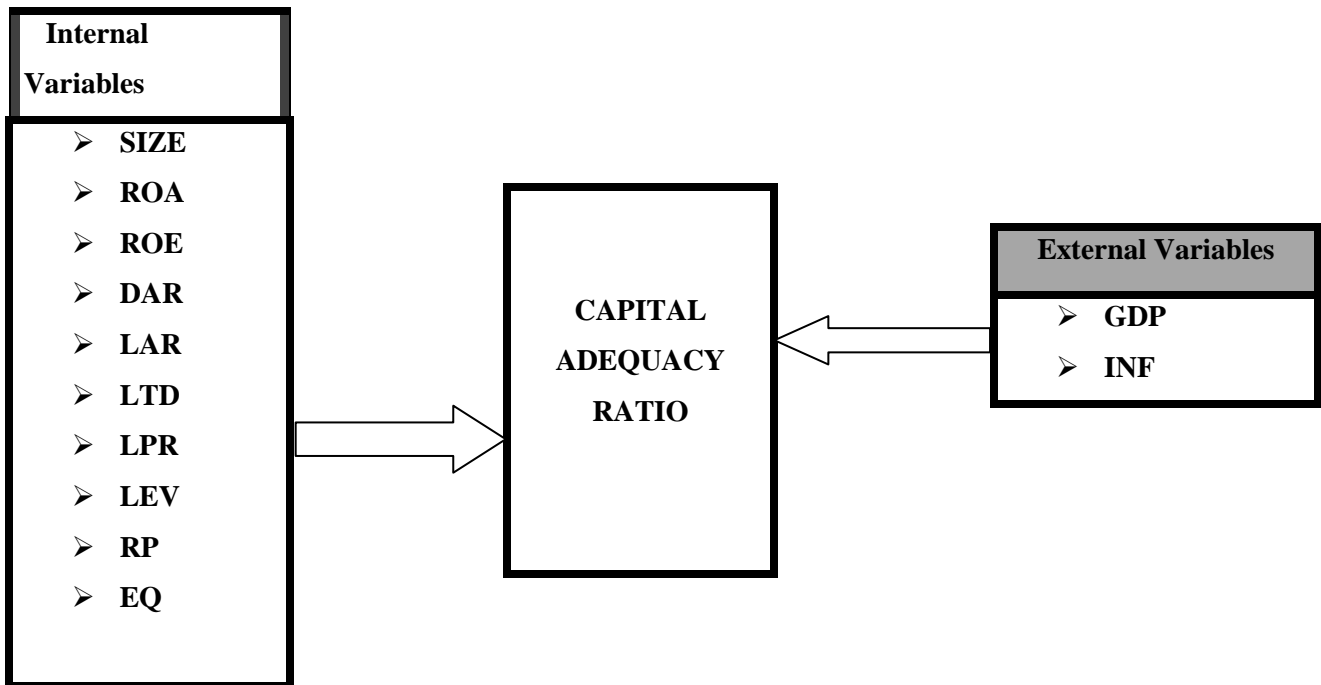
To summarize in the context of Ethiopia, the related study conducted by Bahiru (2014), Yonas (2015), Dawit (2015) and Aradom (2017) examined the determinants of capital adequacy ratio of commercial banks in Ethiopia, even if they tries to identify the effect of some bank specific and macro-economic variables on capital adequacy ratio as per the researcher knowledge there is no one of the studies Conducted on private banks. All the researchers incorporate public banks CBE, and CBB. As shown from the empirical considered the challenges of private banks and no one of them examine the private banks and also fails to include important variable that is not tested in Ethiopian context; such as revenue ratio power and equity asset.

In general, even if there are studies conducted on the determinants of capital adequacy in the context of Ethiopia as per the researcher knowledge there is no study made to identify the determinants of capital adequacy only taking private commercial banks and inconsistency in the result of the studies initiate for this study. Therefore, the objective of this study is to examine the determinants of capital adequacy of Ethiopian private commercial bank.

This study therefore, seeks to fill this gap by establishing the link between Capital Adequacy Ratio and its determinants (internal and external factors) in case of private commercial banks in Ethiopia. There are plenty of variables that affect the CAR. In this study, the researcher focused on both internal and macroeconomic determinants of CAR of private commercial banks in Ethiopia. However, the variables that got more attention and included in this study were internal factors: Bank size (SIZE), Return on Asset (ROA), Return on Equity (ROE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Loan Loss Provision (LPR), Leverage, Equity to asset ratio, Revenue power ratio and macroeconomic (external) variables (gross domestic product and inflation).

### 2.3. Conceptual Frame Work

The main objective of this study is to examine the determinants of CAR of private 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. Internal factors Bank size (SIZE), Return on Asset (ROA), Return on Equity (ROE), DAR (Deposit to Asset Ratio), Loan to Asset Ratio (LAR), Loan to Deposit (LTD), Loan Loss Provision (LPR), Leverage (LEV), Revenue power ratio and Equity Ratio (EQR) on the other hand 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.



*Fig 2.1 Conceptual frame work of Determinants of capital adequacy model Source. Owen based on previous studies and some modification of variables*

## **CHAPTER THREE- METHODOLOGY**

### **3. INTRODUCTION**

*This chapter provides research design adopted in the study, which in turn includes research design, population and sampling design, source of data and collection tools, analytical tools and techniques, data analysis method and definition and measurement of variables. Moreover deals with model selection issues in a considerable detail including various tests conducted to select the appropriate model for the study.*

#### **3.1 Research design**

In this study the researcher adopts explanatory research. The data was collected from private commercial banks in Ethiopia and it covered the period from 2011 to 2016. The functional or positivist paradigm that guides the quantitative mode of inquiry is based on the assumption that social reality has an objective of ontological structure and that individuals are responding agents to this objective environment (Morgan & Smircich, 1980). Quantitative research involves counting and measuring of events and performing the statistical analysis of a frame of numerical data. The assumption behind the positivist paradigm is that there is an objective truth existing in the world that can be measured and explained scientifically.

According to (Cassell & Symon, 1994) the main concerns of the quantitative paradigm are the measurement of its reliability, validity, and generalization in its clear prediction of cause and effect. Quantitative researches begin with particularistic idea by formulating the research hypothesis and verifying them empirically on a specific set of data. Scientific hypothesis are value free from biases and subjectivity preferences have no places in the quantitative approach. Researcher can view the communication process as existing, tangible and could be analyzed it without contacting real people involved in communication (Ting-Toomey, 1984). Due to the above reasons the researcher used quantitative research approach.

#### **3.2 Population and sampling techniques**

All commercial banks licensed by the National Bank of Ethiopia are target population of the study. Currently after the merger of Commercial Bank of Ethiopia and Construction and Business Bank by

April, 2016, there are two public-owned and sixteen private commercial banks operating in Ethiopia. A sample is a portion of the population that inferences are to be made about the population. To select sample population from the total population the researcher used purposive sampling technique and selected thirteen private banks Namely, Awash International bank (AIB), Bank of Abyssinia (BOA), Dashen Bank (DB), Nib Bank (NIB), United Bank (UB) , Wegagen Bank (WB), Lion International Bank (LIB), Cooperative Bank of Oromia (CBO),Berhan International Bank (BBI),Buna International Bank (BIB) ,Oromia International Bank (OIB), Zemen Bank (ZB) and Abay Bank (AB). In the scope of the study it states the period covers six years and use balanced data, due to its availability and the time include the newly established banks and considering having at least six years panel data which is worthwhile for panel data estimation concern of most newly established private banks the researcher purposely reduce required number of sample to thirteen from the target population. The sample frame for the study was determined based on six year data of the experience in the area of banking operation and the availability of individual bank data from the year 2011 to 2016. The selection of the sample period is based on the intention to increase the degree of freedom to meet the requirements of the estimation procedure inclusion of banks that do not have data for the whole sample period specified above would lead to unbalanced panel data which may fail to satisfy the assumptions of model which is based on balanced data. Thus, private banks established after the year 2011 and public banks are excluded from the sample to satisfy the balanced data and the objective of the study requirement of the model.

### **3.3. Source of data and data Collection Instruments**

To achieve the objectives of the study and document review will be employed for this research to collect required and relevant information. The researcher used secondary sources of data and the annual published and audited financial statements (balance sheet and income statement) will review for internal factors and for macro-economic factors data will collect from NBE. The data helps to determine internal variables and macroeconomic (external) variables. To collected the data the researcher selected thirteen banks and collected six consecutive years' balance sheet and income statement report. The data obtained from both sources checked their consistency and reliability reconcile based on the published annual reports of banks. According to Koul (2006) Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of the research findings. In line with this data collection instruments conducting appropriate data gathering instruments help researchers to combine the strengths of the inadequacies of data source to minimize risk of irrelevant conclusion.

### **3.4. Data Analytical**

To comply with the objective, the paper was primarily based on panel data, which was collected through structured document review. As noted in Baltagi (2005) the advantage of using panel data is that it controls for individual heterogeneity, less collinearity among variables and tracks trends in the data something which simple time-series and cross-sectional data cannot provide. Thus, the collected panel data was analyzed using descriptive statistics, and multiple linear regression analysis. Mean values and standard deviations were used to analyze the general trends of the data from 2011 to 2016 based on the sector sample of 13 banks and a correlation matrix will be use 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 capital adequacy. The multiple linear regressions model was run, and thus OLS conducte EVIEWS 8 econometric software package, to test the casual relationship between the the independent variables and its effect on banks' capital adequacy. The rational for choosing OLS is as noted in Petra (2007) OLS outperforms the other estimators when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS. A random cross-sectional effect is specified in the estimation so as to capture unobserved idiosyncratic effects of different banks. In addition, as noted in Gujarati (2004) if T (the number of time series data) is small and N (the number of cross-sectional units) is large.

Furthermore, various diagnostic tests such as Normality, Heteroscedasticity, Autocorrelation and Multicollinearity test conducted to determine whether the data used for this study fulfill the assumption of classical linear regression model. Regression results were also presented in a tabular form with the appropriate test statistics and then an explanation of each parameter was given in line with the evidence in the literature.

### **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) asset

### **Total Capital**

$$\text{CAR} = \frac{\text{Total Capital}}{\text{Risk Weighted Assets}} \times 100$$

### **Risk Weighted Assets**

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 Banks 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) , Equity Ratio (EQR), Leverage (LEV) and Revenue power ratio 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, 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 and a negative relationship is expected between bank size and capital adequacy ratio.

$$\text{SIZE} = \text{Natural Logarithm of TOTAL ASSETS} = \ln(\text{Total Assets})$$

### **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 below and a positive relationship is expected between ROA and capital adequacy ratio.

$$\text{ROA} = \text{Net Income after Tax/Total Assets}$$

### **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 below and a positive relationship is expected between ROE and capital adequacy ratio.

$$\text{ROE} = \text{Net Income after Tax/Total Equity}$$

### **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 and a negative relationship is expected between DAR and capital adequacy ratio.

$$\text{DAR} = \text{Total Deposits/ Total Assets}$$

### **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 Loan to asset ratio, the more risky a bank maybe to higher defaults. LAR is calculated presented as below and a negative relationship is expected between LAR and capital adequacy ratio.

$$\text{LAR} = \text{Total loan/ Total Assets}$$



### **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 is calculated presented as below and a negative relationship is expected between LTD and capital adequacy ratio.

$$\text{LTD} = \text{Total loan} / \text{Total Deposit}$$

### **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 and a negative relationship is expected between leverage and capital adequacy ratio.

$$\text{LPR} = \text{Loan Loss Provision} / \text{Total Loans}$$

### **Leverage (LEV)**

Leverage measured by the total equity to total liability. Leverage allows a financial institution to increase the potential gains or losses on a position or investment beyond what would be possible through a direct investment of its own funds whenever an entity's assets exceed its equity base, its balance sheet is said to be leveraged. Ahmet and Hasan, (2011), states that highly leveraged banks hold less equity than low leveraged banks. Therefore, a positive relationship is expected between leverage and capital adequacy ratio.

$$\text{Leverage} = \text{Total Equity} / \text{Total Liability}$$

### **Revenue Power**

Revenue power ratio (RP) ratio is measure for institution efficiency, since profit is an absolute number that does not indicate the realized investments, while revenue power finds out this relationship, which in turn facilitates comparison with revenues from other time periods and institutions, in addition to identifying that institutions Performance will take, it is also a measure of the institution's operational performance efficiency (Abu Zeiter, 2006). It is measured as a ratio of total revenue to total asset, presented as below and a positive relationship is expected between RP and capital adequacy ratio.

$$\text{RP} = \text{Total Revenues} / \text{Total Assets}$$

### **Equity Ratio**

Equity ratio of total equity to total asset it measures the risk default for a bank although capitalization has been indicated to be essential in describing the performance of financial institutions,

its effect on bank profitability is equivocal. EQR is calculated according to the presented as below and a positive relationship is expected between EQR and capital adequacy ratio.

$$\text{EQR} = \text{Total Equity} / \text{Total Assets}$$

### **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 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.

## CHAPTER FOUR -DATA ANALYSIS AND DISCUSSION

### 4. INTRODUCTION

*This chapter presents the results and analysis based on data collection through secondary source to examine the determinants of capital adequacy ratio of private banks in Ethiopia by using different models and tools. The chapter is organized into three sections. Section 4.1 shows the specification of model. Section 4.2 presents the descriptive statistics results and the classical linear regression model assumptions and finally section 4.3 indicates the hypothesis testing.*

#### 4.1. Research Model Specification

As was stated in the first chapter, the main objective of the study was to examine the determinants of capital adequacy ratio of private commercial banks in Ethiopia. In order to achieve this objective the model presented below was used. 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, 2008). 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):

$$Y_{it} = \beta_0 + \beta X_{it} + \epsilon_{it}$$

Where: -  $Y_{it}$  is the dependent variable for firm 'i' in year 't',  $\beta_0$  is the constant term,  $\beta$  is the coefficient of the independent variables of the study,  $X_{it}$  is the independent variable for firm 'i' in year 't' and  $\epsilon_{it}$  the normal error term.

This model has its underpinning to the models of (Fawad and Taqadus 2013), (Bahiru 2013) and (Dawit 2014), Yonas (2015) and Aradom (2017) with some modification made to control the impact of other variables (EQR and RP) in order to explain the relationships between Capital Adequacy Ratio and independent variables.

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

$$CAR_{it} = \beta_0 + \beta_1(SIZE)_{it} + \beta_2(ROA)_{it} + \beta_3(ROE)_{it} + \beta_4(DAR)_{it} + \beta_5(LAR)_{it} + \beta_6(LTD)_{it} + \beta_7(LPR)_{it} + \beta_8(LEV)_{it} + \beta_9(RP)_{it} + \beta_{10}(EQR)_{it} + \beta_{11}(GDP)_{it} + \beta_{12}(INF)_{it} +$$

Where:

$\beta_0$  is an intercept,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}$  represent estimated coefficient for specific bank i at time t,

CAR<sub>it</sub>: The capital adequacy ratio for bank *i* at time *t*,

SIZE<sub>it</sub>: Total assets for bank *i* at time *t*, (Log Size)

ROA<sub>it</sub>: Return on assets for bank *i* at time *t*, Net income after tax/ Total Asset

ROE<sub>it</sub>: Return on equity for bank *i* at time *t*, Net income after tax /Total Equity

DAR<sub>it</sub>: The ratio of total deposit to total assets for bank *i* at time *t*,

LAR<sub>it</sub>: The ratio of total loans to total assets for bank *i* at time *t*,

LTD<sub>it</sub>: The ratio of Total loan to Total Deposit for bank *i* at time *t*,

LPR<sub>it</sub>: loan loss provision of bank *i* at time *t*, Loan loss provision/ Total Loan

LEV<sub>it</sub>: The ratio of Total Equity to Total Liability for banks *i* at time *t*,

EQR<sub>it</sub>: The ratio of Total Equity to Total Asset for banks *i* at time *t*,

RP<sub>it</sub>: - The ratio of Total Revenue to Total Asset for banks *i* at time *t*,

GDP<sub>it</sub>: Real GDP growth rate of Ethiopia at time *t*,

INF<sub>it</sub>: The overall inflation rate in Ethiopia at time *t*,

*t*: Time

$\varepsilon_{it}$ : the normal error term.

The dependent variable in the model is Capital Adequacy Ratio (CAR) while the explanatory variables are internal and external listed above.

## **4.2. Results and Tests for CLRM**

This part of the paper discusses the basic findings and presents the tests for the classical linear regression model. It is structured as follows. First, it gives the descriptive statistics of the variables used in the research. Second, it presents the results of correlation analysis and tests for the Classical Linear Regression Model assumptions respectively. Then the result of the regression analysis is presented in the last section.

### **4.2.1. Descriptive statistics**

The researcher conducted descriptive statistic using Eviews.8 software in order to give more understanding about the study variables that are being analyzed. Descriptive Statistics is the foundation stone for any type of analysis which enables the researcher to describe the relevant aspects to all the study variables that will entail detailed information about each relevant variable (Saswata Chatterjee, 2012).

The descriptive statistics of the dependent variables and the independent variables are presented in the table 4.1 below. As shown from the table the total numbers of independent variables are twelve and

the total observation for the each dependent and explanatory variable was seventy eight. Furthermore, the table also shows the mean, media, standard deviation, minimum, maximum Skewness and Kurtosis values for the dependent and independent variables.

**Table 4.1: Descriptive Statistics of the Variables**

|           | CAR   | SIZE  | ROA   | ROE   | DAR   | LAR   | LTD   | LPR   | LEVE  | RP    | EQR   | GDP   | INF   |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mean      | 21.82 | 22.56 | 2.71  | 19.16 | 75.58 | 44.64 | 59.23 | 1.36  | 17.91 | 9.30  | 15.05 | 10.14 | 15.13 |
| Median    | 19.66 | 22.74 | 2.64  | 18.74 | 76.14 | 44.85 | 58.49 | 1.29  | 16.88 | 9.30  | 14.44 | 10.12 | 11.60 |
| Maximum   | 66.61 | 24.11 | 5.25  | 35.67 | 84.43 | 57.28 | 89.12 | 8.83  | 52.66 | 13.49 | 34.49 | 13.53 | 33.70 |
| Minimum   | 11.01 | 19.94 | -0.83 | -2.41 | 57.65 | 32.07 | 40.49 | 0.00  | 9.99  | 2.70  | 9.08  | 7.96  | 7.70  |
| Std. Dev. | 8.16  | 0.91  | 0.87  | 7.03  | 5.08  | 5.39  | 7.64  | 1.65  | 6.40  | 1.42  | 4.07  | 1.77  | 9.10  |
| Skewness  | 2.49  | -0.59 | -0.42 | -0.02 | -0.94 | -0.19 | 0.60  | 2.34  | 2.76  | -0.84 | 1.95  | 0.79  | 1.24  |
| Kurtosis  | 13.13 | 2.79  | 6.43  | 3.43  | 4.34  | 2.80  | 4.94  | 10.89 | 14.56 | 8.40  | 9.70  | 2.80  | 3.13  |
| N         | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 | 78.00 |

**SOURCE:** Financial statement of sampled private banks and own computation through Eviews 8Note: CAR refers to capital adequacy ratio, BankSize, Return on Asset(ROA), Return on Equity (ROE),Deposit Asset Ratio (DAR),Loan Asset Ratio (LAR),Loan to Deposit (LTD), loan Loss Provision (LPR), Leverage (Lev), Revenue Power (RP) and Equity Asset Ratio (EQR) .

Table 4.1 includes the descriptive statistics of the under-studying data for using in regression. According to this fact that the statistical data & information were extracted from the data of 13 private banks during 2011 to 2016, so each of the variables can have 78 observations. The observed calculated descriptive statistics consist of minimum, maximum, mean, median, Standard Deviation, skewness and kurtosis.

Capital Adequacy Ratio (CAR) has a minimum value 11.01 % and the maximum value 66.61% which means the sample private banks in Ethiopia were committed by a minimum capital adequacy ratio. A mean of 21.82 % indicates the sample private commercial banks have higher than 8% regulatory requirement. This indicate, they have an opportunity to take a minimum revenue 13.82% (21.82%-8%) on existing capital to invest more to the public. In line with this, standard deviation of 8.16% indicates the most CAR observation value deviate to the mean. As shown from the above table the standard deviation of CAR is higher than other variables and it implies CAR value deviate from the mean highly. A positive skewness 2.49 shows the observation concentrated on the right side.

The variable size has a minimum value 19.94 % and maximum value 24.11%. This shows the large banks asset size 24.11 % and smallest banks asset size 19.94 %. These results show that private commercial banks in Ethiopia have a relative variation in their total asset. In line with this mean value of 22.56% indicate on average the sample private banks asset size with a negative skewness – 0.59.

The negative skewness closer to zero and this indicate the observation of the data relatively in smaller amount concentrated on the left side. The median and standard deviation values of Bank size were 22.74% and 0.91 % respectively.

The mean value of ROA was 2.71 and the median value was 2.64. The maximum and the minimum value of ROA were 5.25 and – 0.83 respectively. This result indicates the most profitable bank among sample banks earned 5.25 cents profit for a single birr investment on it assets and the least profitable bank among the sample banks earned -0.83 cents profit for single birr investment. The standard deviation statistics for ROA was (0.87) which indicates that the profitability variation from the mean between the selected banks was high. The result implies that these banks used their asset to increase the return ontheir assets.

The other profitability indicator ROE measures the efficient earning from the investment of shareholders. The result shows from the above table the minimum of ROE -2.41 % and maximum of 35.67%. This implies that private commercial banks in Ethiopia have relatively a good performance in terms of ROE It has a mean of 19.16 % with 7.03% standard deviation. The standard deviation statistics was (7.03%) which indicates that the profitability variation between the selected banks was high.

In summary from the two profitability indicator return on asset and return on equity, private commercial banks in Ethiopia earned high return from its own equity than assets.

The mean, median, standard deviation values of DAR were 75.58%, 76.14%and 5.08 respectively. The maximum and minimum values of DAR were 84.43% and 57.65% respectively. The minimum and maximum amount implies that on the minimum 57.65 % of the bank's asset generate from their deposit and maximum generation of the asset from the deposit is 84.43 %.The mean value of 75.58% indicate that on average banks generate their asset from deposit. The standard deviation of DAR (5.08%) implies the deviation from the mean value is low during the period of the study.

The maximum and minimum values for LAR were 57.28% and 32.07 % respectively. The maximum ratio indicates bank liquidity is low and in more risky a bank maybe to higher defaults. On the other hand the minimum 32.07 % vice versa .The mean value of LAR was 44.64% and median value was 44.85. The mean value result indicates private commercial banks in Ethiopia around half of bank total assets are engaged in loan and advances, which means major sources of banks earning is income from interest . This position is further supported by the low standard deviation of LAR (5.39%) from the mean.

The loan-to-deposit ratio is the ratio of a bank's total outstanding loans for a period to its total deposit balance over the same period. So an LDR figure of 100% indicates that a bank lends each birr to customers for every birr that it brings in as deposits. But this also means that the bank doesn't have significant cash on hand for contingencies. In the above table 4.1 shows the maximum and minimum values of loan to deposit ratio (LTD) were 89.12% and 40.49 %. The maximum (89.12%) indicate that from the total deposit 89.12 % lend to borrows and at minimum (40.49 %) implies least banks lend below 50% of its deposit. The mean and media value of LTD were 59.23 % and 58.49 and standard deviation 7.64 %. The mean value 59.23% indicates banks diversify above 50% of its deposit to loan and the deviation from the mean 7.64 %.

The maximum and minimum values of LPR were 8.83% and 0.00 %. On the other hand the mean 1.36%, media 1.29 % and standard deviation 1.65 %. The result indicates on average the private banks held 1.36 % of their loan as loan loss provision. The maximum 8.83% implies banks hold 8.83 % of its total loan as loan loss reserve and a minimum of 0 provisions that implies banks not recorded any loan loss reserve. The media rate 1.36% indicates that as per the regulatory classification of loan and advances it lies on minimum provision of pass category.

The leverage (total equity to total liability) shows minimum and maximum values were 9.99 % and 52.66%. This implies the maximum (higher) EQTL 52.66 % ratio banks have lower Leverage and the minimum (lower) EQTL 9.99 % ratio banks have lower Leverage. In line with this highly levered banks get more return than the lower levered banks. The mean of banks is 17.91% with the standard deviation of 6.40%.

The minimum and maximum values of Revenue Power Ratio (RP) were 2.70 % and 13.49 %. The result indicates the range in revenue generation slightly high which means on the maximum banks generate 13.49 % revenue and at the minimum 2.70%. The mean and media values 9.30 % with standard deviation 1.42% and the deviation from the mean is lower.

Equity ratio (EQR) the minimum and maximum values were 34.49 % and 9.08 %. The mean, media and standard deviation values were 15.05%, 14.44 % and 4.07. The result indicates a higher equity to total asset ratio with a positive skewness value of 1.95% which means most banks have higher than average EQR.

The average real growth rate (GDP) for the last six years 10.14% and the maximum and minimum values were 13.53 % and 7.96 %. On the other hand inflation rate values a mean 15.13 %, maximum and minimum values 33.70 % and 7.70% with 9.10 % standard deviation.

As it can be seen from the Table 4.1, all the variables are unbalanced or in one size. In line with skewness is positive for CAR, LTD, LPR, LEV, EQR, GDP and INF, While, SIZE, ROA, ROE, DAR, LAR and RP have a negative skewness relatively ROE have lower skewness its near to zero. Kurtosis value of all variables also indicates that three variables (SIZE, LAR and GDP) are nearly normally distributed, while the others are not normally distributed as their kurtosis values are deviated from 3. The measure of Jarque-Bera statistics and corresponding p-values are used to test for the normality assumption. Based on the Jarque-Bera statistics and p-values this assumption is rejected at 5% level of significance for variables. The dependent and independent variables are examined for multicollinearity based on a simple correlation matrix. As depicted in Table 4.2, all of them are have no co linearity problem. Having concluded that none of the bank specific variables are highly correlated and no multicollinearity amongst these variables exist; the effect of explanatory variables on the capital adequacy ratios is examined by the Panel Data estimation. The regression results of panel data are reported in Table 4.3.

#### **4.2.2. Correlation Analysis**

One of the measures used to identify the degree of linear association between variables is correlation. Values of the correlation coefficient are always ranged between +1 and -1. A correlation coefficient of +1 indicates that the existence of a perfect positive association between the two variables; while a correlation coefficient of -1 indicates perfect negative association. A correlation coefficient of zero, on the other hand, indicates the absence of relationship (association) between two variables (Brooks 2008). In this study, the researcher employed the Pearson product moment of correlation coefficient in order to find the association of the independent variables with the capital adequacy ratio of the selected private commercial banks. The sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. As a sample size approaches to 100, the correlation coefficient of about or above 0.20 is significant at 5% level of significance (Meyers et al. 2006). The sample size of the study was 6\*13 matrixes of 78 observations which were more than 50 and around 100 hence the study used the above justification for significance of the correlation coefficient.



**Table 4.2: Correlation (Pearson) matrix**

|      | CAR   | SIZE  | ROA   | ROE  | DAR   | LAR  | LTD  | LPR   | LEVE  | RP   | EQR  | GDP  | INF |
|------|-------|-------|-------|------|-------|------|------|-------|-------|------|------|------|-----|
| CAR  | 1     |       |       |      |       |      |      |       |       |      |      |      |     |
| SIZE | -0.68 | 1     |       |      |       |      |      |       |       |      |      |      |     |
| ROA  | -0.29 | 0.21  | 1     |      |       |      |      |       |       |      |      |      |     |
| ROE  | -0.53 | 0.43  | 0.61  | 1    |       |      |      |       |       |      |      |      |     |
| DAR  | -0.63 | 0.53  | 0.10  | 0.40 | 1     |      |      |       |       |      |      |      |     |
| LAR  | -0.51 | 0.49  | 0.00  | 0.02 | 0.22  | 1    |      |       |       |      |      |      |     |
| LTD  | -0.16 | 0.18  | -0.06 | 0.19 | -0.35 | 0.64 | 1    |       |       |      |      |      |     |
| LPR  | 0.10  | 0.02  | 0.38  | 0.34 | 0.10  | 0.33 | 0.36 | 1     |       |      |      |      |     |
| LEVE | 0.82  | -0.63 | -0.28 | 0.62 | -0.71 | 0.22 | 0.21 | -0.10 | 1     |      |      |      |     |
| RP   | -0.46 | 0.30  | 0.66  | 0.51 | 0.24  | 0.39 | 0.24 | 0.18  | -0.37 | 1    |      |      |     |
| EQR  | 0.61  | -0.62 | -0.23 | 0.62 | -0.71 | 0.21 | 0.22 | -0.08 | 0.69  | 0.32 | 1    |      |     |
| GDP  | 0.27  | -0.33 | 0.06  | 0.07 | -0.11 | 0.45 | 0.35 | 0.24  | 0.21  | 0.24 | 0.18 | 1    |     |
| INF  | 0.19  | -0.34 | 0.13  | 0.11 | -0.23 | 0.37 | 0.22 | 0.26  | 0.12  | 0.21 | 0.12 | 0.08 | 1   |

**SOURCE:** *Financial statement of sampled private banks and own computation through Eviews8*

As it can be seen from the result of the correlation matrix in Table-4.2, the correlation between the dependent variable CAR and SIZE, ROA, ROE, DAR, LAR, LTD, and RP was negatively. This indicates the dependent variable CAR and independent variables SIZE, ROA, ROE, DAR, LAR, LTD, and RP moved in opposite direction. On the other hand CAR had positive correlations with LPR, LEVE, EQR, GDP, and INF and moved in the same direction. In line with this, capital adequacy ratio highly and positively correlated with leverage (0.82) and EQR (0.61) and statically significant correlation at 5%.

The correlation matrix also shows that SIZE is negatively correlated with LEVE, EQR, GDP and INF. This indicates that SIZE with LEVE, EQR, GDP and INF move in opposite directions. ROA had positive correlation with ROE, LAR, LPR, RP, GDP, and INF. indicating that, when ROE, LAR, LPR, RP, GDP, and INF increase, ROE will also move in the same direction.

DAR, LAR, LPR and NPL had statistically significant at 5% significant level and negative linear relationship with CAR with coefficient correlation of -0.26, - 0.35, - 0.35 and- 0.39 respectively. On the other hand, ROE and RAR had negative linear relationship with CAR but statistically

insignificant/not different from zero with coefficient correlation of - 0.13 and -0.14 respectively. ROA and INF had statistically significant at 5% significant level and positive linear relationship with CAR with coefficient correlation of 0.38, 0.35 and 0.25 respectively. On the other hand, GDP, SIZE and LQR had positive linear relationship with CAR but statistically insignificant/not different from zero with coefficient correlation of 0.02, 0.14 and 0.07 respectively.

#### **4.2.3. Tests for the Multiple Linear Regression Model Assumptions**

In order to make the data ready for analysis and to get reliable results from the research, the model stated previously was tested for five multiple linear regression model assumptions. Among them the major ones are: test for heteroscedasticity, autocorrelation, multicollinearity, normality and constant variable. Accordingly, the following sub-section presents the tests made.

***Assumption one: the errors have zero mean ( $E(\varepsilon) = 0$ ) or constant variable***

***The first assumption*** states that the average value of the errors should be zero. According to (Brooks 2008) if the regression equation contains a constant term, this presumption will never be breached. Therefore, since from the regression result table the constant term (i.e.  $\beta_0$ ) was included in the regression equation; this assumption holds good for the model.

***Assumption two: homoscedasticity (variance of the errors is constant ( $Var(\mu_t) = \sigma^2 < \infty$ ))***

Heteroscedasticity is a systematic pattern in the errors where the variances of the errors are not constant. When the variance of the residuals is constant it is referred as homoscedasticity, which is desirable. To test for the absence of heteroscedasticity white test was used in this study. In this test, if the p-value is very small, less than 0.05, it is an indicator for the presence of heteroscedasticity (Gujarati 2004).

But from Table 4.3 presents three different types of tests for heteroscedasticity. The most common type of to test heteroscedasticity is Obs\*R-squared. The p-value of Obs\*R-squared, 0.0518 wereconsiderably in excess of 0.05 it's a clear indicator that there is no evidence for the presence of heteroscedasticity. Hence, the model passes the second test.

**Table 4.3: Heteroscedasticity Test: White test**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

|                     |          |                      |        |
|---------------------|----------|----------------------|--------|
| F-statistic         | 2.327537 | Prob. F(14,63)       | 0.0417 |
| Obs*R-squared       | 26.59054 | Prob. Chi-Square(14) | 0.0518 |
| Scaled explained SS | 26.12806 | Prob. Chi-Square(14) | 0.0549 |

**SOURCE:** *Financial statement of sampled private banks and own computation through Eviews8*

**Assumption three: covariance between the error terms over time is zero ( $cov(u_i, u_j) = 0$ )** This assumption states that covariance between the error terms over time or cross-sectional, for that type of data is zero. That is, the errors should be uncorrelated with one another. If the errors are not uncorrelated with one another it is an indicator for the presence of Auto correlation or serial correlation (Brooks 2008).

According to Brooks (2008), presence/absence of autocorrelation is by using the Breusch–Godfrey test (shown in table 4.4). The result of the statistic labeled “obs\*R-squared”, which is the LM test statistic for the null hypothesis of no serial correlation shows a p-value of 0.1117 (which is far greater than 0.05) which strongly indicates the absence of autocorrelation.

**Table 4.4. Breusch-Godfrey Serial Correlation LM Test**

Breusch-Godfrey Serial Correlation LM Test:

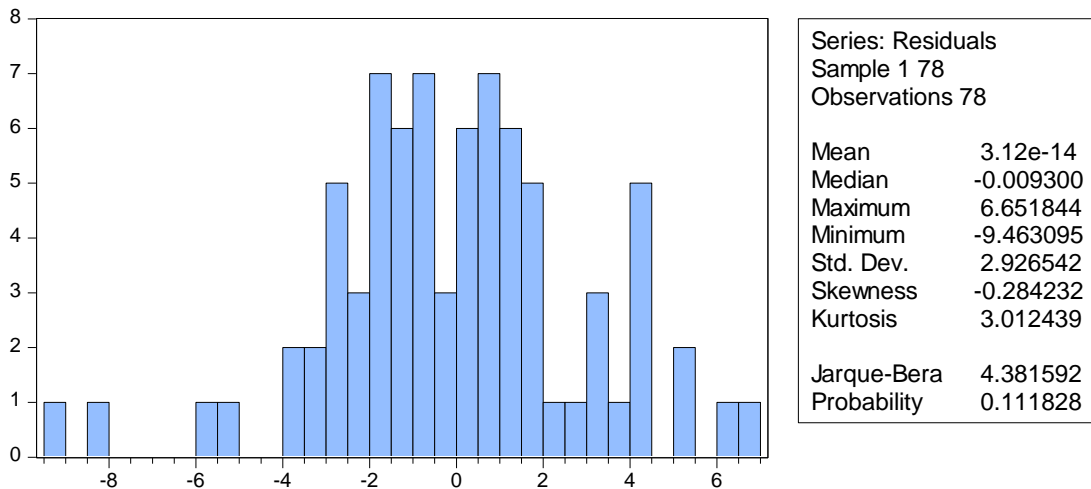
|               |          |                     |        |
|---------------|----------|---------------------|--------|
| F-statistic   | 1.846347 | Prob. F(2,62)       | 0.1664 |
| Obs*R-squared | 4.384508 | Prob. Chi-Square(2) | 0.1117 |

**Assumption four: Normality (errors are normally distributed  $\mu_t \sim N(0, \sigma^2)$ )**

A normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skewness and kurtosis are zero and three respectively. Normality assumption of the regression model can be tested with the Jarque- Bera measure. If the probability of JarqueBera value is greater than 0.05, it’s an indicator for the presence of normality (Brooks 2008).

The normality tests for this study as shown in Figure 4.1 the kurtosis is close to 3, skewness close to 0 and the Jarque-Bera statistic has a p-value of 0.1118 which is well over 0.05 implying that the data were consistent with a normal distribution assumption.

**Figure 4.1 Normality Test result**



***Assumption five: Multicollinearity Test***

According to (Churchill and Iacobucci 2005), multicollinearity is concerned with the relationship which exists between explanatory variables. When there exists the problem of multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases and as a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. How much correlation causes multicollinearity, however, is not still clearly defined? Many authors have suggested different level of correlation to judge the presence of multicollinearity. While (Hair, et al. 2006) argued that correlation coefficient below 0.9 may not cause serious multicollinearity problem.

Therefore, in this study correlation matrix for 12 of the independent variables is shown below in Table 4.5. The result of the estimated correlation matrix shows that the highest correlation of 0.71 which is between EQR and DAR. Since there is no correlation above 0.75 and 0.9 according to (Malhotra 2007) and (Hair, et al. 2006) respectively, it can be concluded that there is no problem of multicollinearity.

**Table 4.5: Correlation matrix between explanatory variables**

|      | SIZE  | ROA   | ROE  | DAR   | LAR  | LTD  | LPR   | LEVE  | RP   | EQR  | GDP  | INF |
|------|-------|-------|------|-------|------|------|-------|-------|------|------|------|-----|
| SIZE | 1     |       |      |       |      |      |       |       |      |      |      |     |
| ROA  | 0.21  | 1     |      |       |      |      |       |       |      |      |      |     |
| ROE  | 0.43  | 0.61  | 1    |       |      |      |       |       |      |      |      |     |
| DAR  | 0.53  | 0.10  | 0.40 | 1     |      |      |       |       |      |      |      |     |
| LAR  | 0.49  | 0.00  | 0.02 | 0.22  | 1    |      |       |       |      |      |      |     |
| LTD  | 0.18  | -0.06 | 0.19 | -0.35 | 0.64 | 1    |       |       |      |      |      |     |
| LPR  | 0.02  | 0.38  | 0.34 | 0.10  | 0.33 | 0.36 | 1     |       |      |      |      |     |
| LEVE | -0.63 | -0.28 | 0.62 | -0.71 | 0.22 | 0.21 | -0.10 | 1     |      |      |      |     |
| RP   | 0.30  | 0.66  | 0.51 | 0.24  | 0.39 | 0.24 | 0.18  | -0.37 | 1    |      |      |     |
| EQR  | -0.62 | -0.23 | 0.62 | -0.71 | 0.21 | 0.22 | -0.08 | 0.69  | 0.32 | 1    |      |     |
| GDP  | -0.33 | 0.06  | 0.07 | -0.11 | 0.45 | 0.35 | 0.24  | 0.21  | 0.24 | 0.18 | 1    |     |
| INF  | -0.34 | 0.13  | 0.11 | -0.23 | 0.37 | 0.22 | 0.26  | 0.12  | 0.21 | 0.12 | 0.08 | 1   |

**SOURCE:** *Financial statement of sampled private banks and own computation through Eviews8*

#### 4.2.4. Regression results

There are broadly two classes of panel estimator approaches that can be employed in a panel data financial research: fixed effects models (FEM) and random effects models (REM) (Brooks 2008). Even if these two approaches end up with nearly the same result, there are situations that they will deviate widely. To check which of the two (FEM or REM) models provide consistent estimates (is preferred) for this study; Hausman test was employed and the result is presented as follows.

**Table 4.6: Correlated Random Effects - Hausman Test**

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

| Test Summary         | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob.  |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 0.000000          | 12           | 1.0000 |

\* Cross-section test variance is invalid. Hausman statistic set to zero.

**SOURCE:** *Financial statement of sampled private banks and own computation through Eviews8*

The null hypothesis of the Hausman test was that the random effect method is the preferred regression method. Table 4.6 showed the p-value for the test is 1.00 (which is well over 0.05), which indicates that the null hypothesis was not rejected. Hence, the random effect method was preferable. Thus, the relationship between Capital Adequacy Ratio and the explanatory variables was examined by the random effects model in this study.

Accordingly, the result obtained by the random effect model is reported in Table 4.7 below which shows regression results between the dependent variable (capital adequacy ratio) and explanatory variables. The R-squared value measures how well the regression model explains the actual variations in the dependent variable (Brooks 2008). Thus, the R-squared value in Table 4.7 below indicates that 87.15 variations in Capital adequacy ratio of the selected private commercial banks were explained by the twelve independent variables (SIZE, ROA, ROE, DAR, LAR, LTD, LPR, LEV, RP, EQR, GDP and INF). The rest 12.85 percent variation in Capital Adequacy Ratio was explained by residuals or other variables other than the twelve variables. The regression F-statistic (30.52) and the p-value of zero attached to the test statistic reveal that the null hypothesis that all of the coefficients are jointly zero should be rejected. Thus, it implies that the independent variables in the model were able to explain variations in the dependent variable.

**Table 4.7 Regression result- Random Effect Model**

Dependent Variable: CAR  
 Method: Panel Least Squares  
 Date: 11/23/17 Time: 04:43  
 Sample: 2011 2016  
 Periods included: 6  
 Cross-sections included: 13  
 Total panel (balanced) observations: 78

| Variable           | Coefficient | Std. Error         | t-Statistic | Prob.    |
|--------------------|-------------|--------------------|-------------|----------|
| C                  | 100.4727    | 46.24334           | 2.172695    | 0.0336   |
| SIZE               | -1.654652   | 0.694912           | -2.381095   | 0.0203   |
| ROA                | -4.501462   | 1.694301           | -2.656826   | 0.0100   |
| ROE                | 0.568463    | 0.220586           | 2.577056    | 0.0123   |
| DAR                | -0.537418   | 0.579039           | -0.928121   | 0.3569   |
| LAR                | 0.399305    | 0.927353           | 0.430585    | 0.6682   |
| LTD                | -0.586040   | 0.667911           | -0.877423   | 0.3836   |
| LPR                | 0.972291    | 0.281167           | 3.458058    | 0.0010   |
| LEVE               | -0.729989   | 0.687856           | -1.061253   | 0.2926   |
| RP                 | -0.420883   | 0.482798           | -0.871759   | 0.3867   |
| EQR                | 2.773716    | 1.177845           | 2.354906    | 0.0217   |
| GDP                | -0.630055   | 0.313576           | -2.009258   | 0.0488   |
| INF                | -0.161963   | 0.058414           | -2.772691   | 0.0073   |
| VAR1               | 10.04416    | 3.443239           | 2.917066    | 0.0049   |
| VAR2               | 10.32520    | 3.454062           | 2.989293    | 0.0040   |
| R-squared          | 0.871517    | Mean dependent var |             | 21.82372 |
| Adjusted R-squared | 0.842965    | S.D. dependent var |             | 8.164545 |
| F-statistic        | 30.52411    | Durbin-Watson stat |             | 1.513483 |
| sProb(F-statistic) | 0.000000    |                    |             |          |

\*\*, \* indicates significant at 5%, and 10% significance level respectively

**SOURCE:** Financial statement of sampled private banks and own computation through Eviews8

The regression model arising from the above data is of the form;

$$\text{CAR} = 100.47 - 1.65 \text{ SIZE} - 4.50 \text{ ROA} + 0.57 \text{ ROE} - 0.54 \text{ DAR} + 0.399 \text{ LAR} - 0.59 \text{ LTD} + 0.97 \text{ LPR} - 0.73 \text{ LEV} - 0.42 \text{ RP} + 2.77 \text{ EQR} - 0.63 \text{ GDP} - 0.16 \text{ INF} + \varepsilon$$

The model above can be interpreted explanatory variables; the coefficient of internal variables, SIZE ROA, DAR, LTD, LEV and RP had negative impact on CAR having a coefficient of -1.65 , - 4.50 , - 0.537 , -0.586 , - 0.729 and - 0.42 respectively. The result shows that one unit change (increase/decrease) SIZE ROA, DAR, LTD, LEV and RP can result an opposite change on CAR by the amount of coefficient of each variable. In the same way, external variables GDP and Inflation had negative impact on the level of CAR having a coefficient of -0.63 and -0.16 which indicates a one unit

change (increase/decrease) in GDP and INF can result a change on CAR by 0.63 and 0.16 units respectively in opposite direction.

On the other hand, internal variables ROE, LPR, LAR and EQR had positive impact on Capital adequacy ratio having a coefficient of 0.568, 0.9722, 0.399 and 2.77. This means one unit change (increase/ decrease) in ROE, LPR, LAR and EQR can result 0.568, 0.9722, 0.399 and 2.77 in the same direction.

The random effect results in Table 4.7 revealed existence of a direct and significant relationship between ROE, EQR and LPR with Capital Adequacy Ratio. As shown from the result ROE had statistically significant (p-value=0.0123) at 1 percent level of significance and had positive relation with CAR. On the same way EQR had statistically significant (p-value=0.021) at 5 percent level of significance and had positive relation with CAR. Similarly, LPR had statically highly significant (p-value = 0.0010) at 1 percent level of significance and positive (direct) relation with CAR. On the other hand independent variables SIZE, ROA, GDP and INF result indicate inverse (negative) and significant relationship with CAR. As shown from the result SIZE had statistically significant (p-value=0.02) at 5 percent level of significance and had negative relation with CAR. Likewise, ROA had statistically significant (p-value=0.01) at 1 percent level of significance and had negative relation with CAR. Similarly, GDP had statically significant (p-value = 0.0488) at 5 percent level of significance and INF had statically highly significant (p-value = 0.0073) at 1 percent level of significance and both had negative relationship with CAR.

Finally, independent variable LAR had positive and statistically insignificant relationship with CAR (p-value = 0.66). In line with this, DAR, LTD, LEV and RP had negative and statically insignificant relationship with CAR and (P-value = 0.356, 0.38, 0.29 and 0.38) respectively.

### **4.3. Testing of Hypothesis**

The following section provides a detailed but brief analysis of the results for each explanatory variables and their importance in determining capital adequacy ratio through testing hypothesis. In addition, the discussions analyses the statistical findings of the study in relation to the previous empirical evidences. In line the researcher uses two profitability and two intermediation variables, because of the inconsistent result in previous studies.



### 4.3.1 Bank Size

#### **Hypothesis 1: Bank SIZE has negative and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7 is consistent with the hypothesis developed by the researcher. The result indicated the size of banks have negative and significant impact on capital adequacy ratio of selected private banks and also significant (p-value = 0.02). The coefficient value (-1.65), the negative coefficient of size indicates that as there is indirect relationship between the size of bank and their Capital adequacy ratio. The indirect relationship implies that, when the asset size of the bank increases, the capital adequacy ratio of the banks is decrease. This leads to as decrease in risks associated with each and every activity of the banks. In line with this 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. The finding was found to be consistent other countries with the findings of Al-Sabbagh (2004), Dreca (2013), Bateniet *al.*, (2014) Bouheni and Rachdi (2015), Alajmi and Alquasem (2015) and locally with Aradom (2017).

### 4.3.2 Return on Asset (ROA)

#### **Hypothesis 2: ROA has positive and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, the result indicated the ROA of banks have negative and significant impact on capital adequacy ratio of selected private banks and also significant (p-value = 0.01). 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. On the other the negative sign implies that more profitable banks tend to have lower capital. The coefficient value (-4.50) in this case indicates that as there is inverse relationship between ROA and CAR. So the indirect relationship implies that, the coefficient of ROA a unit increases in profitability decreases the banks' capital by (-0.4.50) and vice versa. Even if the results deviate from the researcher hypothesis due to the significance of p value accept ROA. The finding was found to be consistent other countries with the findings of Almazari (2004), Dreca (2013) and Alajmi and Alqasem (2015).

### 4.3.3 Return on Equity (ROE)

#### **Hypothesis 3: ROE has positive and significant impact on capital adequacy ratio**

One of the most important indicators of profitability is Return on equity ratio (ROE) which expresses the return realized by owners in return of investing their funds in the bank. It helps owners decide to

continue their investment in the bank or transferring their investments to other activities that yield suitable return. The result of the random effect model in table 4.7, indicated the ROE of banks have positive and significant impact on capital adequacy ratio of selected private banks and also significant (p-value = 0.0123). The coefficient value (0.568) in this case indicates that one unit change in ROE directly (increase / decrease) the capital adequacy ratio of banks by 0.568 due to the positive and significant relationship. The finding was found to be consistent with other countries findings of Buyukşalvarc and Abdioğlu (2011), Dreca, (2013) Bateniet al., (2014) and in our country Aradom (2017)

#### **4.3.4 Deposit to Asset Ratio (DAR)**

##### **Hypothesis 4: DAR has negative and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, indicated the DAR of banks have negative and insignificant impact on capital adequacy ratio of selected private banks and also significant (p-value = 0.3569). The coefficient value (-0.537). Even if the result of the study insignificant, the coefficient value -0.537 indicates that for one unit change in DAR, resulted 0.537 unit changes on the level of CAR in opposite direction. The finding was found to be consistent other with countries findings of Buyukşalvarc and Abdioğlu (2011), Dreca, (2013) Bateniet al., (2014) and in our country Aradom(2017).

#### **4.3.5 Loan to Asset Ratio (LAR)**

##### **Hypothesis 5: LAR has negative and significant impact on capital adequacy ratio**

Loans to Total Assets are not significantly correlated with the capital adequacy ratio. The loan to total assets is a proxy to 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 maybe to higher defaults if the banks is well operated and has a considerable market share in the credit market compared to other banks and even if loan to asset ratio related to banks liquidity and risk due to positive and insignificant (p value =0.66) LAR has no impact on capital adequacy ratio of selected private banks. In line with this, the result of the random effect model in table 4.7 indicated the LAR of banks coefficient value (0.399). The finding was found to be consistent with other countries findings of El-Ansary and Hafez (2015) and (Alajami&Alqasem, 2015).

#### **4.3.6 Loan to Deposit Ratio (LTD)**

##### **Hypothesis 6: LTD has positive and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, indicated the LTD of banks have negative and insignificant impact on capital adequacy ratio of selected private banks and also insignificant (p-value

= 0.3836) and coefficient value (-0.586). Even if the variable is insignificant the increase in LTD ratio indicates which in turn should be reflected in the decrease of the capital adequacy ratio. Similarly, one unit change in LAR resulted 0.537 unit changes on the level of CAR in opposite direction. The finding was found to be consistent with other countries with the findings of (Alajami&Alqasem, 2015) and Aradom (2017).

#### **4.3.7 Loan Loss Provision (LPR)**

##### **Hypothesis 7: LPR has negative and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, the result indicated the LPR of banks have positive and highly significant impact on capital adequacy ratio of selected private banks and significant (p-value =0.001). The coefficient value (0.9722) in this case the result indicates that as there is direct relationship between LPR and CAR. The result of LAR is significantly correlated positively with the capital adequacy ratio shows that banks increasing provision to meet the unexpected percentage in nonperforming loans they have to consider provisions when calculating the capital adequacy ratio since the main target is of capital requirement is a cushion against unexpected loss. Even if the results the coefficient deviate from the researcher hypothesis due to the high significance of p value accept LAR. The finding was found to be consistent with other countries findings of Ahmet and Hasan (2011), Dreca (2013) and Ansari &Masood (2016).

#### **4.3.8 Leverage (LEV)**

##### **Hypothesis 8: Leverage has positive and significant impact on capital adequacy ratio**

The financial leverage of the bank is calculated by dividing its total equity to total asset. In general, the relationship between LEV and the capital adequacy ratio is expected to be positive because if we increase equity, we have to expect a higher capital adequacy ratio. But for the selected private banks in the period 2011-2065, LEV did not impact on CAR. The result of the random effect model in table 4.7, the result indicated the Leverage of banks have negative and insignificant impact on capital adequacy ratio of selected private banks and insignificant (p-value = 0.292). The coefficient values (-0.7299). The finding was found to be consistent with other countries findings of Thoa&Anh (2017) and the finding of, Yonas (2015).

#### **4.3.9 Revenue Power Ratio (RP)**

##### **Hypothesis 10: RP has positive and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, shows an inverse and statistically insignificant relationship between revenue power and banks' capital adequacy at (P value=0.386).The correlation coefficient was (-0.42) the result might be attributed to the low operational performance of the assets

involved in bank usual operations which might cause the decrease of the revenue power to have a negative effect on capital adequacy. The finding was consistent with findings of previous studies such Al-Tamimi and Obeidat (2013) and Mugwang'a (2014).

#### **4.3.10 Equity Ratio (EQR)**

##### **Hypothesis 9: EQR has positive and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, shows an direct (positive) and statistically significant relationship between Equity to asset ratio and banks' capital adequacy at (pvalue=0.021) 5 percent significant level .The correlation coefficient was (2.77), the positive and significant result implies that the more reliance on capital instead of financing on the basis of deposits provides a sound financial base for the banks. The finding was consistent with findings of previous studies such Al-Sabbagh (2004) and Ansari & Masood (2016).

#### **4.3.11 Gross Domestic Product (GDP)**

##### **Hypothesis 11: GDP has negative and significant impact on capital adequacy ratio**

The relationship between GDP and the capital adequacy ratio is expected to be negative (inverse relationship). The negative sign implies that at the time of strong economic growth, bank risk is lower, which leads banks to reduce their regulatory capital. On the other hand, when the economic growth low bank's financial risk also increases due to these banks encourage to maintain a high capital ratio to minimize the risk. The result of the random effect model in table 4.7, also support this and as shown an inverse (negative) and statistically significant relationship between GDP and banks' capital adequacy at (P value=0.0488) at 5 % significance .The correlation coefficient was (-0.63), indicates that the result attributed to the one unit change in GDP change CAR by 0.63 inversely (opposite). The finding was consistent with findings of previous studies such (Bokhari& Syed, 2013), Asarkaya&özcan, 2007), and Dawit(2014).

#### **4.3.12 Inflation (INF)**

##### **Hypothesis 12: INF has negative and significant impact on capital adequacy ratio**

The result of the random effect model in table 4.7, shows an inverse and statistically highly significant relationship between Inflation and banks' capital adequacy at (Pvalue=0.0073).The correlation coefficient was (-0.16) the negative coefficient of inflation indicates that there is inverse relationship between INF and Capital adequacy ratio. The inverse relationship implies that, at the time of high inflation, the bank capital is eroded. The finding was consistent with findings of previous studies such Yahaya et al., (2016), Williams (2011).

This chapter discussed the results of the documentary analysis and then presented the discussions of these results using the appropriate method. Accordingly, the chapter discussed the descriptive analysis, correlations between the variables and through the regressions analyses; it illustrates how the independent variables influence the dependent variable. Thus, a discussion of the result indicates that Size, Return on Asset, GDP and Inflation had negative and significant impact on Capital Adequacy Ratio of Banks, Return on Equity, Loan Loss Provision and Equity Asset Ratio had positive and significant impact. Except Return on Asset and Loan Loss provision shows the expected sign. However, discussions of the result indicate that Deposit Asset Ratio, Loan to Deposit, Leverage, Revenue Power and Loan Asset Ratio were not an important explanatory variable for Capital adequacy ratio of private commercial Banks in Ethiopia. The next chapter presents conclusions and recommendations of the study.

The table below presents the expected result, significant level and actual result.

**Table 4.8 Comparison of the Test Result with the Expectation**

| <b>Independent Variables</b> | <b>Expected Relationships with Capital Adequacy Ratio</b> | <b>Actual Result</b> | <b>Statistical Significance Test</b> | <b>Accept or Reject</b> |
|------------------------------|---|----------------------|--------------------------------------|-------------------------|
| <b>SIZE</b>                  | <b>Negative (-)</b>                                       | <b>Negative (-)</b>  | <b>Significant</b>                   | <b>Accept</b>           |
| <b>Return on Asset</b>       | <b>Positive (+)</b>                                       | <b>Negative (-)</b>  | <b>Significant</b>                   | <b>Accept</b>           |
| <b>Return on Equity</b>      | <b>Positive (+)</b>                                       | <b>Positive (+)</b>  | <b>Significant</b>                   | <b>Accept</b>           |
| Deposit Asset Ratio          | Negative (-)  | Negative (-)         | Insignificant                        | Reject                  |
| Loan Asset Ratio             | Negative (-)  | Positive (+)         | Insignificant                        | Reject                  |
| Loan to Deposit              | Positive (+)  | Negative (-)         | Insignificant                        | Reject                  |
| <b>Loan loss provision</b>   | <b>Negative (-)</b>                                       | <b>Positive (+)</b>  | <b>Significant</b>                   | <b>Accept</b>           |
| Leverage                     | Positive (+)  | Negative (-)         | Insignificant                        | Reject                  |
| Revenue Power                | Positive (+)  | Negative (-)         | Insignificant                        | Reject                  |
| <b>Equity Ratio</b>          | <b>Positive (+)</b>                                       | <b>Positive (+)</b>  | <b>Significant</b>                   | <b>Accept</b>           |
| <b>GDP</b>                   | <b>Negative (-)</b>                                       | <b>Negative (-)</b>  | <b>Significant</b>                   | <b>Accept</b>           |
| <b>Inflation</b>             | <b>Negative (-)</b>                                       | <b>Negative (-)</b>  | <b>Significant</b>                   | <b>Accept</b>           |

# CHAPTER FIVE - CONCLUSIONS AND RECOMMENDATION

## 5. INTRODUCTION

*The previous chapter presented the analysis of the findings, while this chapter deals with the conclusions and recommendations provided based on the findings of the study. The following sections discussed about the final conclusion remarks of the study and applicable recommendations. Accordingly this chapter is organized into two sections. The first section, section 5.1 presents the summary of major findings and conclusions and the section 5.2 presents the recommendations.*

### 5.1 Summary and conclusion of major findings

The main objective of this paper is to investigate empirically the determinants of CAR in thirteen private commercial banks in Ethiopia. This study used secondary data for the period of 6 years. A panel data was collected from the sample of thirteen private commercial banks in Ethiopia from 2011 to 2016 due to availability of the data. The collected Data was analysis by using descriptive statistics, balanced correlation and regression analysis. The study also used an appropriate econometric methodology for the estimation of variables coefficient under random effect regression models. Before performing OLS regression the models were tested for the classical linear regression model assumptions. Random effect model was used based on convenience. Based on previous researches ten internal variables and two macro-economic variables were chosen and analyzed.

Panel data regression is used in this study and analyzes relationships between independent variables: (Size ROA, ROE, Deposit to Asset, Loan to Asset, Loan to Deposit, Loan Loss Provision, Leverage, Revenue power, Equity to Assets , GDP and Inflation) and a dependent variable which is CAR. From the listed variables, Variables Deposit to Asset, Loan to Deposit, Loan to Asset, Leverage and Revenue Power ratio does not have any impact on capital adequacy ratio. However, SIZE has a significant and negative relationship with capital adequacy ratio. This result represents that large banks have lower regulations than small size banks. Also, ROA shows a significant and negative relationship with capital adequacy ratio. Moreover the result under random effect model indicates that CAR is to be adversely affected by bank's SIZE, which means that large banks have low supervisory control on their capital adequacy ratio (CAR). In line with this, ROA has a significant and negative relationship with capital adequacy ratio, which suggests that the higher the profits of private banks the lower the need for more capital to absorb losses.

## 5.2 Recommendations

- Size of bank had negative effect on CAR of private commercial bank that means large asset size banks capital adequacy ratio is lower. In line with this large private banks have low supervisory control on their capital adequacy ratio (CAR) related to small banks, however large banks attain a high risk assets portfolio. Based on the result the study recommends that for private banks whether their asset size large or small focused on associated their asset with the appropriate risk weight. Because small asset size banks also may increase their asset level. On the other hand the study recommended regulatory body i.e. National Bank of Ethiopia due to its shortcoming the accord revised to time however NBE used the old accord, so the existing minimum requirement based (Basel I) accord revised by the recent one it helps to influence private commercial banks in order to disclose all component of CAR in detail in their annual financial statement.
- ROA had negative and significant effect on CAR of private commercial banks. The result that commercial banks in Ethiopia in order to meet the regulatory requirement level of capital uses asset as sources. Even if ROA one of the profitability indicators based on the result the study recommended to the banks to find other cheaper source of finance other than asset.
- ROE had positive and significant effect on CAR of Private Commercial Banks in Ethiopia. The result that return originated from equity of the bank will enhance the capital adequacy of the bank. So the study recommends that banks should increase their ROE to increase their CAR rather than increase their ROA.
- To ensure the stability of the banking sector supervisory authority used the two most vital macro prudential policies i.e. Loss loan provision (LPR). As shown from the result of the study LPR had positive and high significant effect on CAR; Based on the result and the variable is very significant the study recommend that private commercial banks decrease their expected losses through more focused on the quality of their loan, strictly undertake a follow up and monitoring activity by making sure that loans disbursed are collected based on the Pre-scheduled loan repayment program and contractual agreement and in turn reduce the erosion of capital. In addition to the above 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 affected and the extension of credit to the deserving borrowers is also restricted due on concentration of bad loans in a particular segment.

- Equity ratio had positive and significant impact on CAR. Based on the result the study recommends for the sound financial bases of Private Commercial Banks management focused on the consistent of their capital instead of financing on the bases of deposit.
- The result that GDP had negative but significant effect on CAR .This means that capital adequacy ratio decreases as the economy of the country increases. Based on the result the study recommended that the management of private commercial Banks in Ethiopia should increase their CAR during the decline stage of the country's economy in order to maintain the soundness of their bank.
- In the same way the other macroeconomic variable inflation had negative but significant effect on CAR. Based on the result the study recommends that capital adequacy ratio decreases as the purchasing power of the money increases so management of private Commercial Banks in Ethiopia should increase their CAR during the purchasing power of money decrease for soundness of the Bank sector.
- Finally the researcher recommends that continued use of capital adequacy ratios in determining bank soundness and stability is recommended. Risk-weighted ratio provides a better determination of the optimum level of a bank's capital, which banks can use to manage the effect of internal factors and withstand macro-environmental shocks that obstruct performance. Therefore, given the important roles played by capital, it is imperative that measures of capital adequacy be continuously used in assessing financial condition of banks.
- The study further recommends due to the significance of capital adequacy ratio for the banking sector need more investigation on the other determinants of CAR.



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# Appendix

## Appendix A

Heteroskedasticity Test: Breusch-Pagan-Godfrey

|                     |          |                      |        |
|---------------------|----------|----------------------|--------|
| F-statistic         | 2.327537 | Prob. F(14,63)       | 0.0417 |
| Obs*R-squared       | 26.59054 | Prob. Chi-Square(14) | 0.0518 |
| Scaled explained SS | 26.12806 | Prob. Chi-Square(14) | 0.0549 |

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/23/17 Time: 04:33

Sample: 1 78

Included observations: 78

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | -137.7917   | 189.4678   | -0.727257   | 0.4698 |
| SIZE     | -1.506454   | 2.847188   | -0.529103   | 0.5986 |
| ROA      | 4.169931    | 6.941872   | 0.600692    | 0.5502 |
| ROE      | -0.666542   | 0.903784   | -0.737501   | 0.4636 |
| DAR      | 2.319614    | 2.372431   | 0.977737    | 0.3319 |
| LAR      | -4.368952   | 3.799540   | -1.149863   | 0.2545 |
| LTD      | 2.838825    | 2.736557   | 1.037371    | 0.3035 |
| LPR      | -0.080990   | 1.151994   | -0.070304   | 0.9442 |
| LEVE     | 4.491540    | 2.818276   | 1.593719    | 0.1160 |
| RP       | 3.357016    | 1.978115   | 1.697078    | 0.0946 |
| EQR      | -6.311078   | 4.825857   | -1.307763   | 0.1957 |
| GDP      | 1.665012    | 1.284781   | 1.295950    | 0.1997 |
| INF      | 0.008287    | 0.239332   | 0.034624    | 0.9725 |
| VAR1     | -10.95774   | 14.10760   | -0.776726   | 0.4402 |
| VAR2     | -17.43230   | 14.15195   | -1.231795   | 0.2226 |

|                    |           |                       |          |
|--------------------|-----------|-----------------------|----------|
| R-squared          | 0.340904  | Mean dependent var    | 8.454843 |
| Adjusted R-squared | 0.194439  | S.D. dependent var    | 14.76953 |
| S.E. of regression | 13.25610  | Akaike info criterion | 8.177835 |
| Sum squared resid  | 11070.63  | Schwarz criterion     | 8.631048 |
| Log likelihood     | -303.9356 | Hannan-Quinn criter.  | 8.359264 |
| F-statistic        | 2.327537  | Durbin-Watson stat    | 2.138289 |
| Prob(F-statistic)  | 0.011722  |                       |          |

## Appendix B

Breusch-Godfrey Serial Correlation LM Test:

|               |          |                     |        |
|---------------|----------|---------------------|--------|
| F-statistic   | 1.846347 | Prob. F(2,62)       | 0.1664 |
| Obs*R-squared | 4.384508 | Prob. Chi-Square(2) | 0.1117 |

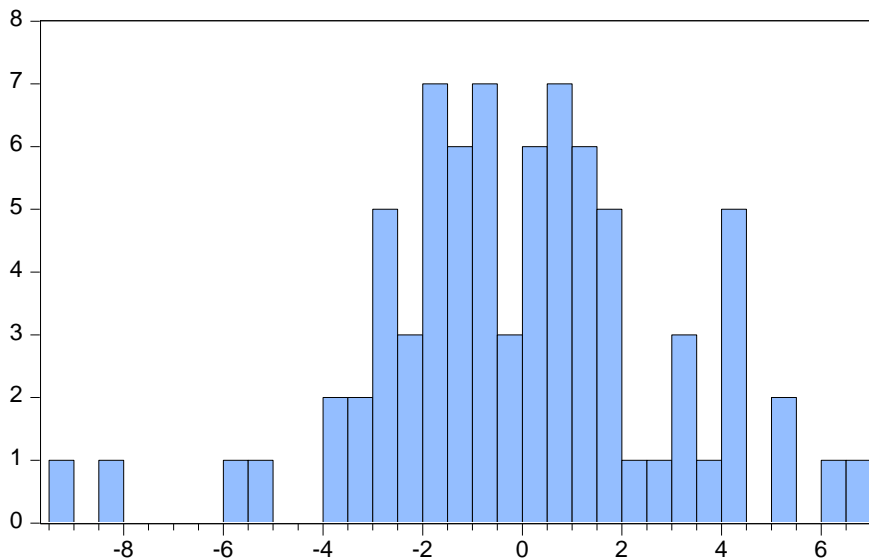
Test Equation:  
 Dependent Variable: RESID  
 Method: Least Squares  
 Date: 11/23/17 Time: 04:35  
 Sample: 1 78  
 Included observations: 78  
 Presample missing value lagged residuals set to zero.

| Variable  | Coefficient | Std. Error | t-Statistic | Prob.  |
|-----------|-------------|------------|-------------|--------|
| C         | -7.170222   | 48.56922   | -0.147629   | 0.8831 |
| SIZE      | -0.096323   | 0.732074   | -0.131576   | 0.8957 |
| ROA       | 0.118592    | 1.801388   | 0.065834    | 0.9477 |
| ROE       | 0.003657    | 0.230979   | 0.015831    | 0.9874 |
| DAR       | 0.078337    | 0.603540   | 0.129796    | 0.8971 |
| LAR       | -0.111142   | 0.966922   | -0.114944   | 0.9089 |
| LTD       | 0.108492    | 0.697134   | 0.155626    | 0.8768 |
| LPR       | -0.119663   | 0.301378   | -0.397053   | 0.6927 |
| LEVE      | -0.130622   | 0.724667   | -0.180251   | 0.8575 |
| RP        | 0.081052    | 0.514090   | 0.157661    | 0.8752 |
| EQR       | 0.164425    | 1.239270   | 0.132679    | 0.8949 |
| GDP       | 0.071887    | 0.323491   | 0.222224    | 0.8249 |
| INF       | 0.007719    | 0.061252   | 0.126024    | 0.9001 |
| VAR1      | -1.591550   | 3.697432   | -0.430447   | 0.6684 |
| RESID(-1) | 0.214232    | 0.138563   | 1.546105    | 0.1272 |
| RESID(-2) | 0.139108    | 0.137336   | 1.012901    | 0.3150 |

|                    |           |                       |          |
|--------------------|-----------|-----------------------|----------|
| R-squared          | 0.056212  | Mean dependent var    | 3.83E-14 |
| Adjusted R-squared | -0.172124 | S.D. dependent var    | 3.127211 |
| S.E. of regression | 3.385665  | Akaike info criterion | 5.457660 |
| Sum squared resid  | 710.6892  | Schwarz criterion     | 5.941087 |
| Log likelihood     | -196.8487 | Hannan-Quinn criter.  | 5.651185 |
| F-statistic        | 0.246180  | Durbin-Watson stat    | 2.003369 |
| Prob(F-statistic)  | 0.997886  |                       |          |

### Appendix C



| Series: Residuals |           |
|-------------------|-----------|
| Sample 1 78       |           |
| Observations 78   |           |
| Mean              | 3.12e-14  |
| Median            | -0.009300 |
| Maximum           | 6.651844  |
| Minimum           | -9.463095 |
| Std. Dev.         | 2.926542  |
| Skewness          | -0.284232 |
| Kurtosis          | 3.012439  |
| Jarque-Bera       | 4.381592  |
| Probability       | 0.111828  |

### Appendix D

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

| Test Summary         | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob.  |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 0.000000          | 12           | 1.0000 |

\* Cross-section test variance is invalid. Hausman statistic set to zero.

\*\* WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

| Variable | Fixed     | Random    | Var(Diff.) | Prob.  |
|----------|-----------|-----------|------------|--------|
| SIZE     | -1.213275 | -1.878159 | 4.980820   | 0.7658 |
| ROA      | -5.028417 | -4.071126 | 2.256866   | 0.5240 |
| ROE      | 0.482226  | 0.491768  | 0.043792   | 0.9636 |
| DAR      | -1.381525 | -0.765321 | 0.152342   | 0.1144 |
| LAR      | 1.900985  | 0.784143  | 0.383287   | 0.0712 |
| LTD      | -1.567509 | -0.880644 | 0.170110   | 0.0958 |
| LPR      | 0.461031  | 0.891351  | 0.019014   | 0.0018 |
| LEVE     | -2.189911 | -0.882587 | 0.604066   | 0.0926 |
| RP       | -0.940250 | -0.496627 | 0.113139   | 0.1872 |
| EQR      | 5.205644  | 2.959969  | 1.914232   | 0.1046 |
| GDP      | 0.018621  | -0.508765 | 0.107222   | 0.1073 |
| INF      | -0.057275 | -0.129355 | 0.004568   | 0.2862 |

Cross-section random effects test equation:

Dependent Variable: CAR

Method: Panel Least Squares

Date: 11/23/17 Time: 04:41

Sample: 2011 2016

Periods included: 6

Cross-sections included: 13

Total panel (balanced) observations: 78

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | 135.6826    | 76.31179   | 1.778003    | 0.0811 |
| SIZE     | -1.213275   | 2.322412   | -0.522420   | 0.6036 |
| ROA      | -5.028417   | 2.176100   | -2.310747   | 0.0248 |
| ROE      | 0.482226    | 0.292640   | 1.647848    | 0.1053 |
| DAR      | -1.381525   | 0.661838   | -2.087408   | 0.0417 |
| LAR      | 1.900985    | 1.056506   | 1.799312    | 0.0777 |
| LTD      | -1.567509   | 0.741512   | -2.113937   | 0.0392 |
| LPR      | 0.461031    | 0.295290   | 1.561280    | 0.1244 |
| LEVE     | -2.189911   | 1.006329   | -2.176139   | 0.0340 |
| RP       | -0.940250   | 0.561134   | -1.675625   | 0.0997 |
| EQR      | 5.205644    | 1.764804   | 2.949701    | 0.0047 |
| GDP      | 0.018621    | 0.432913   | 0.043014    | 0.9659 |
| INF      | -0.057275   | 0.086412   | -0.662810   | 0.5103 |

Effects Specification

Cross-section fixed (dummy variables)

|                    |           |                       |          |
|--------------------|-----------|-----------------------|----------|
| R-squared          | 0.906314  | Mean dependent var    | 21.82372 |
| Adjusted R-squared | 0.863890  | S.D. dependent var    | 8.164545 |
| S.E. of regression | 3.012148  | Akaike info criterion | 5.297793 |
| Sum squared resid  | 480.8709  | Schwarz criterion     | 6.053148 |
| Log likelihood     | -181.6139 | Hannan-Quinn criter.  | 5.600175 |
| F-statistic        | 21.36337  | Durbin-Watson stat    | 2.247328 |
| Prob(F-statistic)  | 0.000000  |                       |          |

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