Addis Ababa University
School of Graduate Studies
College of Business and Economics
The Department of Accounting and Finance

Determinants of Capital Adequacy Ratio:

An Empirical Study on Commercial Banks of Ethiopia

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Accounting and Finance

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Declaration

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

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Abstract

This study was conducted to examine bank specific and macroeconomic determinant factors of Capital Adequacy ratios of commercial banks in Ethiopia. To this end, the researcher collected secondary sources of panel data over the period 2002-2013from eight senior commercial banks in Ethiopia selected based on purposive sampling.

The research finding revealed that Bank size (SIZE), liquidity (LQR) and Non-Performing Loan (NPL) ratio had positive whereas Inflation (INF) had negative, but insignificant effect on CAR of commercial banks in Ethiopia. The share of deposit (DAR), Loan(LAR), Loan provision (LPR), Bank risk (RAR), Return on equity and Economic growth (GDP) had negative and statistically significant effect on Capital Adequacy ratios of commercial banks in Ethiopia. Furthermore, Return on Asset (ROA) and Net interest Margin (NIM) had positive and statistically significant effect on CAR of commercial banks in Ethiopia.

The finding of this study is significant as it revealed to bank managers the relevant factors to take into consideration when they make financial policies to maintain at least the expected required level of CAR. Based on the findings, the study recommends to the management of National Bank of Ethiopia to revise the existing minimum requirement based on Basel III accord and also to influence commercial banks in order to disclose all component of CAR in detail in their annual financial statement.

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List of acronyms

AIB: Awash International Bank

BCBS: Basel Committee on Banking Supervisions

BIB: Birhan International Bank

BIS: Bank for International Settlements

BLUE: Best Linear Unbiased Estimator

BOA: Bank of Abyssinia

BUIB: Buna International Bank

CAR: Capital Adequacy Ratio

CBB: Construction and Business Bank

CBE: Commercial Bank of Ethiopia

CBO: Cooperative Bank of Oromiya

CC: Correlation Coefficient

CI: Condition Index

CLRM: Classical Linear Regression Model

CSA: Central Statistical Agency

DAR: Deposits to Assets Ratio

DB: Dashed Bank

DW: Durbin-Watson

FEM: Fixed Effect Model

GDP: Real Gross Domestic Products growth rate

INF: General Inflation Rate

JB: Jarque-Bera

LAR: Loans to Assets Ratio

LIB: Lion International Bank

LPR: Loan Provision to Total Loan Ratio

LQR: Liquidity

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NIB: Nib International Bank

NIM: Net Interest Margin

NPL: Non-performing loans

OECD: Organization of Economic Countries and Development

OIB: Oromiya International Bank

OLS: Ordinary Least Square

RAR: Risk Weighted Assets to Asset s Ratio

REM: Random Effect Model

ROA: Return on Assets

ROE: Return on Equity

RWA: Risk Weighted Assets

SIZE: Bank size

UB: United Bank

VaR: Value at risk

WB: Wogagen Bank

ZB: Zemen Bank

Chapter One

1.1 Introduction

The importance of the banking sector is premised on the basis that banks are considered to be the foremost channel of savings and allocations of credits in an economy (Ariccia & Marquez, 2004). The banking sector facilitates the vital financial intermediation function by transferring the deposits into productive investments (King & Levine, 1993). Beyond the intermediation function, the financial performance of the financial institutions and banks has significant implications for economic growth of an economy. Sound financial performance rewards the stakeholders for their investment and encourages additional investment. On the other hand, poor banking performance may result in banks' failure and collapse which have negative ramification on the growth of the economy (Parvesh & Afroze, 2014). Lindgren (1999) concludes from early experiences that moments of weaknesses in the banking sector have generated a slowdown of the economic growth.

The importance of banks is more pronounced in developing countries because financial markets are usually underdeveloped and banks are considered the merely major source of finance for the majority of firms and are usually the main depository of economic savings (Arun & Turner, 2004). Oloo (2011) emphasized that where the financial sector is dominated by commercial banks, any breakdown has an enormous implications on the economic growth of an economy. This is due to the fact that any bankruptcy in the banking sector has a contagion effect that can lead to overall financial crisis and economic tribulations.

Besides, the financial crisis incurred in the banking sector transmits from the one country to another country (Chen, 2003). Hence, there is an urgent need to keep the performance of banks under close watch and supervision at all times (Parvesh & Afroze, 2014) and prudential regulation of banks is supposed to prevent or at least to reduce the frequency of such crises (Büyüksalvarc & Abdioğlu, 2011).

Due to this fact, the western banking system has established internationally-recognized capital regulations, which are formulated by the Basel Committee on Banking Supervision (Büyüksalvarc & Abdioğlu, 2011).

Over the past years, the bank regulators have introduced a number of measures to link the regulation and supervision of commercial banks to the level of risk and financial viability. The regulators have augmented bank supervision through maintaining an adequate and sufficient level of capital adequacy (Parvesh & Afroze, 2014).

One of the basic tasks assigned to regulators is to ensure the stability and soundness of the financial system; first by associating capital requirements with the idea of reducing the risk of failure of individual banks for the purpose of protecting market participants who provide banks´ resources and are unable to monitor their level of risk exposure; second by reducing the likelihood of having strong adverse consequences on the real economy resulting from the different innovations and mutations in the banking system (Kcharem, 2014). In order to prevent bank failures and protect the interest of the depositors, it is necessary to require banks to maintain a significant level of capital adequacy (Büyüksalvarc & Abdioğlu, 2011).

Ebhodaghe (1991), has defined capital adequacy as a situation where the adjusted capital is sufficient to absorb all losses and cover fixed assets of the bank leaving a comfortable surplus for the current operation and future expansion. In fact, adequate capital is regarded as the amount of capital that can effectively protect bank operations from failure by absorbing losses.

Capital adequacy as a concept has been inexistence prior to the era of capital regulation in the banking industry .The concept appeared in the middle of the 1970's because of the expansion of lending activities in banks without any parallel increase in its capital (Al-Sabbagh, 2004). This led to the evolution of international debt crisis and the failure of one of the biggest American banks, Franklin National Bank (Koehn & Santomero, 1980). These events forced regulatory authorities to stress more control procedures and to improve new criteria and methods to avoid bank's insolvency (Al-Sabbagh, 2004).

Therefore, the globally recognized and acceptable capital regulations were originated by the Basel Committee on Banking Supervision(BCBS), which was established by the central bank governors of the Group of Ten countries in 1975 (Kcharem, 2014). The committee framed the details of the agreed structure for measuring capital adequacy and the minimum standard. In 1988 Basel Capital Accord propounded the definition of capital and distinguished it between core elements Tier 1 capital (equity capital and disclosed reserves) and supplementary elements Tier 2 capital (long term debt, undisclosed reserves and hybrid instruments).

In 1988 Basel Capital Accord also introduced capital adequacy regulation, which required globally active banks to maintain a minimum capital equal to 8% of risk adjusted assets and that has been adopted by more than 100 countries (Jacobson, 2002).

Similarly in Ethiopia, the central bank i.e. National Bank of Ethiopia (NBE) has articulated in its Directive No.SBB/9/95 a specific measure for the capital adequacy position of Banks, the computation mechanism and the conversion factors for both on and off-balance sheet items(NBE, 1995). Hence, NBE sets for all banks not to maintain their capital level below 8% of their risk weighted assets (Tesfaye, 2014).

In general, banks are expected to manage the level of their Capital adequacy ratio (CAR). However, managing Capital adequacy ratio without knowing and controlling the factors affecting it is not possible. Previous studies indicate that there are several bank specific and macro-economic factors that are claimed to be determinants of capital adequacy ratio (CAR) in different countries commercial Banks. While Bank size, Deposits, Loans Provision, Liquidity, Profitability, Net interest margin, Leverage and similar others are identified as bank specific factors, others such as inflation, economic growth and others are categorized as macro-economic factors (William, 2011; Al-Sabbagh, 2004; Büyüksalvarc & Abdioğlu, 2011; Bateni et al, 2014; Ali& Hyseni, 2015; Asarkaya& özcan, 2007). However, there is lack of study investigating the determinants of banks' capital adequacy ratio (CAR) in Ethiopia to the knowledge of the researcher.

Thus, the main objective of this study is to examine the bank specific and macroeconomic determinants of CAR of commercial banks in Ethiopia.

1.2 Overview of Banking System in Ethiopia

Modern banking in Ethiopia started in 1905 with the establishment of Bank of Abyssinia, which was based on a fifty year franchise given to the British -owned National Bank of Egypt. It has landmark significance in introducing financial services, which were hitherto unknown in the country (Tesfaye, 2014).

However, bank of Abyssinia was closed in 1932 by Ethiopian government under Emperor Haile Selassie and replaced by Bank of Ethiopia with a capital of pound sterling 750,000.Following the Italian occupation between1936-1941, the operation of bank of Ethiopia ceased and resumed once again after the departure of Italian and restoration of Emperor Haile Selassie's government with the name of the state bank of Ethiopia in 1943.

However, State bank of Ethiopia was separated into National bank of Ethiopia and commercial bank of Ethiopia S.C. to separate the responsibility of national bank from commercial banks in 1963. Then, on December 16, 1963 as per proclamation No.207/1955 of October 1963, commercial bank of Ethiopia was made to control all commercial banking activities (Fasil & Mehretab, 2009).

Following the declaration of socialism in 1974, the government extends the extent of its control over the whole economy and nationalized all large corporations. Accordingly, Addis bank and commercial bank of Ethiopia Share Company were merged by proclamation No.84 of August 2, 1980 to form single commercial bank in the country until the establishment of private commercial banks in 1994. During the Derg era, there were three major banks namely; National bank of Ethiopia, commercial bank of Ethiopia and Agricultural and development bank. Following the departure of the Dergue regime, Monetary and Banking proclamation of 1994 established the National Bank of Ethiopia as a legal entity.

Further, the Monetary and Banking proclamation No.84/1994 and the Licensing and supervision of banking business proclamation No.84/1994 laid down the legal basis for investment in banking sectors (Habtamu, 2012). Currently, banking sectors in Ethiopia are showing progressive developments in terms of number of branches, total assets, human resource utilization and the like. As Table 1.1 shows, there are now around nineteen banks in Ethiopia.

Table 1.1 Lists of Banks Operating in Ethiopia

Ser no	Name of the Bank
1	Development Bank of Ethiopia
2	Commercial Bank of Ethiopia
3	Construction and Business Bank
4	Awash International Bank
5	Dashen Bank
6	Bank of Abyssinia
7	Wegagen Bank
8	United Bank
9	Nib International bank
10	Cooperative Bank of Oromia
11	Lion International Bank
12	Zemen Bank
13	Oromia International Bank
14	Buna International Bank
15	Berhan International Bank,
16	AbayBank S.C
17	Addis International Bank
18	Debub Global Bank S.C
19	Enat Bank S.C

Source: www.nbe.et

1.3 Problem Statements

Capital adequacy ratio (CAR) is the ratio that is set by the regulatory authority in the banking sector and this ratio can be used to test the health of the banking system. This ratio has mandatory requirement imposed by the state bank because this ratio ensures that the bank has the ability to absorb the reasonable amount of losses. State central bank set and monitor capital adequacy ratio to protect the interest of depositors and to maintain the confidence of the banking sector. CAR ensures that banks are in capacity to meet the liabilities and other risks such as credit risk, market risk, operational risk, and others.

Various scholars have studied about determinants of capital adequacy ratio. Some studies focus on explaining the level of capitalization in a bank, using only bank specific variables. Demsetz & Saidenberg (1996) and Ayuso & Saurina (2004) showed that large banks have the ability to operate with low levels of capital; this finding indicates that large banks could benefit from diversification and can therefore, operate with lower capital ratios. Gropp & Heider (2007) and Kleff & Weber (2008) claimed that the most profitable banks tend to have relatively higher regulatory capital. Yu (2000) demonstrated that liquidity is positively and significantly related to capital ratio, which implies that banks do not consider liquidity as a pure direct substitute for capital; thus, it cannot be used to cover whole portfolio risk.

The other stream of studies has attempted to include macroeconomic variables. These studies suggest that the national economic environment has an effect on the solvency of the bank; therefore, it should be considered a fundamental determinant of the CAR of a bank. For example, Hortlund (2005) tested the impact of inflation on the capitalization of Swedish banks and demonstrated that inflation and the banks regulatory capital ratios were inversely related. Williams (2011) studied the impact of macroeconomic variables on the CAR; he noted that Macroeconomic variables such as Inflation, Real exchange rate, Money supply, Political instability, and Return on investment are significant determinants of regulatory capital.

There is therefore no gainsaying the fact that there are several researches that have provided evidences about the capital adequacy ratio and its determinants in other countries. However, given the unique features of banking sector and environment in which they operate and also rapid expansion of banking institutions in Ethiopia, it has been observed that there have not been significant researches on the relationship between capital adequacy and banks specific and macro-economic variables since the wake of the banking sector in Ethiopia. Further, to the best of the researcher's knowledge, there has been no model designed to determine the relative impact of bank's capital and macroeconomic variables and their possible linkages between the banking sector and the real sector of the Ethiopia economy.

Therefore, the motivation for undertaking this study is to fill the identified gaps through studying the determinants of CAR of commercial banks in Ethiopia.

1.4 Capital Adequacy Frame Work

There was no standard definition of capital before 1988. Since central banks used different approach to measure capital, it was difficult to evaluate and compare the financial position of banks in different countries. As a result, the concept of capital for regulatory purposes was standardized in the first Basel Capital Accord (Basel I).

Basel I was formulated by the Basel Committee on Banking Supervisions (BCBS) at the Bank for International Settlements (BIS), an international organization formed in 1930 to promote international monetary and financial co-operation and to serve as a bank for central banks around the world.

The guidelines were intended to 1) establish a systematic analytical framework that make regulatory capital requirements more responsive to differences in risk profiles among banking organizations, 2) take off balance sheet exposure into explicit account in evaluating capital adequacy, and 3) minimize disincentives to hold liquid and low risk assets.

The Basel rules included a schedule for implementing the new system worldwide, with a ratio of 8 percent, of which at least 4 per cent must be in the form of tier I capital and the remaining 4 percent is for tier II. This framework aims to provide a common standard for safe and prudent banking capitalization.

1.5 Research Questions

This research is conducted to seek answer for the following questions:

RQ1: what are the major factors that affect capital adequacy ratio of Ethiopian Commercial Banks?

RQ2: To what extent do those factors explain the variation in CAR?

1.6 Objective of the Study

1.6.1 General Objectives

The main purpose of this study is to identify empirically the main factors that affect CAR of commercial banks in Ethiopia and to determine the size of their effect**.**

1.6.2 Specific Objectives

With a view to achieve the above general objective, the study has the following specific objectives:

- To examine the effect of Bank specific factors like: Share of deposit (DAR), Loan (LAR), Loss loan provision (LPR), Net interest Margin (NIM), Bank Risk (RAR), Return on Asset (ROA), Return on equity (ROE) , Bank size (SIZE), Liquidity (LQR) and Non Performing Loan (NPL) on Capital Adequacy Ratio (CAR) of Ethiopian commercial banks.
- To analyze the effect of macroeconomic factors like Economic growth (GDP) and Inflation (INF) on Capital Adequacy Ratio (CAR) of Ethiopian commercial banks.

1.7 Hypothesis of the Study

The study has developed the following hypotheses based on extant theory and empirical studies related to factors affecting capital Adequacy of commercial banks.

Hypothesis 1. Share of deposit (DAR) has negative effect on CAR.

Hypothesis 2. Loan (LAR) has negative impact on CAR.

Hypothesis 3. Loss loan provision (LPR) has negative impact on CAR.

Hypothesis 4. Net interest Margin (NIM) has positive effect on CAR.

Hypothesis 5. Bank Risk (RAR) has negative impact on CAR.

Hypothesis 6. Return on Asset (ROA) has positive impact on CAR.

Hypothesis 7. Return on equity (ROE) has positive impact on CAR.

Hypothesis 8. Economic grow (GDP) has negative impact on CAR.

Hypothesis 9. Bank size (SIZE) has negative impact on CAR.

Hypothesis 10. Liquidity (LQR) has positive impact on CAR.

Hypothesis 11. Inflation (INF) has negative effect on CAR.

Hypothesis 12. Non-Performing Loan (NPL) has negative effect on CAR.

1.8 Research Methodology

This study explores the determinant factors of CAR in Ethiopia in terms of bank specific and macroeconomic variables. The panel data ordinary least square/OLS regression model has been used for commercial banks that have at least twelve years' experience (2002 to 2013).

While structured document survey was used to collect necessary sample data from audited financial statements of each sample commercial bank for bank specific factors, annual reports of National Bank of Ethiopia (NBE), annual statistical abstract of Central Statistical Agency (CSA) and annual report of Ministry of Finance and Economic Development (MoFED) were also used to get the necessary information for macro factors. For purpose of regression analysis, the study employed the E-views 7software package.

1.9 Significance of the Study

The study sought for Determinates of Capital Adequacy Ratio in Ethiopian commercial banks. Knowledge of such determinant factors have both theoretical /research as well as practical significance. The theoretical /research related significance relates to further validation of some of the factors identified as determinants of CAR based on empirical data from Ethiopia. The practical significance of the study is its identification of the bank related and macro-economic determinant factors that banks in Ethiopia must consider to effectively manage their capital asset ratio. In specific terms, the following are the significances that this study has achieved.

- Identified the relevant factors that commercial banks need to pay attention to in order to better manage their CAR; for example in policy formulation related to capital regulation in the financial sector of the economy.
- The study empirically determined the factors that determine Capital Adequacy Ratio and as such it can be considered as additional evidence to the existing debate about the relationship between CAR and bank internal and external factors.

1.10 Scope and Limitation of the Study

This study primary employed secondary data consisting of annual report of Commercial banks i.e. two state owned commercial banks; namely Commercial Bank of Ethiopia (CBE) and construction and Business Bank(CBB) and 6 private commercial banks, which have at least the latest twelve years' experience. As such, the study has inherent limitations resulting from the nature of the data employed; such as difficulty in providing detail explanation for some of the empirical statistical findings.

1.11 Organization of the Study

This research report is organized into five chapters. Chapter one provides the general introduction about the whole report. Chapter two describes the review of related literature. Chapter three provide detail description of the methodology employed by the research. Chapter four provides the data description, analysis resultants, and its interpretation. Finally, chapter five presents the conclusion and recommendation.

1.12 Operational Definition

Soundness: the soundness of a bank can be defined as the likelihood of a bank becoming insolvent. The lower this likelihood the higher is the soundness of the bank. Soundness could be achieved by increasing bank capital, because capital provides a cushion against failure.

Bank specific factors: - are variables that are under the control of bank management. They can be directly/ indirectly stated in the financial statements of banks.

Macroeconomic factors: - are variables in which the bank management has no power to control them. Rather, these variables are related with the fiscal and monetary policies of the country.

Capital adequacy: Is a level of capital that banks are required to hold by the regulator in order to execute their business operations and absorb losses without ceasing trading.

Capital adequacy ratio: It is a measure of capital adequacy and it is the ratio of capital (Tier I and Tier II) to Risk-weighted assets.

Tier I capital (prime capital) consists of equity capital, paid-in capital, legal reserve, General Reserve and others.

Tier 2 capital (supplementary capital) capitals consists of Retained earnings, , undisclosed reserves, assets revaluation reserves, general provisions, and others.

Risk-weighted assets: These are the total of on balance sheet asset (Cash, claim on banks, claim on Government , Loan and Advance , Fixed asset , other asset and others) and off balance sheet assets (Letter of Credit , Guarantee facilities and others) of a bank after adjusted for their risk of loss or default.

Capital buffer: The level of Capital Adequacy ratio above the minimum requirement set by the Basel.

Bank runs: A situation that occurs when a large number of bank customers withdraw their deposits simultaneously due to concern about the bank's solvency. And the bank's reserves may not be sufficient to cover the withdrawals.

Chapter Two

Literature Review

The literature review is organized into two major parts, i.e. the theoretical review and the empirical review part. The theoretical review part discusses the theories that states about the importance of bank capital, capital regulation, capital requirement/ adequacy and the variables that are claimed to affect Capital adequacy ratio. The empirical literature part reviews past studies that were conducted on the area of factors determining CAR. In this part the variables that were included, the methodology that was used to undertake the study and the results of the study under review are discussed.

2.1 Theoretical Framework

2.1.1 The Importance of Bank Capital

Studies on the economic roles of banks indicate that banks are fundamentally different to industrial firms and the importance of bank capital cannot be explained using the same parameters as those of industrial firms. Consistent with the discussion on the role of capital for industrial firms, different studies give different justifications of the role of bank capital and the importance of bank capital structure. Using the 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).

Therefore, as in industrial firms, bank managers take advantage of the asymmetric information problem by signaling information to the market through their capital structure (Ross, 1989).

Using the same asymmetric information argument, Stein (1998) shows 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. Therefore, banks generally have lower capital than firms in other industries that are not protected by the safety net. They further argue that if raising capital quickly is costly then banks may hold additional capital.

Diamond and Rajan (2000) present a theory of bank capital using a model where a bank's assets and liabilities are tied together. As capital holders do not have the first-come-first-served right to cash flows as do depositors, it may be optimal for the bank to partially finance itself with capital. They identify the role of bank capital as ensuring bank safety by providing a buffer to absorb losses, thus better enabling the bank to pay their debt holders in full. By maintaining a certain level of capital and reducing deposits to a safe level, it enables banks to refinance at low cost and minimize distress costs. They suggest that an appropriate capital structure can allow a bank to extract more from borrowers, thus allowing it to lend more.

2.1.2 Bank Capital Regulation

As most studies support the importance of bank capital, the next issue is whether banks and bank capital should be regulated. Some research supports the view that banks need to be regulated by considering the fragility of their financial structures and the important roles they play in the payment system and the wider economy. One of the most prominent arguments in favor of bank regulation is that it reduces the negative externalities resulting from government supported deposit insurance.

On the other hand, other studies argue that even though markets are not perfect, they perform better than governments in securing the banking system. They therefore conclude that market discipline should be improved and banks should not be regulated (Derina, 2011).

2.1.2.1 Free Banking System

Free banking theorists oppose government interventions in the form of government sponsored deposit insurance and government regulation of the financial system, highlighting the moral hazard created by these interventions (Derina, 2011).They argue that empirical evidence shows intervention generally weakens the financial system by encouraging banks to increase their risk and lower their capital positions, hence causing the problem it is meant to solve. Dowd (1996) argues that there is no need to establish a central bank in order to provide the lender of last resort function.

Dowd argues that deposit insurance would diminish the incentives for depositors to monitor bank management and that therefore bank managers would be less concerned about maintaining depositors' confidence. The fight for market share would force them to cut their capital so that they could offer a better rate to their depositors. Furthermore, deposit insurance encourages banks to take excessive risks to maximize the insurance premium. In effect, deposit insurance reduces the safety and health of the banking system.

Dowd concludes that an unregulated banking system with no lender of last resort or deposit insurance system is a stable system. Assuming that information is symmetrically available in the markets so that markets are able to value bank's assets and liabilities and also assuming limited supremacy of big banks, the market forces banks to gain depositors' confidence by maintaining their safety. Depositors would compensate these safe banks by accepting lower interest rates on deposits.

Also, the free market banking system ensures competition between banks and forces them to maintain their capital at a level required by their customers. Benston and Kaufman (1996) support Dowd's free banking system position. They argue that the most important justification for government-imposed regulations is the presence of negative externalities arising from government provided deposit insurance.

They reason that other negative externalities such as contagious runs on solvent banks and economic distress or collapse due to bank failure are not strong enough reasons to justify bank regulations. Benston and Kaufman assert that the market is able to measure and price a bank's risk since in order to gain market confidence banks have the incentives to provide adequate and accurate information to the market. Banks will gain by demonstrating that they are unlikely to fail by providing information about their conditions and operations, via audited financial statements, public announcements and the like.

The market would discipline banks that are considered illiquid and unsafe by increasing the required rate of return or withdrawing deposit funds unexpectedly. Banks recognize the risk of insolvency caused by massive deposit withdrawals; therefore they would plan their liquidity and solvency by holding sufficient amounts of liquid assets and capital. However, they admit that a run on one bank might cause a run on a solvent bank if depositors are unable to distinguish between solvent and insolvent banks (Derina, 2011).

2.1.2.2 Regulated Banking System

They argue that regulations insure banks against bank runs and therefore against the risk of systemic failure. Banks are susceptible to runs because of the nature of their businesses. The asset transformation activities which include liquidity and maturity transformations expose banks to several risks, including bank runs and banking panics (Bhattacharya and Thakor, 1993). Therefore proper and adequate instruments are required to protect the system from liquidity-based runs. Several proposals have been made for methods to insulate banks from runs. Dewantripont and Tirole (1993, 1994) propose the representation hypothesis, which focuses on the importance of monitoring banks for depositors because banks are subject to moral hazards and adverse selection problems created by the separation of ownership from management. However, monitoring is costly and efficient monitoring requires adequate information. Moreover, as bank liabilities are mainly held by uninformed depositors and most of them hold only a small deposit, depositors have little incentive to perform the efficient monitoring function required. This problem creates the need for a sophisticated and fully coordinated representative to control and monitor banks.

Others propose government supported deposit insurance (Diamond and Dybvig 1983) which guarantees banks full protection from runs. However, the insurance scheme is not socially free as it is funded by taxes from other sectors in the economy. Furthermore, deposit insurance may create a moral hazard for banks. Empirical evidence shows that deposit insurance weakened the incentive for depositors to monitor banks (Flannery&Rangan, 2002; Peresetsky, 2008; Peria and Schmukler 2001; Ioannidou & Dreu 2006). Also, banks would increase their risks to maximize the value of the insurance premiums paid, especially because deposit insurance premium systems (either flat rate or risk-related premium system) are unable to determine the appropriate deposit insurance premium that reflects banks' risk profiles.

Many studies show that to be effective, deposit insurance premiums must be sensitive to the risks to which a bank is exposed. With the ineffective insurance premium, banks can potentially expropriate wealth from the insuring agent and achieve the wealth transfer by increasing their overall risk (Merton 1977, Cummins 1988). Unfortunately, due to asymmetric information problems between banks and regulators and rapid innovation of financial products, pricing risk sensitive deposit insurance premium is still a challenge for regulators (Kaufman 1995).

Therefore, to mitigate the moral hazard of deposit insurance while maintaining protection for depositors, complementary regulations on capital structure are suggested. Allen and Gale (2004) suggest that if properly designed and implemented, bank regulations in the form of capital regulations may reduce systemic risk. However, with the growing innovation of credit risk transfer there have been increased concerns whether capital requirements actually improve financial stability (Calomiris, 2007). **"Too big to fail"** theory asserts that certain corporations, particularly financial institutions, are so large and so interconnected that their failure would be disastrous to the greater economic system, and they therefore must be supported by government when they face potential failure. So large firm should be regulated (Andrew, 2009)

Bank regulations are a form of government regulation which subject banks to certain requirements, restrictions and guidelines. This regulatory structure creates transparency between banking institutions and the individuals and corporations with whom they conduct business, among other things. Given the interconnectedness of the banking industry and the reliance that the national and global economy holds on banks, it is important for regulatory agencies to maintain control over the standardized practices of these institutions (Barth & Ross, 2002).

The capital regulation by the bank regulatory agencies has become 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). And 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.

In 1988, the Committee decided to introduce a capital measurement system commonly referred to as the Basel Capital Accords. The capital regulation rules those 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.

2.1.3. Capital Requirements

Capital requirements determine the capital level maintained by banks in proportion to their assets. Recognizing the important role of the banking sector in the payment system and the various impacts of banking crises on the economy, regulators impose mandatory capital requirements which may differ from market generated optimal capital structure (Derina, 2011).

In order to understand the ideal regulatory capital requirements, theoretical frameworks of market-based capital requirements are discussed in the following section. This is followed by discussion of the regulatory capital requirements applied uniformly by international banks in most developed countries.

2.1.3.1 Market Generated (Optimal) Capital Requirements

Berger et al (1995) define market capital requirements as a bank's optimal capital structure, and they describe the market capital ratio as "the capital ratio that maximizes the value of the bank in the absence of regulatory capital requirements (and all the regulatory mechanisms that are used to enforce them), but in the presence of the rest of the regulatory structure that protects the safety and soundness of banks."

Market capital requirements are determined by introducing the imperfections –taxes, expected costs of financial distress, transaction costs and asymmetric information problems –back into the perfect world of M&M.

As risk of financial distress increases with the increase in debt, banks are required to add more capital to protect against bankruptcy risk. Therefore, the expected costs of financial distress tend to raise capital requirements (Derina, 2011).

The existence of asymmetric information between banks, borrowers, lenders and capital markets enables managers to signal information to the market through capital decisions (Ross 1977; Acharya 1988). Combined with the transaction costs of new equity issues, asymmetric information influences the relative costs of internal versus external finance and the relative costs of debt versus equity. Transaction costs may encourage banks to hold a capital buffer to fund unexpected investment opportunities as well as to protect them against costly unexpected shocks to capital (Berger et al, 1995). The same authors argue that the safety net provided by regulators, which includes deposit insurance, payments guarantees, as well as capital unrelated regulations and supervision, protects bank creditors from the full consequences of bank risk taking. Therefore it tends to reduce market capital requirements.

2.1.3.2 Regulatory Capital Requirements

Governments provide implicit and explicit unconditional guarantees for most bank creditors. Explicit guarantees come in the form of deposit insurance and implicit guarantees often occur in the form of too big to fail policy (TBTF) , a widespread belief that because of the severe impacts banking crises have on the wider economy, governments will act to guarantee bank deposits. Such implicit guarantees are politically binding (Merton, 1977); the cost on the guarantor is essentially the same as for explicit guarantees.

This safety net creates moral hazard incentives for banks to undertake excessive risk taking. By protecting the ‘big’ financial institutions, the TBTF policy removes any possibility of bankruptcy and thus allows banks, especially large banks, to avoid paying premiums for the additional risk they undertake, which gives banks more incentives to increase risks in their operations (O'Hara & Shaw 1990). Moreover, the TBTF policy increases banks’ moral hazard by reducing uninsured depositors’ incentives to discipline banks (Mishkin 2006; Rime 2005).

By guaranteeing deposits, regulators become the largest "uninsured creditor" of banks. This raises the need to force mandatory capital requirements to protect regulators from the moral hazard triggered by deposit insurance (Berger et al 1995). Therefore the first objective of capital requirements regulation is to protect consumers as well as the regulators from exploitation by better-informed banks.

The second purpose of capital regulation is to protect the economy from systemic risk. Combined with the fragility of their financial structure, banks are often considered to be the source of systemic risk because of their central role in the payments system and in the allocation of financial resources (Berger et al 1995; Saldenberg & Shuermann 2003).

Berger et al (1995) conclude that regulatory capital requirements differ substantially from market-generated capital requirements. Even though regulators have access to confidential bank information, and are hence able to appropriately price risk and set capital requirements (Berger and Davies, 1994), regulatory requirements only incorporate differences in bank risk. They do not incorporate dynamic changes in demand amongst uninsured depositors resulting from changes in riskiness of individual banks.

2.1.3.3 Risk-Based Capital Requirements

Jeitschko & Jeung (2005) build a testing model that incorporates the three different incentives of the three entities that are involved in the risk determination of a bank. Based on empirical findings on Korean commercial banks, they propose that capital regulation alone may not be enough to safeguard the sound banking business of banks since high capital banks present positive relationship in bank capitalization and portfolio risk. Secondly, the negative relationship between risk and capitalization for commercial banks with low capital suggests that the closer monitoring implementation are required to prevent those banks from gambling in excessively risky activities.

Many studies show that to be effective, capital requirements must be sensitive to the risks to which a bank is exposed. After experiencing high default rates in banking industries, regulators reformed their 'flat' unadjusted risk capital requirements by adjusting bank asset portfolios to the assets' perceived risks (Derina, 2011).

2.2 Capital Adequacy

Capital adequacy ratios are measures of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures. It is an international standard which recommends minimum capital adequacy ratios that has been developed to ensure banks can absorb a reasonable level of losses before becoming insolvent(Chen, 2003).

It is broadly defined as the percentage ratio of a financial institution's primary capital to its assets (loans and investments), used as a measure of its financial strength and stability. According to the Capital Adequacy Standard set by Bank for International Settlements (BIS), banks must have a primary capital base equal at least to eight percent of their assets. The Federal Reserve System acknowledges that the primary function of capital is to support the bank's operations, act as a cushion to absorb unanticipated losses and declines in asset values that could otherwise cause a bank to fail, and provide protection to uninsured depositors and debt holders in the event of liquidation. Yu (2006), defined the adequate capital for banks as the level at which the deposit insuring agency would just breakeven in guaranteeing the deposits of individual banks with premium the banks pay. From the postulated definitions it is observable that capital adequacy is a relative term that expresses the overall bank capital in relation to the amount of the banks` exposure.

2.3 The origin of Capital Adequacy

The origin of Capital Adequacy Directive as well as the capital regulation could be traced back to the concern that a bank might hold less capital than is socially optimal “relative to its riskiness as negative externalities resulting from bank default are not reflected in market capital requirements” (Rime, 2001). In the 1988 Accord, the Basel Committee came up with a ratio of capital to risk-weighted assets. They came up with a formula where capital was broken into Tier 1 (equity capital plus disclosed reserves less goodwill) and Tier 2(revaluation reserves, undisclosed reserve, general loan loss reserves, and subordinated term debt). In addition, the denominator of this Basel formula is the sum of risk-adjusted assets plus off-balance sheet items adjusted to risk facing the bank. According BIS (2008) the1988 Basel Accord prescribed for banks to hold capital of at least eight percent of their risk weighted assets.

Basel I

In 1987 the Federal Reserve Board, representing by 12 countries such as United States, Belgium, Canada, France, Germany, Italy, Japan, The Netherlands, Sweden, Switzerland, the United Kingdom, and Luxemburg announced preliminary agreement on new capital standard, often referred to as the Basel Agreement or Basel I that would be uniformly applied to all banking institutions in their respective jurisdictions.

Formally approved in July 1988, those new requirements are designed to encourage leading banks to strengthen their capital positions, reduce inequality in the regulatory rules of different nations, and consider the risk to bank of the off balance sheet commitments that they have made in recent years.

Basel I primarily focused on credit risk. Assets of banks were classified and grouped in five categories according to credit risk, carrying risk weights of zero (for example home country sovereign debt), ten, twenty, fifty, and up to one hundred percent (this category has, as an example, most corporate debt). Banks with international presence are required to hold capital equal to 8 % of the risk weighted assets. This version has helped to strengthen the soundness and stability of international banking system as a result of the higher capital ratios that it required.

However, the accord goes along with some major disadvantages. The capital requirement is softly tied to economic risk, which creates chances for regulatory capital arbitrage. As a result, the quality of bank loan portfolios is averagely reduced. Besides, amended1996 version Basel Accord still ignores operational risk, inaccurate market risk measurement, and unclear level of risk. These shortcomings forced the Basel Committee to release two consultative packages with more risk-sensitive accord in June 1999 and January 2001.

Basel II

Basel II initially published on June 2004, aims to create an international standard for banking regulators to bring the framework more in line with modern banking by becoming more risk sensitive and representative of current risk management practice. This version intended to control how much capital banks need to put aside to guard against the types of financial and operational risks banks (and the whole economy) face.

Basel II was created to build on a solid foundation of prudent capital regulation, supervision, and market discipline, and to enhance further risk management and financial stability. As such, the Committee encourages each national supervisor to consider carefully the benefits of the new framework in the context of its own domestic banking system and in developing a timetable and approach to implementation.

Given resource and other constraints, these plans may extend beyond the Committee's implementation dates. That said, supervisors should consider implementing key elements of the supervisory review and market discipline components of the new framework even if the Basel II minimum capital requirements are not fully implemented by the implementation date. National supervisors should also ensure that banks that implement Basel II are subject to prudent capital regulation and sound accounting and provisioning policies. Advocates of Basel II believed that such an international standard could help protect the international financial system from the types of problems that might arise should a major bank or a series of banks collapse.

In theory, Basel II attempted to accomplish this by setting up risk and capital management requirements designed to ensure that a bank has adequate capital for the risk the bank exposes itself to through its lending and investment practices (BIS, 2012) .Generally speaking, these rules mean that the greater risk to which the bank is exposed, the greater the amount of capital the bank needs to hold to safeguard its solvency and overall economic stability.

Similar to the older version, Basel II appears have several disadvantages. Firstly, Basel II adds Tier 2 capital of short-term subordinated debt covering market, which is reprimanded as one of the main reasons contributing to 2008 Financial Crisis. Secondly, while rating agencies unfairly perform their tasks for self-profit, risk assessing approach primarily basing on credit degree of customers offers opportunities for inaccurately healthy financial institutions to invest in venture projects, which leads to higher risk. Besides, supervisory and risk assessment processes seem to ignore business cycle factor. Capital quality issues are also not seriously considered in risks evaluation. In December 2010, Basel III Capital Accord was agreed upon the member of Basel Committee on Banking Supervision in the effort to get a handle on banking risks after 2008 Global Financial Crisis, implemented roadmaps for full Basel III standards appliance.

Basel III

Forum Basel Committee on Banking Supervision in Switzerland has decided that the world have to improve standards of banking regulation following the crisis 2008. With the due date of January 1, 2013, the whole world should implement certain standards for sound banking. Basel III is intended to be applied consistently around the world so as to reduce the risk that financial institutions will move their operations to jurisdictions with more lenient regulatory regimes. Basel III requires that individual countries consider whether to increase their national capital requirements when there is an unsafe build-up of credit. If a bank has operations in more than one country, the countercyclical buffer that it is required to maintain will be a weighted average of all of the countercyclical buffers in force in countries in which it has credit exposure.

The final rule requires the Basel minimum capital of 13% CAR by the composition of at least 6% tier one, 2% tier two, capital conservation buffer of 2.5%, and another 2.5% of capital during periods of high credit growth.

2.4 The Adoption of 8% as Minimum Capital Adequacy Ratio in Basel Accord

Although there is no strong justification for the ratio of 8% specifically, it still was considered to be sufficiently adequate due to the empirical application from previous policy applied in some states such as the USA and Britain`s bilateral agreement of 1986 regarding capital adequacy (Rime, 2005). Eight percent were the moderate in promoting good practice at that time: the USA as well as the UK around 7.5 %, Switzerland 10%, France and Japan 3% (Lastra, 2004). "Most countries experienced increases in their capital ratios although those countries, which were close to, or below, the Basel minimum capital adequacy ratio of 8% in1988 evidenced a much higher overall increase than those, which had initial high capital ratios" (Jakson, 1999). Basel II`s Pillar 1 (Minimum Capital Requirements), the overall level of regulatory capital currently held by banks is not set to fluctuate around the set percentage point.

The capital ratio is calculated using the definition of regulatory capital and risk-weighted assets and the total capital ratio must not be below eight percent. In addition, the tier 2 capital is limited to 100% of Tier 1 capital (BIS, 2004).

2.5. Bank Capital that is used to Calculate Capital Adequacy

The calculation of capital ratios requires some adjustments to be made to the amount of capital shown in the balance sheet, (Elliott 2010). According to Basel Capital Accord, capital is classified into two, which are tier one capital and tier two capital. This is done to give a distinct assessment of bank performance.

2.5.1 Tier One Capital

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.

2.5.2 Tier Two Capital

Tier two 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 sub-divided 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 un audited retained earnings, revaluation reserves and general provisions for bad debts, perpetual cumulative preference shares and perpetual subordinated debt.

2.6 The Role of Capital Adequacy in a Bank

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 researchgate.net (2013) asserts that it is pertinent for banks worldwide to adopt the Basel 2 capital adequacy for it serves as a buffer for absorbing losses and it regulate the amount of lending that a bank can do.

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.

2.6.1 Insurance Against Loses

Morison and White (2006) concluded that capital adequacy is very relevant in the absence of deposit insurance. They put it that deposit insurance provides a general subsidy to the banking system, making depositing one's funds in a bank more attractive. This allows bankers to offer lower deposit rates and still attract deposits. This was supported by Yamanura (2003) who acknowledged that capital adequacy is a risk management technique which promotes strong relationship lending approach. Bliss (2008) concurred with the view that regulations of capital requirements on credit institutions such as banks to enable them to avoid risks and also provide defensive shield to depositors against losses. The author noted that the aim is to ensure the soundness of these institutions and also to maintain customer satisfaction for its rights in the institution and at a larger point of view to ensure the stability of financial system.

2.6.2 Security to Depositors

Risk is broadly defined as the probability of deviation from expectations, (Williams, 2011).In a business practice, lending depositors money to borrowers may be risky if there is a possibility of debt defaults. Therefore, it is essential for banks to hold a capital buffer for the absorption of unexpected losses and protect depositors and shareholders. Bedoumra (2009) explains that by enabling it to absorb risk out of its own resources, the Bank risk capital protects its shareholders by minimizing the probability of call on capital. This is acknowledged as the basis for capital adequacy (Gallanti, 2003). As stated by Young (2006), the purpose of the risk ratios serves to help financial institutions calculate the amount of capital to hold at any given point in time.

As such, prudent financial regulation should ensure that financial institutions have adequate minimum capital at all times. This capacitates the financial institutions to repay what they owe to depositors. This can be achieved if banks have the discipline of holding to adequate capital (Gallanti, 2003).However, Ezike and Oke (2013) added a new dimension by postulating that adequate capital on commercial banks directly and automatically influences the amount of funds available for loans, which invariably affects the level and degree of risk absorption. Gardner (1981) as quoted in Ezike and Oke (2013) stresses that, despite its many roles and diverse functions, it is clear that bank capital is acting as protective cushion against losses precipitated by certain kinds of uncertainties. When financial institutions are under pressure to offer more imaginary financial products to their consumers in a bid to attain competitive advantage, they get in a position of creating greater financial losses in future especially when a bank is depends on unstructured loans. Bankers should have a guiding principle that provides for anticipated losses, as well as discretion for all gains and be vigilant against uncertainties and risks to the operating environment and their unsound behaviors as well. This has become the underlying principle of capital adequacy.

2.6.3 Promotion of Economic Growth and Financial Discipline

According to Bank of International Settlement, capital adequacy standards require that a capital ratio to asset ratio of central banks should be above a set minimum international standard to ensure protection from risks of all the central banks involved. This was the main role of BIS in setting capital adequacy standards (BIS, 2006).A bank may have capital adequacy ratio well above the minimum levels recommended by the Basle Capital Accord but still be unsound for the promotion of economic growth and financial discipline in the market. Thus capital adequacy ratios are concerned primarily with credit risks. However, there are also other types of risks such as inadequate internal control systems that could lead to large losses by fraud, or losses could be made on the trading of foreign exchange and other types of financial instruments which are not recognized by capital adequacy ratios. The risk based capital ratios are used to evaluate capital as a measure and a percentage of combination risk factors. These factors include weighted balance sheet and other related off-balance sheet risks that are determined according to risk factors (Olger, 2007).

2.6.4 Structuring the Financial Resources

Ekundano (2009) observed that adequacy of capital helps to enhance and structure the financial resources of an organization with a view to enlarging the size of long-term funds available to the company through the provision of working capital and funding to capital projects. In practice, banks should aim at striking a balance between risks and the availability of capital to support such a risk (King, 2005). Therefore, banks should be equipped with capital resources towards risks and capital management and this is achieved through capital adequacy adherence. Quaglia (2007) asserts that banks and their subsidiaries should be subjected regulations with respect to capital adequacy requirements as this is a critical indicator of financial stability and performance of banks.

2.7 Determinants of Capital Adequacy Ratio –Theory

The importance of the topic of regulatory capital in ensuring the stability of banking systems has motivated several researchers to study the determinants of regulatory capital banks. Our investigation of the literature allows us to deduce that the works on the determinants of banks CAR may be split in to two broad categories i.e. Bank Specific factors and Macroeconomic factors.

2.7.1 Bank Specific Determinant Factors

A. Share of Deposits and Capital Adequacy Ratio

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.

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". 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 (Sharp, 1964).

Dowd (1996) found in his study that the imposition by regulators of minimum capital standards on financial institutions can be seen as a means of strengthening the safety of deposits and soundness of the banking system. He also suggested that an information asymmetry between bank managers and depositors could produce market failure that provides a rationale for government intervention in the financial system.

This intervention would take the form of capital adequacy regulation to force banks to maintain a stronger capital position. Also, Harold (1999) found the same result as Dowd, in that many regulators and consumers were concerned about the safety of deposit insurance system. His study applied existing bank risk-based capital requirements to current credit union data to measure credit union's risk-based capital strength. When deposits increase, banks should be more regulated and controlled to guarantee the depositors rights, and to protect a bank from insolvency (Al-Sabbagh , 2004).If depositors cannot assess financial soundness of their banks, banks will maintain lower than optimal capital ratios. Optimal capital ratios are those that banks would have observed if depositors could have assessed their financial positions properly.

Therefore, if depositors can assess a bank's capital strength, a bank will maintain a relatively strong capital positions because greater capital induces depositors to accept lower interest rates on their deposits.

B. Loans and Advances (LAR) and CAR

One of the principal activities of commercial banks is to grant loans to borrowers. 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).

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).

C. Loss Loan Provision Ratio (LPR) and Capital Adequacy Ratio

Loss loan provision defined as a valuation reserve against a bank's total loans on the balance sheet, representing the amount thought to be adequate to cover estimated losses in the loan portfolio (Thiam, 2009).The relationship between loan-loss provisions and capital is two of the most vital macro prudential policy tools by which supervisory authorities use to ensure banking stability is linked by the BASEL II framework, the developments of which have led to the use of loan loss provisions to cover expected losses, and capital to cover unexpected losses (BIS, 2009).From a conceptual point of view, loan loss reserves should cover expected losses, while capital is intended to provide an adequate buffer for unexpected losses. Thus, an inaccurate level of loan loss reserves has a direct impact on bank capital.

The provision for loan losses is closely related to bank risks because general provisions can be included in supplementary capital, and specific provisions can be used as a deduction from risky assets. Therefore the loan loss provision is related to the regulatory capital adequacy ratio, which is probably related to capital management (Dong, et al., 2012). Loan loss provisioning policy is critical in assessing financial system stability, in that it is a key contributor to fluctuations in banks' profitability and capital positions, which has a bearing on banks' supply of credit to the economy (Beatty & Liao, 2009).

Bikker and Metzemakers (2005) show that provisioning levels vary significantly with the business cycle. During economic downturns, banks increase their loan loss provision, thereby magnifying the impact of the economic cycle on banks' capital (Laeven and Majnoni, 2003).

This pattern implies that banks' buffers need to be restored during downturns, meaning that fewer profits are available to supplement existing capital, possibly forcing banks to reduce lending.

If provisions are not able to cover the whole spectrum of potential loan defaults once an economic downturn occurs, then, naturally, the bank will need to cover the excess loss from its capital. Banks with low capital levels may increase loan-loss provision levels in order to comply with the regulatory requirement and to mitigate solvency risk. Therefore, banks' level of loan loss provisions could have an important effect on banks' capital adequacy ratios decisions (Beatty & Liao, 2009).

D. Management Quality (Net Interest Margin) and CAR

Net interest margin is defined as the ratio of net interest income to average earning assets. It is a summary measure of banks' net interest rate of return. While it is well known that the net interest margin is a significant element of bank profitability, however the effects of market interest rate volatility and default risk on the margins are not well recognized. The net interest margins are set by banks to cover the costs of intermediation besides reflect both the volume and mix of assets and liabilities. More specifically, adequate net interest margins should generate adequate income to increase the capital base as risk exposure increases (Angabazo, 1997).NIM has a positive influence on bank capital due to the high revenues allow the bank to raise additional capital through retained earnings and gave a positive signal to the value of the company (Rime, 2001). On the other hand, with high incomes may lower bank probability as failure (Yu, 1995). As a result, high income led to the bank's management reduce "capital cushion" given the low risk of failure. Therefore, the coefficient NIM can also have a negative relationship.

E. Banking Risk (RAR) and CAR

It has become impossible to discuss the concept of capital adequacy ratio in the banking industry without referring to value at risk (VaR). The 'capital adequacy' principle states that bank's capital should match risks. Since capital is the most scarce and costly resource, the focus of risk monitoring and risk measurement follows.

The central role of risk-based capital in regulations is a major incentive to the development of new tools and management techniques. Undoubtedly a most important innovation of recent years in terms of the modeling 'toolbox' is the VaR concept for assessing capital requirements.

The VaR concept is a foundation of risk-based capital or, equivalently, 'economic capital' (Bessis, 2002). The VaR methodology aims at valuing potential losses resulting from current risks and relies on simple facts and principles.

Financial institutions are able to forecast the average risk and associated credit loss of their assets; these expected losses (EL) are part of doing business and should be covered by the pricing of assets. The unexpected losses (UL), losses that exceed expectations, should to a certain extent be covered by bank capital (Sharpe, 1964).By imposing high capital levels, small investors are protected and potential systematic effects of bank failure are countered.

In banking, one of the most important determinants of capital is related to the risk that banks have taken. Legal regulations relate the level of capital that banks must maintain with the level of risks that they carry. The main reason of this is that capital is viewed as a shield against unexpected losses and bankruptcy (Asarkaya & özcan, 2007).Basel Accord states, the weights of risk were determined by an international standards ranging from (0%, 20%, 50%, 100%), which were based on risk- based capital standards and reflect risk inherent in banks' assets portfolio.

F. Profitability (ROA&ROE) and CAR

Banks' optimal capital ratios are likely to vary over the cycle, typically rising when there are higher expected costs of distress, the relationship between capital and profitability is likely to be highly cyclical, becoming more positive during periods of distress as banks that increase their capital ratios provide reassurance to investors and improve their profitability (Berger et al, 1995).

Higher capital is often supposed to be costly for banks, implying that higher capital reduces profitability, but according to the "trade-off" theory it may also reduce a bank's risk and hence the premium demanded to compensate investors for the costs of bankruptcy. According to conventional corporate finance theories a bank in equilibrium will desire to hold a privately optimal level of capital that just trades off costs and benefits, implying a zero relationship at the margin.

However, capital requirements imposed by regulators, if they are binding, force banks to hold capital in excess of their private optimal and hence force banks above their internal optimal capital ratio impose costs on banks (Miller, 1995; Buser et al, 1981).

Bourke (1989) reports that capital ratios are positively related to profitability under the assumption that well capitalized banks may enjoy access to cheaper and less risky sources of funds and better quality asset markets. Moreover, Berger et al (1995) argues that there are two potential explanations for a positive relationship between the bank's profits and the capital ratio. On the one hand, the expected bankruptcy costs hypothesis, according to which the greater the exogenous factors increasing its expected bankruptcy costs, the higher the optimal capital ratio for a bank will be. The definition of the bankruptcy costs is the likelihood of bank failure times the deadweight liquidation costs which creditors must absorb in the event of failure.

When expected bankruptcy costs increase because of environmental changes that increase the probability of bank failure or increase the liquidation costs per failure, the optimal capital ratio increases in order to reduce the probability of failure and thereby lower the expected value of bankruptcy costs.

On the other hand, the signaling hypothesis can serve to explain the positive relationship between capital ratio and earnings. Here, the symmetric information assumption is relaxed, allowing managers to have private information about the future stream of cash flows. Therefore, managers might be willing to signal this information through capital decisions (Myers and Majluf, 1984). As a result, a signaling equilibrium may exist; in which banks that expect to have improved future performance have higher capital.

In principle, a bank's capacity to absorb unexpected losses determines its level of risk. Several ratios commonly provide a proxy for risk, including the equity-asset (capital) ratio (Goddard et al., 2004). In theory, an excessively high capital ratio could denote that a bank is operating conservatively and ignoring potentially profitable investment opportunities.

High levels of capital imply that the bank is unlikely to earn high profits, but is also less liable to risk; therefore shareholders should be willing to accept a lower return on equity. In Granger-causality tests, Berger et al (1995) finds a positive relationship between the capital ratio and the return on equity.

Berger bases his argument supporting this relationship on the expected bankruptcy costs, which may be relatively high for a bank maintaining capital ratios below its equilibrium values. A subsequent increase in capital ratio should lead to an increase in the return on equity by lowering insurance expenses on uninsured debt.

In contrary, Milne and Whalley (2002) argued a more profitable bank may choose to hold a lower capital buffer since it expects to be able to rely on internal funds to meet regulatory or market demands. Although this would usually drive a negative rather than a positive relationship, it is also possible that under stressed conditions, low profitability may lead a bank to increase leverage in order to rebuild profitability (Milne and Whalley, 2001).

In the same vein, Berger and Bonaccorsi di Patti (2006) explain the possible reverse causation from performance to capital structure, basing it on two arguments. Firstly, they support this issue under the efficiency-risk hypothesis, where more efficient firms tend to choose relatively low equity ratios, as higher expected returns from the greater profit efficiency substitute equity capital to some degree, in terms of protecting the firms against financial distress, bankruptcy, or liquidation. Secondly, they refer to the franchise-value hypothesis, where more efficient firms tend to choose relatively high equity ratios to protect the future income derived from high profit efficiency. Therefore, in line with the previous arguments, a non-monotonic linear relationship between profitability and capital ratio seems likely.

G. Bank size and CAR

Banks' size is important because of its relationship to bank ownership characteristics and access to equity capital. Bank access to equity capital may reflect a relative importance of bankruptcy cost avoidance or managerial risk aversion (Al-Sabbagh , 2004)

In banking, level of risk is a relative concept. In order to understand in which level a bank takes risks, the asset size of a bank should also be taken into account. The general opinion is that asset size is inversely related to capital adequacy. Kleff & Weber (2008) assert that large banks could maintain less capital due to their advantage in covering their capital requirements from external sources relatively easily. They also claim that capital requirements of large banks are lower, because they have less investment opportunities and that their portfolios are diversified to a large extent.

In a related work by Kristian (2010), it was found that large banks usually have smaller excess capital reserves than small banks. One explanation for this is the "too-big-to-fail" argument. That a government guarantee is implied, since regulatory authorities believes the failure of large banks would have incalculable consequences for the society.

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

H. Bank Liquidity and CAR

Liquidity can be defined as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses (BIS, 2008A).

Banks create liquidity by transforming liquid liabilities into illiquid assets; the recent theories indicate the creation of liquidity by changing asset mixes. Diamond & Rajan (2000) and Gorton & Winton (2000) showed that banks can create more or less liquidity by simply changing their funding mix on the liability side.

The theoretical literature provides two opposite views on the relationship between liquidity and bank capital. Under the first view, bank capital tends to impede liquidity creation through two distinct effects: the financial fragility structure and the crowding-out of deposits hypothesis.

Indeed, financial fragility structure, characterized by lower capital, tends to favor liquidity creation (Diamond &Rajan, 2000), while higher capital ratios may crowd out deposits and thereby reduce liquidity creation (Gorton & Winton, 2000). Roughly described, the financial fragility structure effect is the outcome of the following process. Consequently, financial fragility favors liquidity creation since it allows the bank to collect more deposits and grant more loans. By contrast, higher capital tends to mitigate the financial fragility and enhances the bargaining power of the bank that leads to hamper the credibility of its commitment to depositors.

Thus, higher capital tends to decrease liquidity creation. Besides, Gorton & Winton (2000) show that a higher capital ratio may reduce liquidity creation through another effect: the crowding out of deposits. They consider that deposits are more effective liquidity hedges for agents than investments in bank equity. Liquidity creation increases the bank's exposure to risk as its losses increase with the level of illiquid assets to satisfy the liquidity demands of customers (Allen & Gale, 2004). The more liquidity that is created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet the liquidity demands of customers. Bank capital allows the bank to absorb greater risk (Repullo, 2004).

Thus, under the second view, the higher is the bank's capital ratio, the higher is its liquidity creation. Similarly, Angabazo (1997) also supports the assumption.

I. Non-Performing Loan and CAR

Non-performing loans (NPLs) are loans that are outstanding both in its principal and interest for a long period of time contrary to the terms and conditions under the loan contract. Thus, the amount of nonperforming loan represents the quality of bank assets (Tseganesh, 2012).

According to the Ethiopian banking regulation, "Nonperforming loan and advances are a loan whose credit quality has deteriorated and the full collection of principal and/or interest as per the contractual repayment terms of the loan and advances are in question"(NBE, 2008). According to Bloem and Gorter (2001), though issues relating to non-performing loans may affect all sectors, the most serious impact is on financial institutions such as commercial banks and mortgage financing institutions which tend to have large loan portfolios. Besides, the large bad loans portfolios will affect the ability of banks to provide credit. Huge non-performing loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on banks, leading to liquidity problems.

Thus in order to bear such operational and abnormal losses the bank should maintain at least the required minimum CAR (Habtamu, 2012). Moreover, as noted by Makri, et al (2014), NPLs indicates a risky loan portfolio as marked by a high NPL (equivalent to high credit risk) and CAR determines risk behavior of banks. Therefore there is positive association between CAR and NPL. Similarly, Djiogap and Ngomsi (2012) found a positive relationship between NPL and CAR.

2.7.2 Macroeconomic Factors

A. Economic Growth

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)

B. Inflation

It is a situation in which the economies overall price level is rising. It represents sustained and pervasive increment in aggregate price of goods and services resulting decline in purchasing power of money. Accordingly, when inflation is high and unexpected, it can be very costly to an economy.

At the same time, inflation generally transfers resources from lender and savers to borrowers since borrowers can repay their loans with birr that are worthless. It is determined as the general consumer price index. This indicates that, as inflation increase, the cost of borrowing gets more expensive and deteriorates the quality of loan portfolio.

Recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector (both banks and equity market) performance and therefore long-run real activity (Huybens & Smith, 1999). The common feature of these theories is that there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general.

The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment.

According to (Adegbite, 2010), macroeconomic stability as an ingredient of financial stability requires that macroeconomic policies must be antitypical, dousing excessive trend in any direction, maintaining stable prices, ensuring that public sector deficits are minimal and external debt is sustainable. A stable macroeconomic framework is one where the level of national saving is high enough to prevent undue reliance on foreign borrowing. For macroeconomic stability needed to maintain financial stability, macroeconomic policy instruments must be adequate and consistent with the exchange rate regime if not inflation will erode banks capital.

The framework for maintaining financial stability requires that if the financial institutions are stable and macroeconomic is stable then nature of regulatory and supervisory policies should be preventive. If however the institutions are at the brink or border of stability and many any moment plunges into instability, then the nature of regulatory/supervisory policies should be remedial. If however the institutions have become unstable already then the policies should be Resolution policies.

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

2.8 Determinants of Bank Capital Adequacy Ratio: Empirical Evidences

There are a lot of academics and other financial institutions that have tried to investigate the main factors that determine the capital adequacy ratio. Below we give a short literature review of some authors who have studied the relationship between capital adequacy ratio and some internal and external factors.

Al-Sabbagh (2004) analyzed determinants of capital adequacy ratio (CAR), by studying the financial statements of a sample of 17 banks in Jordan in two periods. The first period is conducted from [1985-1994] which represent a time before applying Basel committee standards for capital adequacy ratio in Jordanian banks. While the second period covers from [1995-2001] which is a time after applying Basel committee standards for capital adequacy ratio, that represented in a minimum capital adequacy ratio (CAR) of 8%.

The study found that most Jordanian banks are committed by a minimum 8% capital adequacy ratio, while some banks have higher than 8%. He used a model of nine independent variables expected to affect CAR. Using correlation coefficients and regression analysis, he found a negative relation between CAR and bank's size, while CAR was positively affected by ROA, loan to assets ratio (LAR), and equity ratio (EQR). CAR has a positive relation to risky assets ratio (RAR) in the period [1985-1994], while the relation becomes negative over the period [1995-2001]. 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.

Williams (2011) study the relationship between capital base and some macroeconomic, financial structure and banking variables using an error correction model during 1980 – 2008 in Nigeria. As dependent variable the study uses capital adequacy base while as independent variables the study used total loans, money supply, interest rate, inflation rate, demand deposit, political instability, exchange rate, liquidity risk, openness of the economy and investments.

The study concludes that the money supply is a very important determinant of the capital adequacy base in Nigeria having a high and very strong level of significance. The real interest rate is negatively related to capital adequacy base meaning that an increase of real interest rate dampen the capital adequacy base. The real exchange rate is a significant determinant but its coefficient is not as expected while the deposit liabilities and liquidity risk are not statistically significant. The author finds out that investments and political instability are correctly signed and statistically significant to explain the capital adequacy base in Nigeria.

Ogere et al(2013) on their study attempt to empirically examine the relationship between capital adequacy and banking risks in Nigerian bank by taking three independent variables(risk-weighted asset ratio, deposit ratio and inflation rate). In the study, secondary data were collected from the financial statements of the banks for a period of five years, from 2007 to 2011. The study reveals that there is a significant negative relationship between risk and capital adequacy ratio of banks, which means when risk level rises, capital adequacy ratio falls in the Nigerian banking industry.

In line with these findings, the study recommends 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. On their study they also provided evidence of negative relationship between deposits and capital adequacy ratio, which indicate, increase in deposits does not necessarily result to increase in capital adequacy ratio.

Büyüksalvarc & Abdioğlu (2011) investigate the determinants of the capital adequacy ratio (CAR) in the Turkish banks using secondary data. The capital adequacy ratio is used as dependent variable while as independent variables are use indicators that measure: Banks size, Deposits, Loans, Loan loss reserves, Liquidity, Return on Asset (ROA)and Return on Equity(ROE), Net interest margin and Leverage.

From the regression results the authors find that Loans, Loans Loss Reserves, Leverage, ROA and ROE have a significant relationship with CAR while Bank size, Deposits, Liquidity and Net Interest Margin do not have effect on the CAR in the Turkish banks.

Gropp & Heider (2007) also found that profitable banks tend to have relatively more equity. This finding is consistent with the prediction of the pecking order theory. Similarly, Kleff & Weber (2008) stressed that the capital level is positively correlated with the profit of the bank. Therefore, the accumulation of the profits provides a higher level of capital growth. However, the findings of Ahmad et al (2009) are inconsistent with others. They argued that earnings affect negatively the capital ratio in the Malaysian banking sector.

Bokhari & Syed (2013) analyzed the determinants of capital adequacy ratio in banking sectors of Pakistan by using both internal and external factors. They used deposits, Gross Domestic production growth rate, portfolio risks and profitability as bank characteristics affecting capital ratio. They found that profitability measured by return on equity has negative significant effect on capital ratio. It also concluded that the variables, deposits, portfolio risks and Gross Domestic production growth rate have negative significant impact on capital adequacy ratio.

Dreca (2013) analyzed determinants of CAR based on the data set of observation for 10 banks in period of 6 years in BOSNIAN and the result indicate that SIZE, Deposit(DEP), Loan to Asset ratio (LOA),ROA, ROE and leverage (LEV) have significant effect on CAR. On the other hand Loss Loan Reserve (LLR) and NIM do not appear to have significant effect on CAR. Variables SIZE, DEP, LOA and ROA have negative effect on CAR, while variables LLR, ROE, NIM and LEV are positively related with CAR.

Bateni et al (2014) study the relationship between capital adequacy ratio and bank size, loan to asset ratio, ROE, ROA, equity ratio, deposit asset ratio and risk asset ratio using data from six private Iranian banks during 2006-2012 with a total of 41 observations for each variable. From the regression results it is noticed that the independent variables explain 71.15% of the variation of the dependent variable (CAR). First of all is to emphasize that risk asset ratio (RAR) and deposit asset ratio (DAR) do not have any impact on capital adequacy ratio. Bank size has a negative relationship with CAR while loan to asset ratio (LAR), equity ratio (EQR) and ROA have a positive and significant relationship with CAR.

Ali & Hyseni (2015) studied by giving emphasis to the relationship between capital adequacy ratio and 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) using quarterly data from 2007 to 2014 with a total of 31 observations.

And the regression result indicates that those 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. In contrary to other similar studies in this study, the bank size has a positive impact on CAR meaning that large banks have higher CAR.

Similarly Yuanjuan & Shishun (2012) analyzed the relationship between the capital adequacy ratio (CAR) and some internal banking variables using regression analysis from 2005 - 2010. They use capital adequacy ratio as dependent variable while as independent variable they use: ROA, ROE, Earning per Share (EPS), Deposit loan ratio (DLR) and NPL.

From the regression results the author find a positive relationship between ROA and CAR but a negative relationship between ROE and CAR. In the same time is noticed a negative relationship between CAR and credit risk (NPL) and also liquidity risk (DLR).

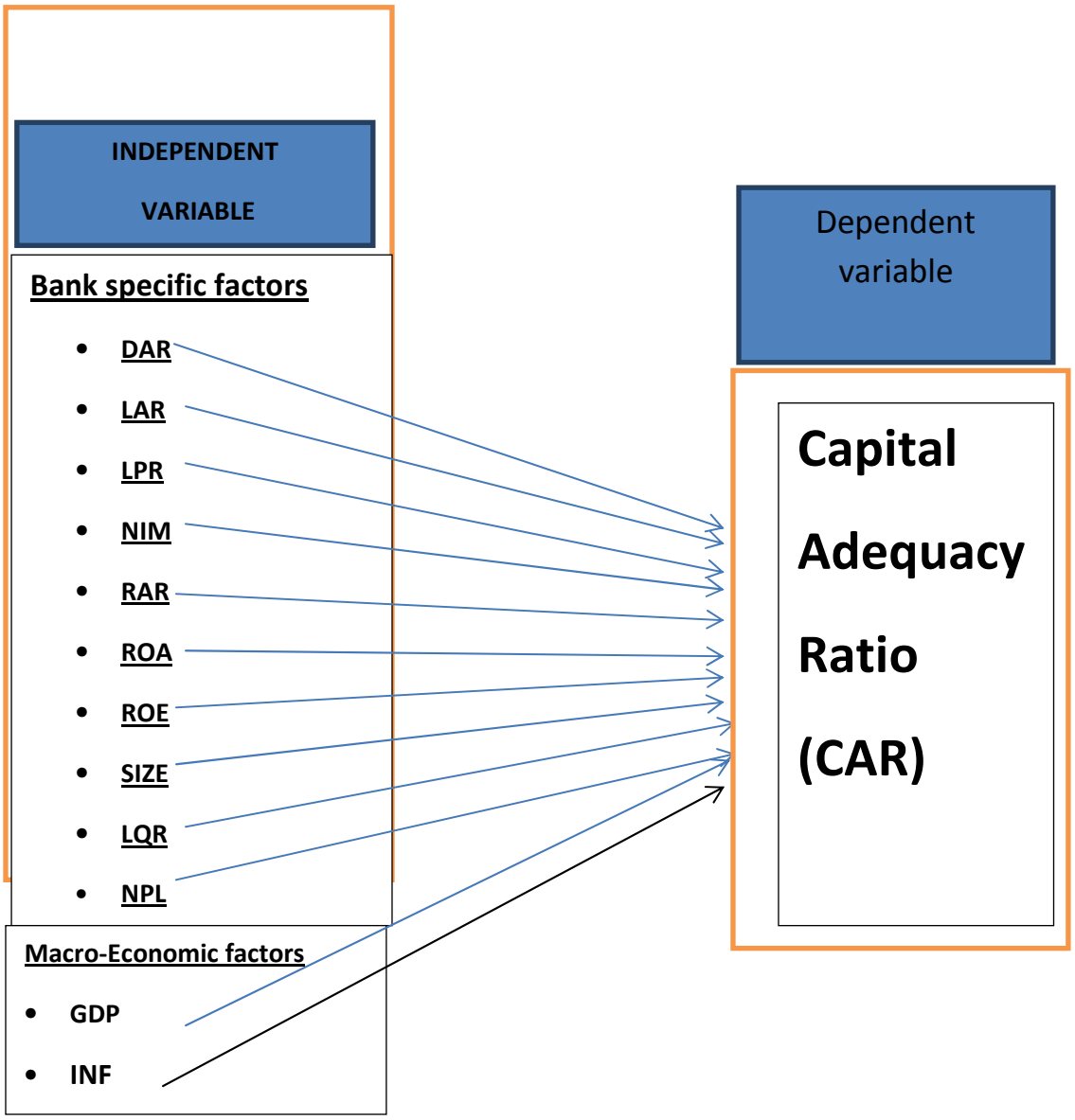
Asarkaya & özcan (2007) analyzed the determinants of capital structure in the Turkish banking sector. They proposed an empirical model in order to identify the factors that explain why banks hold capital beyond the amount required by the regulation. They used a panel data set that employs bank-level data from the Turkish banking sector covering the period 2002 – 2006 and estimated the model with generalized method of moments.

The findings of their study suggested that lagged capital, portfolio risk, economic growth, average capital level of the sector and return on equity are positively correlated with capital adequacy ratio and share of deposits are negatively correlated with capital adequacy ratio.

2.9 Conceptual Frame Work

The main objective of this study is to examine the determinants of CAR of commercial banks in Ethiopia. Based on the objective of the study and insights gained from the literature review, the following conceptual model is framed. The model proposes that Capital adequacy ratio is affected by two set of factors; namely bank specific and macroeconomic factors.

Figure 2.1 Conceptual Framework



Chapter Three

Research Methodology

This chapter discusses the research methodology employed to carry out this study. It starts by discussing the research design and proceeds with a discussion about the nature and instruments of data collection and sampling design.

3.1 Research Design and Approach

Research design is a master plan specifying the methods and procedures for collecting and analyzing the required data. The choice of research design depends on objectives that the researchers want to achieve (Hafiz, et al., 2007). Since this study was designed to examine the relationships between CAR and its determinants, a logical reasoning either deductive or inductive is required. Deductive reasoning starts from laws or principles and generalizes to particular instance whereas inductive reasoning starts from observed data and develops a generalization from facts to theory.

Besides, deductive reasoning is applicable for quantitative research whereas inductive reasoning is for qualitative research. Thus, due to the quantitative nature of the data to be employed in this particular research, the study uses deductive reasoning to examine the cause and effect relationships between CAR and its determinants. As this study examines the cause and effect relationships between Capital Adequacy Ratios and its determinant, it is an explanatory research. As noted by Kothari (2004), explanatory research design examines the cause and effect relationships between dependent and independent variables.

Furthermore the nature of the study is primarily about determining the factors affecting Capital Adequacy Ratios; which are dominantly quantitative data. Thus, the research employs quantitative research approach (Creswell, 2003) to analyze the relationship between the bank related and macro-economic factors and Capital Adequacy ratios of the various banks in Ethiopia. The research uses a panel data from 2002 to 2013.

3.2 Nature of Data and Instruments of Data collection

This study uses panel data. Panel data is used because it can take heterogeneity among different units into account over time by allowing for individual-specific variables. Besides, by combining time series and cross-section observations, it gives more information. Furthermore, panel data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data (Gujarati, 2004).

A secondary source of data, such as panel data, is chosen since it is less expensive in terms of time and money while collecting. It also offers an opportunity to collect high quality data (Saunders et al, 2009 as cited in Belay, 2012). Secondary data may either be published or unpublished data (Kothari, 2004). The panel data for this study is obtained from the audited annual financial statements of the concerned commercial banks in Ethiopia and various reports of NBE, MoFED and CSA. These data includes both bank specific and macroeconomic factors. The bank specific data are obtained from country's central bank (National bank of Ethiopia) which regulates the banking sector of the country and from the head office of each selected commercial banks. The macroeconomic variables were collected from CSA and MoFED.

3.3 Sampling Design

Sample design deals with sample frame, sample size and sampling technique. Sampling is a technique of selecting a suitable sample for the purpose of determining parameters of the whole population. Population is the list of elements from which the sample may be drawn (Hafiz, et al., 2007). A sample is drawn to overcome the constraints of covering the entire population with the intent of generalizing the findings to the entire population. As of May 2015, there are nineteen banks in Ethiopia. These are commercial bank of Ethiopia(CBE), Construction and Business bank(CBB), Awash international bank(AIB), Bank of Abyssinia(BOA), Wegagen bank(WB), United bank(UB), Nib international bank(NIB), Dashen bank(DB), Development bank of Ethiopia, Cooperative bank of Oromia, Lion international bank, Zemen bank, Oromia international bank, Buna international bank, Berhan international bank, Abay bank S.C, Addis international bank S.C, Debub global bank S.C and Enat banks. However, from all the above listed banks, Development bank of Ethiopia is not Commercial bank (www.nbe.et).

As noted by Kothari (2004), good sample design must be viable in the context of time and funds available for the study. Besides, judgmental sampling offers the researcher to deliberately select items for the sample concerning the choice of items as supreme based on the selection criteria set by the researcher. Accordingly, this study employed purposive sampling technique to select the required sample of banks from the above listed banks since it is viable in line with time and funds available for this study.

The selection criteria set by the researcher was first, the required banks are only Commercial banks in Ethiopia. Second, those commercial banks should have started operation before 2001/02 so that they can have financial statements for consecutive twelve years. Therefore, the data for this study was collected from eight commercial banks operating in the country. Out of the eight commercial banks, commercial bank of Ethiopia(CBE) and Construction and business bank(CBB) are state owned banks whereas the remaining six banks:-Awash international bank(AIB), Bank of Abyssinia(BOA), Wegagen bank(WB), United bank(UB), Nib International bank(NIB) and Dashen bank(DB) are private banks that were registered before 2001/02 by NBE.

Since the primary aim of this study is to examine the determinants of Capital adequacy ratio of commercial banks in Ethiopia, it is good to consider sample banks which are much more experienced in the industry. Thus, the study used 12 years data of those eight selected commercial banks that provide financial statements consecutively from 2002-2013periods.

3.4 Data Analysis and Presentation

As noted by Kothari (2004), data has to be analyzed in line with the purpose of the research. Accordingly, this study utilized descriptive, correlation and econometric analysis based on a panel data of commercial banks found in Ethiopia from 2002-2013 in order to examine the relationship between the CAR and its determinant factors. Secondary data collected from NBE, CSA and head office of each respective bank were analyzed to determine its suitability, reliability, adequacy and accuracy. The data collected from different sources were coded, checked and entered to simple excel program to make the data ready for analysis. Then the collected data were processed and analyzed through E-view version 7 software packages.

For descriptive analysis; table and percentage were used to analyze the data. Besides, results of the descriptive statistics such as mean, standard deviation, minimum and maximum values were reported to describe the characteristics of variables under investigation.

Furthermore, various diagnostic tests such as Normality, Heteroscedasticity, Autocorrelation and Multicolinearity test were 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 Variable Description and Research Hypotheses

This research work attempted to see the relationship between CAR of banks and bank specific factors (Share of deposit (DAR), Loan (LAR), Loan provision (LPR), Net Interest Margin (NIM), Bank Risk (RAR),Return on Asset (ROA), Return on Equity (ROE), Size, Liquidity (LQR), Non-Performing Loan (NPL) and macroeconomic factors (Economic Growth and Inflation) affecting CAR in the case of commercial banks in Ethiopia.

3.5.1 Dependent Variable:

Capital Adequacy Ratio (CAR): It is a ratio of total capital to Risk-weighted assets. The higher this ratio is, the higher is the banks' soundness because a bank with high capital adequacy ratio can absorb losses without becoming insolvent (Mpuga, 2002).

So, CAR is calculated using the formula proposed by (Sarker, 2006 ; Hasbi & Haruman, 2011) as follows:

$$CAR = \frac{\text{Total capital}}{\text{Risk weighted asset}} \%$$

Total capital in the nominator is divided into two Tiers: which are called Tier I capital (prime capital) and Tier 2 capital (supplementary capital). Tier one capital consists of paid-in capital, all kind of reserves, retained earnings. While Tier two capitals consists of undisclosed reserves, assets revaluation reserves, general provisions, hybrid capital instruments and subordinated term debt. A risk- weighted asset in the denominator of the capital adequacy ratio represents on balance sheet and off balance sheet assets in the bank's balance sheet weighted by their risk. These weights were determined internationally by Basel Committee and adopted by all banks in the world (Wagster & John, 1996).

The ratio excluded zero risky assets like cash, treasury securities, any claims on government or claims guaranteed by the Organization of Economic countries and Development (OECD) governments and central banks. The calculation of CAR and the detail component off balance sheet and on balance sheet items in the context of Ethiopia is annexed at the end of the paper. Per the directive of NBE, Ethiopian commercial banks must maintain a minimum level of capital adequacy requirements of 8 percent (NBE, 1995).

3.5.2 Independent variables:

All independent variables that were included in the model of this study have been chosen based upon results of previous studies.

1. Share of Deposit- DAR (Deposit to Asset Ratio): Is a ratio of total deposits to total assets. Deposits represent all kind of bank's deposits (Current deposits, Withdrawal deposits and others). This ratio is used to measure the impact of changes in deposits on capital. Deposits are generally considered cheaper sources of funds compared to borrowing and similar financing instruments (such as financing by bond or syndication and securitization loans) for banks (Kleff & Weber, 2008).Ogere et al (2013); Dreca (2013);Asarkaya & özcan (2007) found a negative sign between share of deposit and capital adequacy ratio. Bokhari and Ali (2013) analyzed the determinants of CAR in Pakistan banking sector. In their empirical analyses on the panel data, they found that deposits have a negative significant impact on CAR. So this study hypothesizes negative relationship between DAR and Capital adequacy ratio (CAR).

Hypothesis 1: DAR has negative effect on CAR.

2. Loan –LAR (Loan to Asset Ratio): is a ratio of total loans to total assets for bank. This is important because of its relationship with diversification and the nature of investment opportunity set. It measures the impact of loans in assets portfolio on capital. The study conducted by Dreca, (2013) indicates that banks may require more loans to invest in diversified nature of business. So banks transform more capital into loans. Due to this fact the balance of capital gets reduced and invested in loan. The reduction of capital brings the reduction of capital adequacy ratio of the banks .The idea is also supported by finding of Büyüksalvarc &Abdioğlu (2011).Thus, this study hypothesizes a negative relationship between LAR and capital adequacy ratio (CAR).

Hypothesis 2: LAR has negative impact on CAR.

3. Loan Provision-LPR (Loan Provision Ratio): is a ratio of loan loss provisions to total loans. It 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). Banks with more loan loss reserves are more aggressive in their lending practices, and are willing to accept losses instead of negotiating concession with loan defaulters. This means, a positive effect could signal that banks voluntarily increase their capital to a greater extent in order to overcome their bad financial situation. This thought is also supported by the empirical study of (Büyüksalvarc & Abdioğlu, 2011) ,as LPR has positive relationship with CAR.

Loan loss provision is a deduction item of accounting profits. The amount of its extraction not only influences the accounting profits, but also has certain maneuverability, while it is an estimate of the future loss that may occur. Therefore, commercial bank loan loss provisions may affect the earnings. The provision for loan losses is closely related to bank risks because general provisions can be included in supplementary capital, and specific provisions can be used as a deduction from risky assets. Therefore the loan loss provision is related to the regulatory capital adequacy ratio (Dong et al, 2012). With this context Blose(2001) found that provisioning of loan losses caused a decline in capital adequacy ratio and it is supported by finding of (Hassan, 1992;Al-Sabbagh , 2004;Choi, 2000). Therefore, this study also hypothesizes negative relationship between LPR and capital adequacy ratio.

Hypothesis 3: LPR has negative impact on CAR.

4. Management Quality-Net Interest Margin (NIM): is defined as net interest income divided by average earning assets of the bank. It is used as to measure the quality of management (Thiam, 2009). It is a summary measure of banks' net interest rate of return. The net interest margins are set by banks to cover the costs of intermediation and it reflects both the volume and mix of assets and liabilities. Yu H.(1995) indicates that high income led to the bank's management reduce "capital cushion" given the low risk of failure. As a result, there is a negative relationship between net interest margin and capital adequacy ratio. On the other hand, more specifically, adequate net interest margins generate adequate income to increase the capital base as risk exposure increases (Angabazo, 1997). According to Angabazo(1997) NIM has a positive influence on bank capital due to the high revenues that allow the bank to raise additional capital through retained earnings and that give a positive signal to the value of the company (Rime, 2001). This is also supported by Thiam (2009) finding as there is a positive relationship between bank management quality and bank capital. Similarly, Berger et al (1995);Demirgüç-Kunt & Huizinga(1998) found a positive relationship between the NIM and the ratio of equity. Thus, this study also hypothesizes positive relationship between NIM and capital adequacy ratio (CAR).

Hypothesis 4: NIM has positive effect on CAR.

5. Bank Risk – RAR (Risk Weighted Asset to Asset Ratio): is calculated as a ratio of risky weighted assets to total assets. Risky assets represent all assets in a bank's balance sheet weighted by their risk. These weights were determined by an international standards ranging from (0%, 20%, 50%, 100%), which were based on risk- based capital standards and reflect risk inherent in banks' assets portfolio (Al-Sabbagh , 2004) . As per the empirical finding of various scholars in the area an increase in risky assets in a bank's assets portfolio will lead to a reduction in CAR (Mpuga, 2002;Al-Sabbagh, 2004;Okuyan, 2013;Bokhari & Syed, 2013;Ogere et al , 2013).Furthermore, as stated above, capital adequacy ratio (CAR) is the ratio of equity and Risk weighted asset (RAR). So if everything is constant, mathematically we can easily conclude the inverse relationship of Risk weighted Asset (RAR) and Capital Adequacy ratio (CAR). Therefore, this study hypothesizes negative relationship between RAR and capital adequacy ratio (CAR).

Hypothesis 5: RAR has negative impact on CAR.

6. Return on Asset (ROA): is calculated as a ratio of return to total assets. Return on Assets which represent 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 (Khaled & Samer, 2013). This ratio was employed as a measure of banks performance in several previous studies. Büyüksalvarc & Abdioğlu (2011) argued that profitability tends to increase capital relative to assets in the Turkish banking sector. In addition, Gropp & Heider(2007) found that more profitable banks tend to have more capital relative to assets. Thus, a positive relationship is expected between profitability and capital adequacy ratio. Therefore, this study expects a positive relationship between ROA and capital adequacy.

Hypothesis 6: ROA has positive impact on CAR.

7. Return on Equity (ROE): is calculated as a ratio of return to owner's equity. It expresses the return realized by owners in return of investing their funds in the bank. It is also one of the most important profitability ratios because owners according to this ratio decide to continue their investment in the bank or transferring their investments to other activities that yield suitable return (Khaled & Samer, 2013). In this study therefore, ROE 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. This is in line with Gropp and Heider (2007) finding which indicated a positive relationship between profit and capital relative to assets. This is also supported by (Moulyneux & J.Thornton, 1992; Gropp & Heider, 2007;Asarkaya & özcan, 2007)

Hypothesis 7: ROE has positive impact on CAR.

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

To proxy the economic growth the real gross domestic products growth rate was used. The real gross domestic product growth rate (GDP), calculated as the annual change of the Gross Domestic products. Economic growth is among the most commonly used macroeconomic indicators, as it is a measure of total economic activity within an economy.

In the positive economic growth period there is low risk and the banks retain low capital ratio and make more investments in other financial sectors, while when there is negative growth rate then banking may need the relatively high capital or may face sudden economic losses, to hedge that risk banks maintain high capital ratio. And the same is supported by (Bokhari & Syed, 2013).Therefore, this study hypothesizes negative relationship between GDP and capital adequacy ratio (CAR).

Hypothesis 8: Real Gross Domestic Products Growth Rate (GDP) has negative impact on CAR.

9. Bank Size (SIZE): Bank size means the total size of the balance sheet of the bank. Empirical study made by Büyükşalvarcı and Abdioğlu (2011) found that there is no significant relation between the bank size and CAR in the Turkish banks. Gropp and Heider(2007) found that asset-size of a banking organization is an important determinant of its capital ratio in an inverse direction, which means that larger banks have lower capital adequacy ratios. Similarly, Rime (2005) found bank size has a negative and significant impact on capital in Switzerland banks. (Al-Sabbagh, 2004) found the bank size in Jordan negatively impact the CAR. In contrary, as per the finding of Hassan(1992);Ali & Hyseni(2015);Mpuga (2002) size has positive relationship with CAR. Because when bank's size increase its size of operations will also increase. This will lead to an increase in risks associated its activities. So depositors and investors will need a guarantee or a cushion against risk of loss. So capital adequacy ratio which represents a cushion against losses should increase when bank's size increase. Therefore, this study hypothesizes negative relationship between SIZE and capital adequacy ratio (CAR).

Hypothesis 9: SIZE has negative impact on CAR.

10. Liquidity (LQR): LQR represent the ratio of liquid asset to Total Asset. It is used to determine the financial position of banks. Liquidity discloses the capability of a bank to discharge its obligations against depositors. The image of bank is greatly reflected by the risk of liquidity. Liquidity is a significant aspect which reflects bank's ability to meet its credit demand and cash flow requirements. Bank can obtain sufficient liquid funds if it has an adequate liquidity position. Rudolf (2009) emphasized that the liquidity expresses the degree to which a bank is capable of fulfilling its respective obligations.

(Angabazo, 1997) states that as the proportion of funds invested in cash or cash equivalents increases, a bank's liquidity risk declines, leading to lower liquidity premium in the net interest margins. Therefore, an increase in bank liquidity may have a positive impact to capital ratio. The same is supported by (Abusharba, et al., 2013;Parvesh & Afroze, 2014). This study hypothesizes a significant positive relationship between LQR and capital adequacy ratio, because the high liquidity reduces liquidity risks and increases capital. According to the NBE establishment proclamation (No. 592, pp. 4200 part 5 No.20) liquid assets of banks include cash on hand, deposit in other banks, and short term government securities that are acceptable by the NBE as collateral (for instance, Treasury bills).

Hypothesis 10: LQR has positive impact on CAR.

11. Inflation (INF): Consumer price index is used in this study as the proxy of inflation since most ample measure of inflation defines a change in the price of consumer goods and services purchased by households. As to Williams (2011), inflation is one of the factors that determine capital adequacy since during inflation the capital of the bank is eroded. Similarly, this study hypothesizes negative relationship between inflation and capital adequacy ratio (CAR).

Hypothesis 11: INF has negative effect on CAR.

12. Non-Performing Loan (NPL): It is measured by a ratio of Non-Performing Loans to Total Loans. NPL ratio is one of the key indicators that can be used in assessing the performance and quality of bank assets. The higher the NPL ratio indicates the worse the quality of bank credit and the amount of credit risk faced by banks are getting bigger and the impact on the bank's earnings (Nasser, 2003). As a result banks which have a high capital level are expected to have a lower NPL ratio as a result of the coverage of the loan losses by its equity.

Therefore in this study the expected relationship between the NPL ratio and capital adequacy ratio is negative.

Hypothesis 12: NPL has negative effect on CAR.

Table 3.1 Summarizes all the Proposed Hypotheses for Empirical Testing

Independent Variables	Expected Relationship With dependent variable (CAR)
DAR	- ve
LAR	- ve
LPR	- ve
NIM	+ ve
RAR	- ve
ROA	+ ve
ROE	+ ve
GDP	- ve
SIZE	- ve
LQR	+ ve
INF	- ve
NPL	-ve

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

3.6 Regression Model Specification

The nature of data used in this study enabled to use panel/longitudinal data model which is deemed to have advantages over cross sectional and time series data methodology. Panel data involves the pooling of observations on the cross-sectional over several time periods. As Brooks (2008) stated the advantages of using panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross-sectional data alone. Second, it is often of interest to examine how variables, or the relationships between them, change dynamically (over time).

To do this using pure time-series data would often require a long run of data simply to get a sufficient number of observations to be able to conduct any meaningful hypothesis tests. But by combining cross-sectional and time series data, one can increase the number of degrees of freedom, and thus the power of the test, by employing information on the dynamic behavior of a large number of entities at the same time. The additional variation introduced by combining the data in this way can also help to mitigate problems of Multicollinearity that may arise if time series are modeled individually.

Third, by structuring the model in an appropriate way, we can remove the impact of certain forms of omitted variables bias in regression results. Thus, the general panel/longitudinal regression is modeled as: $\mathbf{y_{it} = \beta_0 + \beta x_{it} + u_{it}}$ with subscript *i* denoting the cross-section and *t* representing the time-series dimension. The left-hand variable $\mathbf{y_{it}}$is the dependent variable, $\mathbf{\beta_0}$is the intercept term, βis a $k\times1$ vector of parameters to be estimated on the explanatory variables, and $\mathbf{x_{it}}$is a $1 \times k$ vector of observations on the explanatory variables, t = 1, . . . , T ; i = 1, . . . , N.

Therefore, to test our hypothesis, the following model is formulated:

$$\mathbf{CAR_{it}=\beta_0+\beta 1(DAR)_{it}+\beta_2(LAR)_{it}+\beta_3(LPR)_{it}+\beta_4(NIM)_{it}+\beta_5(LAR)_{it}+\beta_6(ROA)_{it}+\beta_7(ROE)_{it}+\beta_8(GDP)_{it}+\beta_9(SIZE)_{it}+\beta_{10}(LQR)_{it}+\beta_{11}(INF)_{it}+\beta_{12}(NPL)_{it}+\varepsilon_{it}}$$

Where;

- $\boldsymbol{\beta_0}$is an intercept,
- $\mathbf{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}}$ **and** $\mathbf{\beta_{12}}$ represent estimated coefficient for specific bank i at time t ,
- **CAR**$_{it}$: The capital adequacy ratio for bank i at time t.
- **DAR**$_{it}$ **:** The ratio of total deposit to total assets for bank i at time t
- **LAR**$_{it}$ **:** The ratio of total loans to total assets for bank i at time t.
- **LPR**$_{it}$ **:** The ratio of loan loss provisions to total loans for bank i at time.
- **NIM**$_{it}$ **:** Net interest margin for bank i at time t
- **RAR**$_{it}$**:** The ratio of risk weighted assets to total assets for banksi at time t.
- **ROA**$_{it}$**:** Return on assets for bank i at time t.
- **ROE**$_{it}$: Return on equity for bank i at time t.
- **GDP**$_{it}$: Real GDP growth rate of Ethiopia at time t.
- **SIZE**$_{it}$: Total assets for bank i at time t.
- **LQR**$_{it}$ **:**The ratio of liquid asset to total assets for bank i at time
- **INF**$_{it}$: The overall inflation rate in Ethiopia at time t

- **NPL_{it}:** The ratio of Non-performing loan to total loans for bank i at time t.
- **t:** Time (2000-2013).
- **ε_{it}:** Represents error terms for intentionally/unintentionally omitted or added variables. It has the characteristics of zero mean, constant variance and non- auto correlated. The coefficients of explanatory variable were estimated by the use of ordinary least square (OLS) technique.

The null hypothesis is to be rejected at 1%, 5% and 10% significant level.

Chapter four

Data Presentation and Analysis

In the preceding chapters important literatures relating to the topic were reviewed that gives enough understanding about the topic and used to identify knowledge gap on the area. The research design used for this study was also discussed in the preceding chapter. In this chapter, the data and its analysis results such as correlation and regression analysis findings were discussed. The chapter has five sections. The first section (section 4.1.) presents the descriptive statistics of the dependent and independent variables. This was followed by section 4.2 that presents results of the correlation analysis. Section 4.3 presents the test for the validity of assumptions for classical linear regression model/CLRM. Then, the results of the regression analysis were presented under section 4.4. Finally, discussions for the results of the regression analysis were made under section 4.5.

4.1. Descriptive Statistics of the Data

The descriptive statistics for the dependent and independent variables for eight commercial banks of Ethiopia from year 2002 to 2013 with a total of 96 observations are presented below. The dependent variables are capital adequacy ratio measured by capital to risk weight assets ratio (CAR) and the independent variables are Share of Deposit(DAR), Loan(LAR), Loan Provision (LPR),Management Quality(NIM),Risk(RAR), Return on Asset (ROA),Return on Equity (ROE), Economic Growth (GDP), Bank Size(SIZE),Liquidity (LQR),Inflation (INF) and Non-Performing Loan (NPL). Table 4.1 shows the descriptive statistics of the dependent and independent variables.

Table 4.1 Descriptive Statistics of Dependent and Independent Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
CAR	0.145	0.142	0.284	0.073	0.041	96
DAR	0.756	0.772	0.872	0.576	0.067	96
LAR	0.523	0.544	0.753	0.225	0.125	96
LPR	0.059	0.04	0.29	0.012	0.052	96
NIM	0.045	0.044	0.119	0.009	0.018	96
RAR	0.768	0.758	1.13	0.331	0.187	96
ROA	0.024	0.027	0.04	-0.021	0.01	96
ROE	0.225	0.23	0.7	-0.57	0.144	96
GDP	0.098	0.109	0.126	-0.021	0.038	96
SIZE	3.67	3.644	5.295	2.497	0.562	96
LQR	0.263	0.252	0.661	0.076	0.11	96
INF	0.142	0.122	0.364	-0.106	0.127	96
NPL	0.113	0.076	0.535	0.003	0.11	96

Source: Financial statement of sampled commercial banks and own computation through E-views-7

The above table includes the mean, median, standard deviation, number of observations, minimum and maximum for the independent and dependent variables used in this research. It shows the average indicators of variables computed from the financial statements.

As can be seen from Table 4.1, the mean value of CAR was 0.15 and the median value was 0.14. The maximum and the minimum value of CAR was 0.28 and 0.07 respectively. This result shows that the most capitalized bank kept 28% of its total Risk weighted Asset for CAR and the less capitalized kept 7% of its risk weighted asset for CAR . As median value was closer to the mean value it indicates that CAR of sample banks closer to the mean values. The standard deviation of the CAR was 0.05 which shows that the CAR variation among sample bank was small. The mean value of capital adequacy ratio (14.50%) provides the evidence that most of Ethiopian commercial banks maintain higher level of capital requirement than prescribed by National bank of Ethiopia i.e. (8%). Therefore, they have an opportunity to take revenue a minimum 6.5% (14.5%-8%) of existing capital to invest more to the public. However, the minimum CAR value of the sample banks was also below NBE requirement.

DAR ratio that measured by the ratio of total deposits to total assets .The mean , median , standard deviation value of DAR were 0.756, 0.772 and 0.067 respectively. The maximum and minimum values of DAR were 0.872 and 0.576 respectively. The mean value of 75.6% indicate that depositors money are secured as only an average of 75.6% percent of banks total asset in the event of liquidation. This position is further supported by the low standard deviation of DAR (6.7%) during the period of the study.

LAR ratio that measured by total loan to total assets. The mean value of LAR was 0.523 and the median value was 0.5440. The maximum and the minimum value of LAR was 0.753 and 0.225 respectively. The mean value indicates that more than half of a bank total assets are employed 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 (12.5%) during the period of the study.

LPR ratio that measured by Loss loan provision to total loan, it ranges from a minimum of 0.012 to a maximum of 0.29. It has a mean of 0.059 with 5% ups and downs. This indicates that on average Ethiopian banks held 5.9% of their loan as Loan Provision.

NIM ratio that measured by net interest income divided by average earning assets, it ranges from a minimum of 0.9% to a maximum of 11.9%. It has a mean of 4.5% with 0.18% variability. This indicates that from the total of average earning 4.5% were interest incomes.

RAR ratio that measured by Risk Weighted Asset divided by Total Assets, it ranges from a minimum of33% to a maximum of 113%. It has a mean of 76.8% with 18.7% ups and downs for the period from 2002 to2013. The mean value of 77% indicates that substantial proportion of the total assets of Ethiopian banks is risky assets. This is because of the trade-off between risk and return and banks will always combine their asset portfolios in sufficient proportion that will guarantee reasonable return at any level of risk.

ROA is measured by Net return divided by Total Asset. The mean value of ROA was 0.02 and the median value was 0.027. The maximum and the minimum value of ROA was 0.04 and -0.021 respectively. This result indicates the most profitable bank among sample earned 4 cents profit for a single birr investment on it assets and the least profitable bank among the sample banks earned 0.02 cents profit for single birr investment. The standard deviation of the ROA was 0.01 which shows that the profitability variations among the sample banks were very small.

On the other hand, ROE measured by the net profit divided by total equity of the bank. The ratio measures how much the banks earns efficiently from funds invested by its shareholders. As shown in Table 4.2, ROE records a minimum of -57% and maximum of 70%. It has a mean of 22.5% with 14.4% standard deviation. This implies that commercial banks in Ethiopia have relatively a good performance in terms of ROE as compared to ROA during the study period. Thus, commercial banks in Ethiopia earned high return from its own equity than assets.

GDP measures the economic growth of the country. The annual GDP of the country ranges from a minimum of -2.1% to a maximum of 12.6%. The mean value of GDP was 9.8% with 3% up and down. The mean value of GDP indicates the average real economic growth of the country.

Bank size is measured in terms of Asset size .The mean, median, standard deviation value of size were 3.67, 3.64 and 0.56 respectively. The maximum and minimum value of size was 5.29 and 2.497 respectively. The Size of banks was highly dispersed from its mean value (i.e. 367%) with the standard deviation of 56%. The maximum value indicating the commercial bank of Ethiopia (CBE) and the minimum value was some of privately owned commercial banks in Ethiopia. In terms of size CBE outweigh some banks more than 100%.

Inflation rate which measures the variability of the price level in the economy. The average general inflation rate (i.e. 14.2%) of the country over the past twelve years was more than the average Real Gross Domestic Products growth rate (GDP). The maximum inflation was 36.4% and the minimum was -10.6%. The rate of inflation was highly dispersed over the periods under study towards its mean with standard deviation of 112.7%.

Liquidity is measured by Liquid Asset to Total Asset; it ranges from a minimum of 7.6% to a maximum of 66.10%. It has a mean of 26.3% with 11% ups and downs for the period from 2002 to2013. The mean value of 26.3% indicates that from total asset only 26.3% is liquid asset.

NPLs ratio measured by Nonperforming loans divided by total loan ranges from 0.3% to 53.5 %. It has a mean of 11.3% with 11% variation. This indicates that Commercial banks in Ethiopia incurred 11.82% NPLs on averages from its total loan. According to Ethiopian context, the banking sectors are required to maintain the ratio of NPLs at least below 5% (NBE, 2008). However, as indicated above in table 4.1, the NPLs of commercial banks in Ethiopia are more than the required threshold. Thus, NPLs problem are still serious for commercial banks in Ethiopia.

4.2. Correlation Analysis

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The most widely used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which was used in this study. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship). The sample size is the key element to determine whether or not the correlation coefficient is different from zero/statistically significant. 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 8*12 matrixes of 96 observations which was around 100 hence the study used the above justification for significance of the correlation coefficient.

Table 4.2 shows the correlation coefficient between the dependent variables and independent variables.

Table 4.2 Correlation Matrix of Dependent and Independent Variables

	DAR	LAR	LPR	NIM	RAR	ROA	ROE	GDP	SIZE	LQR	INF	NPL
CAR	-0.25787	-0.35136	-0.35051	0.37667	-0.12775	0.34587	-0.13634	0.02456	0.13864	0.07186	0.25204	-0.39135

Source: Financial statement of sampled commercial banks and own computation through E views -7

According to Brooks (2008), if it is stated that y and x are correlated, it means that y and x are being treated in a completely symmetrical way. Thus, it is not implied that changes in x cause changes in y, or indeed that changes in y cause changes in x rather, it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient.

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.

NIM, 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.

4.3. Testing Assumptions of Classical Linear Regression Model (CLRM)

In this study as mentioned in chapter three diagnostic tests were carried out to ensure that the data fits the basic assumptions of classical linear regression model. Consequently, the results for the model assumptions test are presented as follows:

➢ Test for average value of the error term is zero (E(ut)=0) assumption

According to Brooks(2008), if a constant term is included in the regression equation, this assumption will never be violated. Thus, since the regression model used in this study included a constant term, this assumption is not violated.

➢ Test for Homoscedasticity assumption (Var(ut)=σ2)

It has been assumed thus far that the variance of the errors is constant. This is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic. To test this assumption the white test was used having the null hypothesis of heteroskedasticity. Both F-statistic and chi-square (χ) 2 tests statistic were used. The assumption of homoscedasticity is that the residuals are approximately equal for all predicted dependent variable scores- the variance of errors is constant, if the assumption are met the pattern of the residuals will have about the same spread on either side of a horizontal line drawn through the average residual (Wooldridge, 2006). Otherwise if the errors do not have a constant variance, it is said that the assumption of homoscedasticity has been violated. This violation is termed as heteroscedasticity. In this study white test was used to test for existence of heteroscedasticity across the range of explanatory variables.

Table 4.3 Heteroscedasticity Test: White

F-statistic	4.398235	Prob. F(90,5)	0.0503
Obs*R-squared	94.80252	Prob. Chi-Square(90)	0.3441
Scaled explained SS	96.86786	Prob. Chi-Square(90)	0.2916

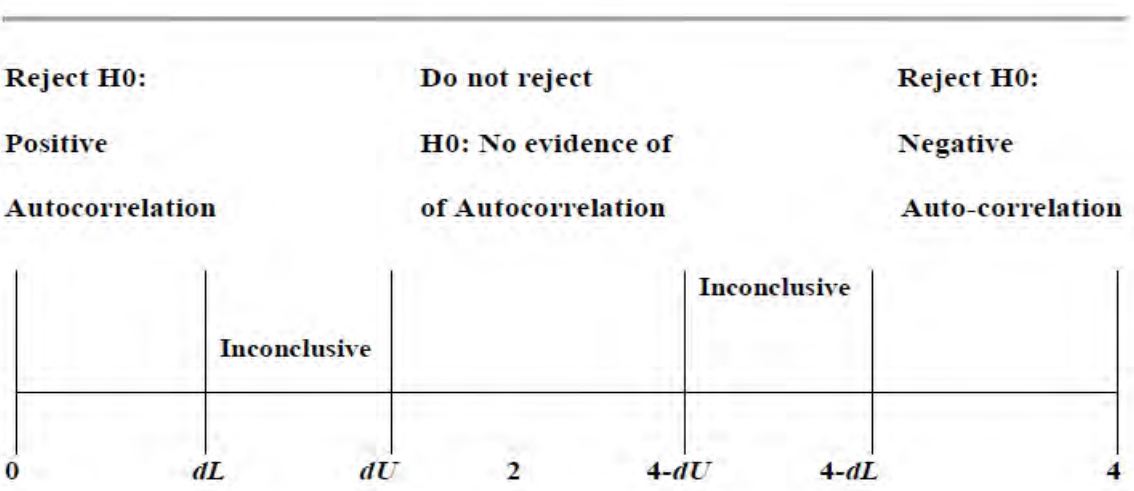
Source: E-view output

The result in table 4.3 shows that F-stat, X^2, and scaled explained SS have probability values greater than 0.05; suggesting absence of Heteroscedasticity.

➢ Test for absence of autocorrelation assumption (cov(ui,uj)=0 for i= j)

This is an assumption that the errors are linearly independent of one another (uncorrelated with one another). If the errors are correlated with one another, it would be stated that they are auto correlated. The study used the dL and dU values for 95 observations as approximation of 96 observations. As per the DW table in the appendix (5) for 95 observations with 12 explanatory variables at 5% level of significant, the dL and dU values are 1.394 and 1.956 respectively.

Figure 4.1 Rejection and Non Rejection Regions for DW Test



The DW test statistic value from the regression result is 1.80 and it is above the lower level but below the upper level. Therefore, it falls in the inconclusive region and the null hypothesis is neither rejected nor not rejected.

Continuing with Breusch-Godfrey Serial Correlation LM test is applied at 12 lagged level considering the 12 independent variables used on the study. The test result indicated below shows the null hypothesis of no autocorrelation is not rejected, since it is above 5% significance level.

Table 4.4 Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.614106	Prob. F(12,71)	0.8234
Obs*R-squared	9.027130	Prob. Chi-Square(12)	0.7006

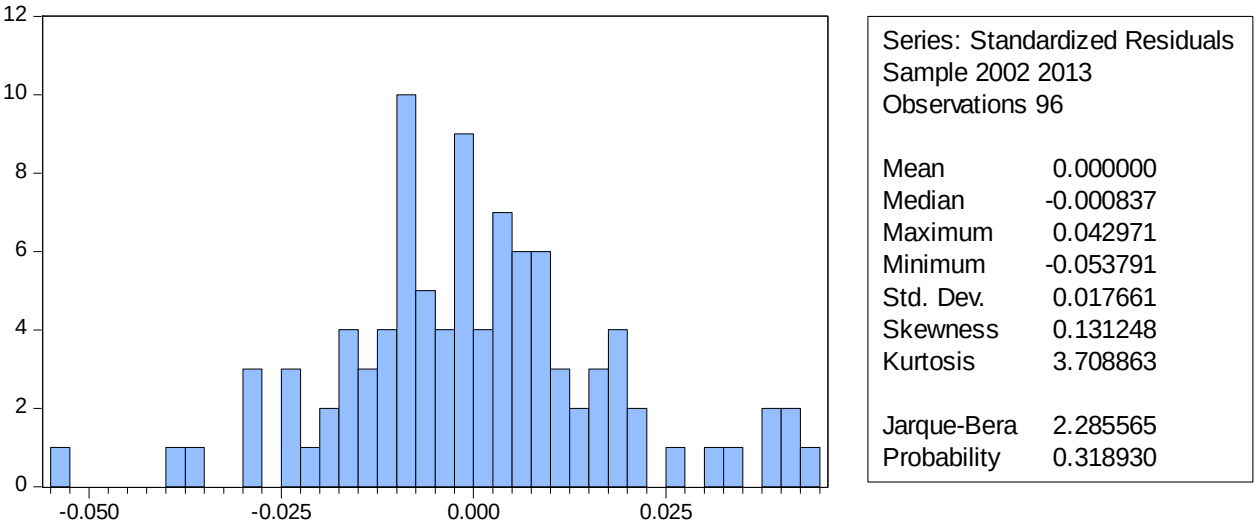
Source: E-view output

➢ Test for Normality assumption (Ut ~N(0, σ2)

A normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Bera-Jarque formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis are zero and three respectively.

Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how far the tails of the distribution are. The Bera-Jarque probability statistics/P-value is also expected not to be significant even at 10% significant level (Brooks, 2008).According to Gujarati(2004), the JB is a large sample test and our sample of 96 falls within that range; suggesting possibility for using JB test also.

Figure 4.2 Normality Test



Source: E-view output

As shown in the above Histogram, kurtosis approaches to 3 (i.e. 3.708863) and the Jarque-Bera statistics was not significant even at 10% level of significance as per the P-values shown in the histogram (i.e. 0.318930). Hence, the null hypothesis that the error term is normally distributed should not be rejected.

➢ Test for Absence of Series Multicollinearity Assumption

This assumption is concerned with the relationship between explanatory variables. If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect Collinearity, and it cannot be estimated by OLS (Brooks, 2008).

Multicollinearity condition exists where there is high, but not perfect, correlation between two or more explanatory variables (Cameron & Trivedi, 2009; Wooldridge, 2006). According to Churchill & Iacobucci(2005), when there is Multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases.

As a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. This assumption does allow the independent variables to be correlated; they just cannot be perfectly correlated. If we did not allow for any correlation among the independent variables, then multiple regressions would not be very useful for econometric analysis.

How much correlation causes Multicollinearity however, is not clearly defined. Hair et al.(2006) argue that correlation coefficient below 0.9 may not cause serious Multicollinearity problem. Malhotra(2007) stated that Multicollinearity problem exists when the correlation coefficient among variables is greater than 0.75. Kennedy (2008) also suggests that any correlation coefficient above 0.7 could cause a serious Multicollinearity problem leading to inefficient estimation and less reliable results. This indicates that there is no a single agreed upon measure of Multicollinearity. For the purpose of this study, Hair et al. (2006) is used.

Table 4.5 Correlation Matrix of Explanatory Variables

	DAR	LAR	LPR	NIM	RAR	ROA	ROE	GDP	SIZE	LQR	INF	NPL
DAR	1.000000											
LAR	-0.024593	1.000000										
LPR	-0.056786	-0.17439	1.000000									
NIM	-0.0552100	0.298671	-0.579775	1.000000								
RAR	-0.081094	0.808528	-0.363966	0.506957	1.000000							
ROA	-0.094255	-0.16778	-0.407869	0.490147	0.167057	1.000000						
ROE	0.052843	-0.30534	-0.137526	0.107853	-0.1845	0.680294	1.000000					
GDP	0.052224	-0.0819	-0.084805	0.133025	0.025947	0.290303	0.168823	1.000000				
SIZE	0.225349	-0.75855	0.105969	-0.25726	-0.746134	0.298540	0.510582	0.160906	1.000000			
LQR	0.136767	-0.01143	0.203819	-0.09339	0.105806	-0.282804	-0.353765	-0.133281	-0.350649	1.000000		
INF	-0.049934	-0.26481	-0.155901	0.297545	-0.076288	0.465915	0.342215	-0.04259	0.390744	-0.2528	1.000000	
NPL	-0.134336	0.244499	0.673282	-0.50864	0.009098	-0.636453	-0.402516	-0.188353	-0.428244	0.389071	-0.384824	1.000000

Source: Financial statement of sampled commercial banks and own computation through E-views- 7

The results of the correlation matrix show that the highest correlation is 0.80 i.e. between RAR and LAR. Since there is no correlation above 0.9 according to Hair, et al.(2006), it is possible to conclude in this study that there is no problem of Multicollinearity.

➢ Choosing Random Effect (RE) Versus Fixed Effect (FE) Models

According to (Gujarati, 2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model/FEM and random effect model/REM. Hence the choice here is based on computational convenience. On this score, FEM may be preferable. Since the number of time series (i.e. 12 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks), FEM is preferable in this case. According to Brooks(2008); Verbeek (2004); Wooldridge(2006), it is often said that the REM is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a FEM is more plausible when the entities in the sample effectively constitute the entire population/sample frame. Hence, this study chose to use FEM since the sample for this study was not selected randomly and closely approximates the sample frame.

4.4. Analysis and Interpretation of Regression Result

This section presents the regression result of fixed effect model that made to examine the determinant of CAR of commercial banks in Ethiopia.

Accordingly, the regression result was made and coefficients of the variables were estimated via E-view version 7 software. As stated earlier in model selection part, fixed effect regression model is an appropriate model used in this study. Thus, the model used to examine the determinants of CAR of commercial banks in Ethiopia in this study was:

$$CAR_{it}=\beta 0+\beta 1(DAR)_{it}+\beta_2(LAR)_{it}+\beta_3(LPR)_{it}+\beta_4(NIM)_{it}+\beta_5(LAR)_{it}+\beta_6(ROA)_{it}+\beta_7(ROE)_{it}+\beta_8(GDP)_{it}+\beta_9(SIZE)_{it}+\beta_{10}(LQR)_{it}+\beta_{11}(INF)_{it}+\beta_{12}(NPL)_{it}+\varepsilon_{it}$$

Where;

- **β0** is an intercept,
- **β1, *β2, β3, β4, β5, β6, β7, β8, β9, β10,β11 and β12*** represent estimated coefficient for specific bank *i* at time ***t*** **,**
- **CAR**$_{it}$: The capital adequacy ratio for bank i at time t.
- **DAR**$_{it}$ **:** The ratio of total deposit to total assets for bank i at time t
- **LAR**$_{it}$ **:** The ratio of total loans to total assets for bank i at time t.
- **LPR**$_{it}$ **:** The ratio of loan loss provisions to total loans for bank i at time.
- **NIM**$_{it}$ **:** Net interest margin for bank i at time t
- **RAR**$_{it}$**:**The ratio of risk weighted assets to total assets for banks i at time t.
- **ROA**$_{it}$**:** Return on assets for bank i at time t.
- **ROE**$_{it}$: Return on equity for bank i at time t.
- **GDP**$_{it}$: Real GDP growth rate of Ethiopia at time t.
- **SIZE**$_{it}$: Total assets for bank i at time t.
- **LQR**$_{it}$ **:**The ratio of liquid asset to total assets for bank i at time
- **INF**$_{it}$: The overall inflation rate in Ethiopia at time t
- **NPL**$_{it}$**:** The ratio of Non- performing loan to total loans for bank i at time t.
- **t:** Time (2000-2013).
- $\varepsilon_{it:}$ Represents error terms for intentionally/unintentionally omitted or added variables. It has the characteristics of zero mean, constant variance and non- auto correlated.

The coefficients of explanatory variable were estimated by the use of ordinary least square (OLS) technique. The regression result in Table 4.6 demonstrates both coefficients of explanatory variables and corresponding p-values.

Table 4.6 Results of Fixed Effect Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.367128	0.077127	4.760070	0.0000
DAR	-0.116702	0.059562	-1.959322	0.0537***
LAR	-0.105346	0.046455	-2.267698	0.0262**
LPR	-0.167085	0.084999	-1.965726	0.0530***
NIM	0.035190	0.011418	3.081915	0.0029*
RAR	-0.066838	0.022356	-2.989774	0.0038*
ROA	1.953072	0.522981	3.734501	0.0004*
ROE	-0.163680	0.028837	-5.675964	0.0000*
GDP	-0.105448	0.062384	-1.690301	0.0951***
SIZE	0.011897	0.014829	0.802247	0.4249
LQR	0.002301	0.009282	0.247866	0.8049
INF	-0.021948	0.023556	-0.931744	0.3544
NPL	0.005441	0.006193	0.878603	0.3824

R-squared	0.811341	Durbin-Watson stat	1.805026
Adjusted R-squared	0.764177		
F-statistic	17.20230		
Prob(F-statistic)	0.000000		

The starred coefficient estimates are significant at the 1 % (*), 5 % (**) and 10% (***) level.

Source: Financial statement of sampled commercial banks and own computation through E-views- 7

Thus, based on the result above Table 4.6, the following model was developed to examine the determinants of CAR in this study.

CAR = 36.71-0.12DAR-0.11LAR-1.17LPR+0.04NIM-0.07RAR+1.95ROA-0.16ROE-0.11GDP+0.01 SIZE +.0002 LQR-0.02 INF+0.005 NPL +ε

The R-squared value measures how well the regression model explains the actual variations in the dependent variable (Brooks, 2008). The adjusted R^2 value in Table 4.6 indicates that 76.41% of the total variability of CAR of Ethiopian commercial banks is captured by the variables in the regression model.

The regression F-statistic (17.20) 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.

Furthermore, the study examined the impact of both bank specific and macroeconomic factor on the level of CAR based on regression result of fixed Effect Model in Table 4.6 in terms of examination of coefficients of explanatory variables and significance level.

Through the examination of coefficients for bank specific factors, DAR, LAR, LPR and ROE had negative impact on CAR having a coefficient of -0.12,-0.11,-0.18, and-0.16 respectively. This indicates that one unit change (increase/decrease) in DAR, LAR, LPR and ROE can result a change on CAR by 0.12, 0.11, 0.18 and 0.16 units in opposite direction respectively. Besides, RAR had negative impact on CAR having coefficient of -0.07. This indicates that 1% change in RAR can result in a change on CAR by 0.07 % in opposite direction.

However, SIZE, NPL, LQR and NIM had positive impact on CAR having a coefficient of 0.01, 0.005, 0.02 and 0.035 which implies one percent change in SIZE, NPL, LQR and NIM can result a change on CAR rate by 0.01, 0.005, 0.02 and 0.035percent respectively in the same direction.

Moreover, ROA had positive impact on CAR having a coefficient of 1.95 which implies one unit change (increase/decrease) in NIM and ROA can result a change on CAR rate by 1.95 units in the same direction.

Besides, from macroeconomic factors, GDP and INF Rate had negative impact on the level of CAR having a coefficient of-0.11 and -0.02 which indicates a one unit change (increase/decrease) in GDP and INF can result a change on CAR by 0.11 and 0.02 units respectively in opposite direction. Besides, GDP and INF had negative impact on CAR.

In terms of significance level (corresponding p-value), all explanatory variables had p-values of less than the selected significance levels (1%,5% and 10%) except for SIZE, NPL,GDP and INF. As shown in Table 4.6 DAR, LAR, LPR, NIM, RAR, ROA, ROE and GDP were the statistically significant factors affecting CAR of commercial banks in Ethiopia.

NIM and ROA had positive and statistically significant impact on CAR at 1% level. And RAR and ROE had negative and statistically significant impact on CAR at 1% level. LAR had negative and significant impact on CAR at 5% level. And DAR, LPR, and GDP had negative and statistically significant influence on banks CAR in Ethiopia at 10% level. Whereas, SIZE, NPL, LQR and INF were statistically insignificant.

Thus, contrary to the expectation, NPL, LQR and SIZE from bank specific factor and inflation from macroeconomic factors did not show any significant impact on the level of CAR of commercial banks in Ethiopia.

4.5 Results and Summaries of the Findings

As stated on introduction section of this research paper, the main purpose of the study was to identify the determinants of CAR of Ethiopian commercial banks and the extent the identified variables affect Capital adequacy ratio in Ethiopia. To attain these objectives 12 hypothesis (see below) were developed based on theories and past empirical studies.

Hypothesis 1. DAR has negative effect on CAR.

Hypothesis 2. LAR has negative impact on CAR.

Hypothesis 3. LPR has negative impact on CAR.

Hypothesis 4. NIM has positive effect on CAR.

Hypothesis 5. RAR has negative impact on CAR.

Hypothesis 6. ROA has positive impact on CAR.

Hypothesis 7. ROE has positive impact on CAR.

Hypothesis 8. GDP has negative impact on CAR.

Hypothesis 9. SIZE has negative impact on CAR.

Hypothesis 10. LQR has positive impact on CAR.

Hypothesis 11. INF has negative effect on CAR.

Hypothesis 12. NPL has negative effect on CAR.

The regression result about those 12 hypotheses is discussed below.

1. Share of Deposit (DAR)

The results of fixed effect model in the above table 4.6 indicate that there is a negative and statistically significant impact of DAR on the level of CAR.

The result shows the effect of deposit measured in terms of DAR on CAR with a coefficient of -0.12 and a p-value of 0.06 at 10% significance level.

This implies that for one unit change in DAR, keeping the other things constant had resulted 0.2 unit change on the level of CAR in opposite direction. A negative relationship could mean deposits in banks are not necessarily guaranteed by increase in capital adequacy ratio. This might be the result of banks' wrong assumption of considering deposit as cheaper and less risky source of funds and the reduction of their capital adequacy ratio in line with their assumption.

In the case of our country usually depositors of the sample Ethiopia banks are not in a position to evaluate the financial position and soundness of their bank , so due to this fact the CAR is negatively related with DAR. Furthermore, the negative result is also put the sample banks in trouble, in that their deposits are not guaranteed by an increase in banks' capital ratio.

Based on the result, hypothesis 1 is not rejected and also we can conclude that DAR had negative and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding was consistence with the previous empirical study of (Büyüksalvarc & Abdioğlu, 2011; Asarkaya & özcan, 2007;Ogere et al , 2013).

2. Loan (LAR)

The results of fixed effect model in the above table 4.6 indicate that there is a negative and statistically significant impact of LAR on the level of CAR. The result shows the effect of loan measured in terms of LAR on CAR with a coefficient of -0.11 and a p-value of 0.05 at 10% significance level. This implies that for one unit change in LAR, keeping the other things constant had resulted 0.3 unit change on the level of CAR in opposite direction.

Negative sign of LAR can be explained in way that the sample Ethiopia banks in order to provide more loans transform more capital into loans which result in a high degree of leverage. Due to this, when the amount of capital is decreases in turn the level of CAR are also decreases. Leaving the CAR not to increase in line of an increase to the size of the loan.

Based on the result, hypothesis 2 is not rejected and also we can conclude that LAR had negative and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding was consistence with the previous empirical study of (Dreca, 2013 ;Büyüksalvarc & Abdioğlu, 2011).

3. Loss Loan Provision (LPR)

The results of fixed effect model in the above table 4.6 indicate that there is a negative and statistically significant impact of LPR on the level of CAR. The result shows the effect of provision measured in terms of LPR on CAR with a coefficient of -0.16 and a p-value of 0.08 at 10% significance level. This implies that for one unit change in LPR, keeping the other things constant had resulted 0.16 unit change on the level of CAR in opposite direction. A negative impact of loan loss reserve in CAR could mean that, with a higher loss loan provision the sample commercial banks might become more aggressive in their lending practice and accepting loan losses and writing off of problematic loans. And this resulted in a decrease in earning in turn lead to a reduction on capital. Therefore, high amount of LPR, leads banks in to strong financial stress which in turn push banks in to more difficulties in increasing their capital adequacy ratio.

Based on the result, hypothesis 3 is not rejected and also we can conclude that LPR had negative and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding was consistence with the previous empirical finding of (Blose, 2001;Hassan, 1992; Büyüksalvarc & Abdioğlu, 2011;Choi, 2000).

4. Management Quality(Net Interest Margin(NIM))

The results of fixed effect model in the above table 4.6 indicate that there is a positive and statistically significant impact of NIM on the level of CAR. The result shows the effect of management quality measured in terms of NIM on CAR with a coefficient of 0.04 and a p-value of 0.00 at 1% significance level. This implies that every one percent change (increase or decrease) in the bank NIM keeping the other thing constant had a resultant change of 3.5 percent on the CAR in the similar direction.

A positive sign indicates, when NIM increases the high revenues allows the bank to raise additional capital through retained earnings. So CAR is also increases.

Based on the result, hypothesis 4 is not rejected and also we can conclude that NIM had positive and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding was consistence with the previous empirical finding of (Berger et al,1995 ;Rime, 2001;Demirgüç-Kunt & Huizinga, 1998;Cebenoyan & Cooperman, 1999; Saunders& Wilson, 2001)

5. Bank Risk (RAR)

The results of fixed effect model in the above table 4.6 indicate that there is a negative and statistically significant impact of RAR on the level of CAR. The result shows the effect of risk measured in terms of RAR on CAR with a coefficient of –0.07 and a p-value of 0.00 at 1% significance level.

his implies that for every one percent change (increase or decrease) in the bank RAR keeping the other thing constant had a resultant change of 2.2 percent on the CAR in the opposite direction.

This Negative sign implies the sample Commercial Banks in Ethiopia follows a riskier investment portfolio for earnings; they generally face a higher level of capital risk due to the increase in risk-weighted asset. The capital risk ratio, therefore, rationally decreases, which is followed by the capital adequacy ratio.

Based on the result, hypothesis 5 is not rejected and also we can conclude that RAR had negative and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding was consistence with the previous empirical finding of (Al-Sabbagh , 2004;Mpuga, 2002;Okuyan, 2013 ;Bokhari & Syed, 2013;Ogere et al, 2013).

6. Return on Asset (ROA)

The results of fixed effect model in the above table 4.6 indicate that there is a positive and statistically significant impact of ROA on the level of CAR. The result shows the effect of profitability measured in terms of ROA on CAR with a coefficient of 1.95 and a p-value of 0.00 at 1% significance level. This implies that for one unit change in ROA, keeping the other things constant had resulted 1.95 unit changes on the level of CAR in similar direction. 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.

Based on the result, hypothesis 6 is not rejected and we can also conclude that ROA had Positive and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding was consistence with the previous empirical finding of (Abusharba, et al., 2013;Büyüksalvarc & Abdioğlu, 2011;Gropp & Heider, 2007;Kleff & Weber, 2008).

7. Return on Equity (ROE)

The results of fixed effect model in the above table 4.6 indicate that there is a negative and statistically significant impact of ROE on the level of CAR. The result shows the effect of profitability measured in terms of ROE on CAR with a coefficient of -0.16 and a p-value of 0.00 at 1% significance level. This implies that for one unit change in ROE, keeping the other things constant had resulted 0.16 unit change on the level of CAR in opposite direction.

The negative sign contrary to the expected positive relationship between profit and capital adequacy and it implies that, commerical banks in ethiopia inorder to meet the requlatory requirement level of capital , they are forced to increase their equity. And as cost of equity is high it drive the cost to increase which inturn leads to a reduction in net profit. Therefore arise of capital make the return on equity lower. Based on the result, hypothesis 7 is not rejected and we can also conclude that ROE had negative and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding is consistent with the previous empirical finding (Bateni, et al., 2014;Khaled & Samer, 2013)

8. Economic Growth –GDP (Real Gross Domestic Products growth rate)

The results of fixed effect model in Table 4.6 indicate that there is a negative and statistically significant impact of GDP on the level of CAR. The result shows the effect of economic growth measured in terms of GDP on CAR with a coefficient of -0.11 and a p-value of 0.095 at 10% significance level. This implies that for one unit change in GDP, keeping the other things constant had resulted 0.11 unit change on the level of CAR in opposite direction.

Thus the negative sign implies that in times of strong economic growth, bank risk is lower, which leads banks to reduce their regulatory capital. On contrary, low economic growth increase a bank's financial risk and encourage banks to maintain a high capital ratio. Based on the result, hypothesis 8 is not rejected and we can also conclude that GDP had negative and significant effect on capital adequacy ratio of Ethiopian commercial banks. The finding is consistent with the previous empirical finding of (Bokhari & Syed, 2013;Asarkaya & özcan, 2007).

9. Bank Size

The regression result of fixed effect model in the above table 4.6 is inconsistent with the hypothesis developed by the researcher. The study hypothesized that there is a negative and significant association between Bank size and CAR of banks. However, the result shows the effect of bank size measured in terms of Assets size on CAR with a coefficient of 0.01 and a p-value of 0.4249. This implies that every one percent change (increase or decrease) in the bank asset size keeping the other thing constant had a resultant change of 1 percent on the CAR in the similar direction.

The positive coefficient of size indicates that as there is direct relationship between the size of bank and their Capital adequacy ratio. The direct relationship implies that, when the asset of the bank increases, the size of operations or activities of the banks are also increases. This leads to an increase in risks associated with each and every activity of the banks. Due to this fact, depositors and investors will need a guarantee or a cushion against risk of loss.

Only the positive relationship was in line with the previous empirical findings of (Jackson et al , 2002;Hassan, 1992;Mpuga, 2002). When we come to P-value of bank size, it is not significant even at 10% level of significant. The result indicate that the effect of bank size on capital adequacy of commercial banks is lower as compared with other variables .Based on the result we can conclude that there is a positive and insignificant relationship between Asset size and CAR. Only the insignificant effect of size on the CAR was also consistent with the finding of (Büyüksalvarc & Abdioğlu, 2011).

10. Liquidity (LQR)

The regression result of fixed effect model in the above table 4.6 is inconsistent with the hypothesis developed by the researcher except the positive sign. The study hypothesized that there is a positive and significant association between Liquidity and capital Adequacy ratio. Contrary to the hypothesis, the result shows the effect of liquidity measured in terms of liquid asset on CAR with a coefficient of 0.002 and a p-value of 0.8049. This implies that every one percent change (increase or decrease) in the liquid asset keeping the other thing constant had a resultant change of 0.2 percent on the CAR in the similar direction.

As shown on the regression result the coefficient of liquidity (LQR) was positive. The positive coefficient of size indicates that as there is direct relationship between LQR of bank and their Capital adequacy ratio. The direct relationship implies that, the high liquidity reduces liquidity risks which boost the financial position and image of the bank due this fact the capital as well as capital adequacy ratio of the bank is also increased. So when liquidity increases CAR is also increase.

The p –value of liquidity show that liquidity of banks was not significant even at 10%of level of significance. These results indicate that the effect of liquidity of banks on commercial bank CAR is lower when we compare with other variable.

Based on the result, we can reject the hypothesis or the data did not support the hypotheses and we can conclude that liquidity of the bank had positive and insignificant effect on CAR of commercial banks. Therefore, this positive and in significant finding was consistent with the previous finding of (Büyüksalvarc & Abdioğlu, 2011).

11. Inflation (INF)

The regression result of fixed effect model in the above table 4.6 is inconsistent with the hypothesis developed by the researcher except the negative sign. The study hypothesized that there is a negative and significant association between Inflation and capital Adequacy ratio. Contrary to the hypothesis, the result shows the effect of inflation measured in terms of consumer price index on CAR with a coefficient of -0.02 and a p-value of 0.3544. This implies that for one unit change in INF, keeping the other things constant had resulted 0.02 unit change on the level of CAR in opposite direction. 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 (Williams, 2011). The p – value of inflation show that inflation of banks was not significant even at 10%of level of significance. This result indicates that the effect of inflation on the commercial banks of CAR is lower when we compare with other variable. Based on the result, we can reject the hypothesis or the data did not support the hypotheses and we can conclude that inflation had negative and insignificant effect on CAR of commercial banks. Therefore, negative insignificant effect of INF on the CAR was also consistent with the finding of (Rafet, et al., 2015).

12. Non-Performing Loan (NPL)

The regression result of fixed effect model in the above table 4.6 is inconsistent with the hypothesis developed by the researcher. The study hypothesized that there is a negative and significant association between NPL and capital Adequacy ratio. Contrary to the hypothesis, the result shows the effect of NPL on CAR with a coefficient of 0.005 and a p-value of 0.3824.This implies that every one percent change (increase or decrease) in the NPL keeping the other thing constant had a resultant change of 0.5 percent on the CAR in the similar direction. As shown on the regression result the coefficient of Non-performing loan (NPL) were positive. The positive coefficient of NPL indicates that there is direct relationship between NPL of bank and their Capital adequacy ratio. The direct relationship implies that, when there is high NPL, the credit risk of the bank is increased so to absorb such risk, the capital adequacy ratio of the bank should be increased. The p–value shows that NPL of banks was not significant even at 10%of level of significance. This result indicates that the effect of NPL on commercial bank CAR is lower when we compare with other variable. Based on the result, we can reject the hypothesis or the data did not support the hypothesis and we can conclude that NPL had positive and insignificant effect on CAR of commercial banks. Therefore, finding was consistent with the previous finding of (Kerina & Anggono, 2014).

Table 4.7 Summary of Regression Results

Comparison of the Test Result with the Expectation

No.	Independent Variables	Expected Relationship With dependent variable (CAR)	Actual Result	Status
Hypothesis 1	DAR	- ve	- ve and significant	Not Rejected
Hypothesis 2	LAR	- ve	- ve and significant	Not Rejected
Hypothesis 3	LPR	- ve	- ve and significant	Not Rejected
Hypothesis 4	NIM	+ ve	+ ve and significant	Not Rejected
Hypothesis 5	RAR	- ve	- ve and significant	Not Rejected
Hypothesis 6	ROA	+ ve	+ ve and significant	Not Rejected
Hypothesis 7	ROE	+ ve	- ve and significant	Not Rejected
Hypothesis 8	GDP	- ve	-ve and significant	Not Rejected
Hypothesis 9	SIZE	- ve	+ ve but in significant	Rejected
Hypothesis 10	LQR	+ ve	+ve but in significant	Rejected
Hypothesis 11	INF	- ve	- ve but in significant	Rejected
Hypothesis 12	NPL	-ve	+ve but in significant	Rejected

H 1: is not rejected, which states DAR has negative effect on CAR.

H2: is not rejected, which states LAR has negative relationship with CAR.

H3: is not rejected, which states LPR has negative impact on CAR.

H4: is not rejected, which states NIM has positive effect on CAR.

H5: is not rejected, which states RAR has negative impact on CAR.

H6: is not rejected, which states ROA has positive impact on CAR.

H7: is not rejected, which states ROE has negative impact on CAR. Though, the sign is differ, but it is significance.

H 8: is not rejected, which states GDP has negative impact on CAR.

H9: is rejected, which states size has negative impact on CAR. Both the level of significance and the actual sign are completely different from the hypothesis.

H 10: is rejected, which states LQR has postive impact on CAR. Though, the level of significance is different, but the sign is similar to the hypothesis.

H11: is rejected, which states INF has negative effect on CAR.Though, the level of significance is different, but the sign is similar to the hypothesis.

H12: is rejected, which states NPL has postive impact on CAR. Both the level of significance and the actual sign are completely different from the hypothesis.

Chapter Five

Conclusions and Recommendations

The previous chapter presented the analysis results and their interpretetion. This chapter would present the conclusions and recommendations made based on the findings of the study. Section 5.1 presents the conclusion and Section 5.2 would present the recommendations made based on insights of the findings.

5.1 Conclusions

The aim of the study was to identify the major factors that affect capital adequacy ratio in commercial banks of Ethiopia and to identfy the extent the identified variables affect CAR. To attain the objectives, previous studies have been reviewed. Based on the previous literature 10 expalanatory bank specific variables and two expalantory macro variables are selected in line with the research objectives, avaialability of data and expalanatory power of variable.

Accordigly, from macro variabe GDP as proxy of economic growth and Inflation rate (INF) were selected. From bank specific factor deposit(DAR), loan(LAR), loan provision (LPR), management quality (NIM), Bank risk(RAR), Return on asset (ROA), Return on equity (ROE), Bank size(SIZE), Liquidity (LQR) and Non perfoming loan(NPL) were selected.

To comply with the research question and reseach objectives, quantitative research approah was used and Secondary data were collected. The seocndary data were collcetde from National bank of Ethiopia (NBE), from Ministry of finance and economic development office(MoFED),Ceneteral Statstics Agency (CSA) and eight (8) commercial banks in Ethiopia. Multiple regression analysis was adopted to measure the effect of 12 explanatory variables on dependent variable i.e., Capital Adequay Ratio with the help of E-views soft ware.To test the research hypyhesis emperically, all necessary data were collcted for the period of 2002 to 2013.

The study found out that DAR, LAR, LPR, NIM, RAR, ROA, ROE and GDP had statistically significant effect on the level of CAR. However, the results of fixed effect regression model revealed the insignificant effect of SIZE, LQR, INF and NPL on the level of CAR of commercial banks in Ethiopia for the period under consideration.

The conclusion made regarding the major determinats of Capital adequacy ratio of Ethiopian commercial banks were given as follows:

In line with the expectation deposit (DAR) had negative and siginificant effect on CAR of Ethiopian commercial banks. As these two variable had sginificant relatioship it indicate that as the deposit increases, the amount of CAR decreases.This implies that banks in Ethiopia assumes that deposit is less risky and cheape sourcse of fund and also believe that ususally depositors cannot assess the financial soundness of their banks. Due to these facts, in Ethiopia deposit has inverse relation with CAR.

The result also shows that Loan (LAR) had negative and significant effect on CAR of commercial banks in Ethiopia. This result may indicate that due to the shortage of deposit most Ethiopian banks may disburse loan by eroding their capital. Therefore, the growth of loan has negative effect on CAR.

Loss loan provision (LPR) had negative and significant effect on CAR of commercial banks in Ethiopia. This implies that banks in financial distress have more difficulties in increasing their capital ratio. This indicate that most Ethiopian Banks with more loan loss reserves are more aggressive in their lending practices, and are willing to accept losses instead of negotiating concession with loan defaulters. This high loan loss reserves may signal that banks are willing to write-off problem loans which can cause a decline in capital or capital adequacy ratio. Thus, holding of more provision affect negatively capital adequacy of banks.

In line with the hypothesis, Net Interset Margin (NIM) had postive and siginificant effcet on CAR of Ethiopian commercial banks. As these two variables had sginificant relationship it may indicate that as the Net interest increases, the amount of CAR also increases. This implies that the quality of management helps banks to be competitive and to increase their revenue or net interste margin which allows the bank to raise an additional capital through retained earnings. Thus quality of management has positive effect on the CAR of Ethiopian Commercial banks.

RAR has negative and significant effect on CAR of Ethiopian commercial banks. The result indicates the larger the ratio of RAR or bank risk would tend to decreased CAR. This implies the sample Commercial Banks in Ethiopia face a higher level of capital risk due to the increase in risk-weighted asset. The capital risk ratio, therefore, rationally decreases, which is followed by the capital adequacy ratio.

ROA also had positive and significant effect on CAR of Ethiopian commercial banks. Return on assets represents how effectively the banks are taking earnings advantage of its base of assets. According to the formula, banks might enhance this indicator by increase in profit or decrease in total assets. While the latter option is unrealistic because of its negative signal about banks performance, the former seems to be a good choice for the banks to enhance their Capital adequacy.

On contrary, ROE of the bank had negative and significant effect on CAR of Ethiopian commercial banks. This indicates that most Ethiopian banks in order to enhance their CAR reduced their ROE by increasing their equity. This finding is exceptional and completely different from the theory stated in the literature report.

The result show Economic growth (GDP) had negative and significant effect on CAR of commercial banks in Ethiopia. This implies that most Ethiopian banks maintain lower CAR during the positive growth of economy.

Size of the bank had positive and insignificant effect on CAR of Ethiopian commercial banks. The result indicates that the larger the size, the bank would tend to expand its operations and take more risk; suggesting a higher CAR in order to minimize such risks. The result also indicates that the effect of SIZE on commercial banks CAR is lower as compared with other variables.

Liquidity of the bank had positive but insignificant effect on CAR of Ethiopian commercial banks. The result indicate that the larger the liquidity it would tend to signal bank soundness and lower liquidity risk, which could make it easier for these banks to increase its CAR. The result also indicates that the effect of LQR on commercial banks CAR is lower as compared with other variables.

Inflation had negative but insignificant effect on CAR of Ethiopian commercial banks. The result indicates the larger the inflation it would tend to erode the capital of the bank; resulting in a decreased amount of capital adequacy. The result also indicates that the effect of inflation on commercial banks' CAR is lower as compared with other variables.

NPL of the bank had positive but insignificant effect on CAR of Ethiopian commercial banks. The result indicates the larger the NPL it would tend to signal higher credit risk; suggesting a higher capital adequacy ratio in order to absorb such risk. The result also indicates that the effect of NPL on commercial banks CAR is lower as compared with other variables.

5.2 Recommendations

Based on the research findings, the study makes the following recommendations for future research and practice:

For all Commercial Banks of Ethiopia

- Since the share of deposit (DAR) had negative and significant relation with CAR i.e. as deposit increase the ratio of capital to the risk weighted asset decrease significantly. And as most of the Ethiopian commercial banks set their CAR to the minimum requirement, there is a need of deposit insurance to safeguard their depositors and investors who request more guarantees; especially those commercial banks whose deposit size have been increasing. To this end the depositor should also properly follow the status of their bank by giving some consideration to the financial information disclosed by the banks.

- Loan amount (LAR) had negative and significant effect on CAR; suggesting that Ethiopian commercial banks erode their capital basis to satisfy the loan request by incurring more into debt financing and this might make the bank more riskier as they become highly leveraged. Therefore, the banks should undertake strong deposit mobilization activities to entertain fully the loan request.

- Loss loan provision (LPR) had negative and significant effect on CAR; suggesting that sample Ethiopia banks could raise their CAR by reducing their Loss Loan provision (LPR) and by giving more emphasis to the quality of their loan. Therefore, Ethiopian commercial banks should 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 in order to enhance their loan quality and in turn reduce the erosion of capital that results a reduction in CAR.

- Since management quality (NIM) had positive and significant effect on capital adequacy ratio and as the quality of management (NIM) increases, the retaining earning of banks also increase in order to increase CAR of commercial banks; therefore it is recommended for the Commercial banks of Ethiopia to give great attention for the management quality which is basis for CAR improvement.

- RAR had a negative and significant effect on CAR of Ethiopian commercial banks. Therefore, it is recommended for the commercial bank to have many incentives to raise equity or spend much more retained earnings in order to better protect depositors' rights. The capital amount growth might strengthen their adequate capital level. In other word, the higher the degree of capital adequacy, the more safely banks might be able to deal with risk. Moreover, it sounds appropriate for banks to reduce risk factors by lowering risky projects, developing an effective internal control system with clear policies and procedures that will strengthen the banks' security level.

- In line with the hypothesis, ROA had positive and significant effect on CAR of Ethiopian commercial banks. This implies that the return originated from all asset of the bank will enhance the capital adequacy of the bank. So banks should increase their ROA to increase their CAR.

- ROE had negative and significant effect on CAR of Ethiopian commercial banks. This implies that commerical banks in ethiopia inorder to meet the regulatory requirement level of capital , uses equity as sources . This has negative impact on ROE. So the study recommended to the banks to find other cheaper sourse of finace other than equity.

- The result that GDP had negative but significant effect on CAR suggests that capital adequacy ratio decreases as the economy of the country increases. This suggests that the management of Commercial banks of Ethiopia should increase their CAR during the decline stage of the country's economy in order to maintain the soundness of their bank.

- As size of bank had positive effect on CAR of Ethiopian commercial bank; suggesting that capital adequacy ratio which acts as cushion against losses should increase when bank's size increases. Alternatively, banks with large dimensions or size should have sufficient capital reserves in order to maintain their good rating.

- As liquidity of the bank had positive effect on CAR, commercial banks should maintain their liquidity position in a manner that increases the soundness and image of their bank.

In general the 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 bank specific 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.

For National Bank of Ethiopia

- Usually commercial banks in Ethiopia are not including the detail computation of Capital Adequacy Ratio. Therefore, NBE should issue a policy which enforces Commercial Banks to disclose their capital adequacy ratio by incorporating the detail of Tier 1 capital, Tier 2 capital, on balance sheet Asset, off balance asset, probability of default and other in their annual financial reports.

- The existing minimum requirement of Capital Adequacy Ratio is 8% and it is allocated proportionally for Tier 1 and 2 capitals. However, after emergence of Basel III accord the level of Capital Adequacy Ratio is increased from 8% to 13% and the proportion of Tier 1 capital is also increased from 4% to 6%. Moreover, 2.5% of CAR is allocated for Capital buffer and another 2.5% of CAR is also earmarked for the period of high credit growth. Therefore, in order to enhance the soundness of Ethiopian commercial banks; NBE should revise the existing directive of Capital adequacy ratio in line with Basel III accord.

For Future Research

- This study examined 10 firm specific and only 2 macroeconomic Determinant of CAR in Ethiopia in 8 banks because of resource and time limitation. Future research is recommended to include external variable like interest rate, Money supply and ownership structure in all existing commercial banks in order to demonstrate the impact of both internal and external variables on the choice of capital adequacy ratio. Considering that the test result for some of hypotheses is contradictory, future research is recommended to test and further validate them.

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APPENDIX

APPENDIX-1 HETROSKEDASTICITY TEST

Heteroskedasticity Test: White

F-statistic	4.398235	Prob. F(90,5)	0.0503
Obs*R-squared	94.80252	Prob. Chi-Square(90)	0.3441
Scaled explained SS	96.86786	Prob. Chi-Square(90)	0.2916

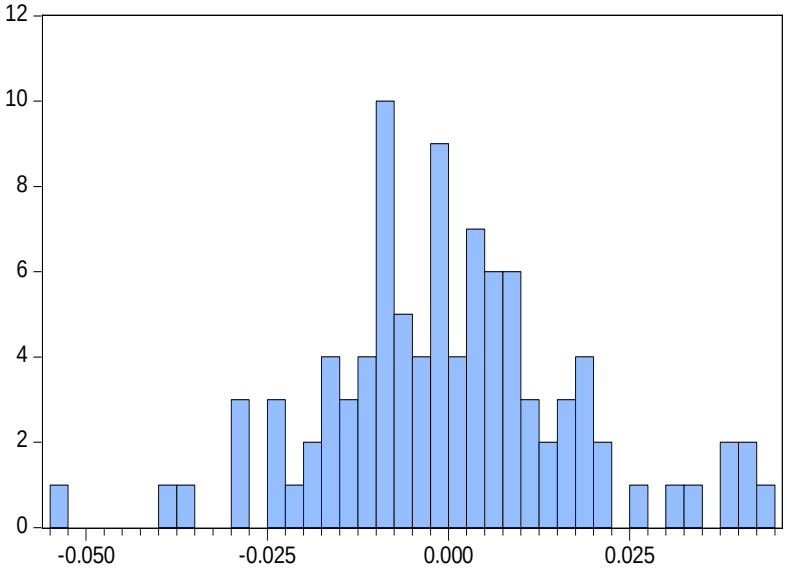
Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/22/15 Time: 17:08
Sample: 1 96
Included observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.072550	0.081749	0.887470	0.4155
DAR	-0.139580	0.137460	-1.015422	0.3565
DAR^2	-0.073367	0.088071	-0.833035	0.4428
DAR*LAR	0.019162	0.067729	0.282920	0.7886
DAR*LPR	0.117956	0.182418	0.646622	0.5464
DAR*(LOG(NIM))	-0.019477	0.017214	-1.131451	0.3092
DAR*(LOG(RAR))	0.034106	0.048564	0.702282	0.5138
DAR*ROA	1.229604	1.393340	0.882487	0.4179
DAR*ROE	-0.056574	0.107023	-0.528616	0.6197
DAR*GDP	0.021419	0.219228	0.097701	0.9260
DAR*SIZE	0.046361	0.019853	2.335174	0.0668
DAR*(LOG(LQR))	-0.007770	0.014116	-0.550448	0.6057
DAR*INF	-0.117889	0.050459	-2.336344	0.0667
DAR*(LOG(NPL))	0.001215	0.011461	0.106017	0.9197
LAR	-0.107296	0.103899	-1.032698	0.3491
LAR^2	0.021457	0.048408	0.443247	0.6761
LAR*LPR	0.025542	0.195169	0.130870	0.9010
LAR*(LOG(NIM))	-0.012596	0.020976	-0.600518	0.5743
LAR*(LOG(RAR))	0.032932	0.073777	0.446375	0.6740
LAR*ROA	-1.042304	1.459615	-0.714095	0.5071
LAR*ROE	0.105104	0.078002	1.347462	0.2357
LAR*GDP	-0.144833	0.220418	-0.657084	0.5402
LAR*SIZE	0.004683	0.021947	0.213382	0.8395
LAR*(LOG(LQR))	-0.011977	0.014378	-0.832990	0.4428
LAR*INF	0.046611	0.044464	1.048284	0.3425
LAR*(LOG(NPL))	-0.004673	0.008807	-0.530597	0.6184
LPR	0.263756	0.354882	0.743220	0.4908
LPR^2	-0.364969	0.299000	-1.220634	0.2766
LPR*(LOG(NIM))	0.141268	0.092786	1.522508	0.1884
LPR*(LOG(RAR))	0.014397	0.087139	0.165213	0.8752
LPR*ROA	-2.067694	2.053232	-1.007043	0.3601
LPR*ROE	0.225020	0.178568	1.260139	0.2632
LPR*GDP	0.169448	0.413896	0.409397	0.6992
LPR*SIZE	0.064492	0.061692	1.045388	0.3437
LPR*(LOG(LQR))	-0.014705	0.028098	-0.523329	0.6231
LPR*INF	-0.124428	0.154294	-0.806436	0.4566
LPR*(LOG(NPL))	0.056444	0.038947	1.449259	0.2069
LOG(NIM)	-0.017480	0.019172	-0.911732	0.4037
(LOG(NIM))^2	-0.002472	0.001618	-1.527969	0.1871
(LOG(NIM))*(LOG(RAR))	0.012863	0.009973	1.289707	0.2536
(LOG(NIM))*ROA	-0.021095	0.163000	-0.129417	0.9021
(LOG(NIM))*ROE	0.022984	0.020387	1.127423	0.3107
(LOG(NIM))*GDP	-0.008594	0.069278	-0.124049	0.9061
(LOG(NIM))*SIZE	0.001987	0.004137	0.480282	0.6513

(LOG(NIM))*(LOG(LQR))	-0.000504	0.002925	-0.172280	0.8700
(LOG(NIM))*INF	-0.001510	0.004550	-0.331820	0.7535
(LOG(NIM))*(LOG(NPL))	-0.003501	0.002237	-1.565009	0.1784
LOG(RAR)	0.016778	0.074693	0.224625	0.8312
(LOG(RAR))^2	0.004522	0.018885	0.239457	0.8203
(LOG(RAR))*ROA	0.151703	0.787525	0.192632	0.8548
(LOG(RAR))*ROE	-0.016432	0.043285	-0.379630	0.7198
(LOG(RAR))*GDP	-0.260715	0.227091	-1.148063	0.3029
(LOG(RAR))*SIZE	0.011555	0.008202	1.408741	0.2180
(LOG(RAR))*(LOG(LQR))	0.008993	0.007364	1.221095	0.2765
(LOG(RAR))*INF	-0.015530	0.025695	-0.604398	0.5720
(LOG(RAR))*(LOG(NPL))	0.006277	0.005693	1.102611	0.3204
ROA	-0.743549	1.345347	-0.552682	0.6043
ROA^2	6.490063	8.490845	0.764360	0.4792
ROA*ROE	-1.267271	0.910327	-1.392106	0.2226
ROA*GDP	1.057084	3.581979	0.295112	0.7798
ROA*SIZE	-0.016530	0.207776	-0.079559	0.9397
ROA*(LOG(LQR))	-0.233233	0.134418	-1.735124	0.1432
ROA*INF	-0.722492	0.412622	-1.750979	0.1403
ROA*(LOG(NPL))	-0.017626	0.125347	-0.140621	0.8937
ROE	0.060093	0.118793	0.505859	0.6345
ROE^2	0.021476	0.025291	0.849162	0.4346
ROE*GDP	0.020836	0.158050	0.131832	0.9003
ROE*SIZE	0.001039	0.021781	0.047689	0.9638
ROE*(LOG(LQR))	0.020158	0.016696	1.207371	0.2813
ROE*INF	0.091610	0.064910	1.411344	0.2172
ROE*(LOG(NPL))	-0.005038	0.011317	-0.445164	0.6748
GDP	0.424336	0.365084	1.162299	0.2976
GDP^2	0.480858	0.483830	0.993857	0.3659
GDP*SIZE	-0.171758	0.143962	-1.193078	0.2864
GDP*(LOG(LQR))	0.006336	0.041154	0.153960	0.8837
GDP*INF	0.181719	0.271802	0.668570	0.5334
GDP*(LOG(NPL))	-0.012303	0.027282	-0.450977	0.6709
SIZE	-0.029132	0.035681	-0.816435	0.4514
SIZE^2	0.002929	0.003728	0.785481	0.4677
SIZE*(LOG(LQR))	-0.002251	0.002100	-1.071857	0.3328
SIZE*INF	-0.004239	0.011179	-0.379224	0.7201
SIZE*(LOG(NPL))	0.002354	0.002398	0.981628	0.3714
LOG(LQR)	0.024203	0.020340	1.189945	0.2875
(LOG(LQR))^2	0.000360	0.001468	0.245216	0.8160
(LOG(LQR))*INF	0.006984	0.003201	2.182020	0.0809
(LOG(LQR))*(LOG(NPL))	0.000417	0.001537	0.271420	0.7969
INF	0.051957	0.061477	0.845142	0.4366
INF^2	0.025553	0.025020	1.021280	0.3540
INF*(LOG(NPL))	-0.002903	0.004338	-0.669134	0.5331
LOG(NPL)	-0.018871	0.013909	-1.356788	0.2329
(LOG(NPL))^2	-0.000804	0.000654	-1.227956	0.2741

R-squared	0.987526	Mean dependent var	0.000399
Adjusted R-squared	0.762998	S.D. dependent var	0.000663
S.E. of regression	0.000323	Akaike info criterion	-14.29891
Sum squared resid	5.21E-07	Schwarz criterion	-11.86812
Log likelihood	777.3478	Hannan-Quinn criter.	-13.31635
F-statistic	4.398235	Durbin-Watson stat	2.254511
Prob(F-statistic)	0.050268		

APPENDIX-2 NORMALITY TEST



Series: Standardized Residuals	
Sample 2002 2013	
Observations 96	
Mean	0.000000
Median	-0.000837
Maximum	0.042971
Minimum	-0.053791
Std. Dev.	0.017661
Skewness	0.131248
Kurtosis	3.708863
Jarque-Bera	2.285565
Probability	0.318930

APPENDIX-3 FIXED EFFECT REGRESSION OUTPUTS

Dependent Variable: CAR
Method: Panel Least Squares
Date: 04/22/15 Time: 17:22
Sample: 2002 2013
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.367128	0.077127	4.760070	0.0000
DAR	-0.116702	0.059562	-1.959322	0.0537
LAR	-0.105346	0.046455	-2.267698	0.0262
LPR	-0.167085	0.084999	-1.965726	0.0530
LOG(NIM)	0.035190	0.011418	3.081915	0.0029
LOG(RAR)	-0.066838	0.022356	-2.989774	0.0038
ROA	1.953072	0.522981	3.734501	0.0004
ROE	-0.163680	0.028837	-5.675964	0.0000
GDP	-0.105448	0.062384	-1.690301	0.0951
SIZE	0.011897	0.014829	0.802247	0.4249
LOG(LQR)	0.002301	0.009282	0.247866	0.8049
INF	-0.021948	0.023556	-0.931744	0.3544
LOG(NPL)	0.005441	0.006193	0.878603	0.3824

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.811341	Mean dependent var	0.145149
Adjusted R-squared	0.764177	S.D. dependent var	0.040662
S.E. of regression	0.019746	Akaike info criterion	-4.828683
Sum squared resid	0.029633	Schwarz criterion	-4.294443
Log likelihood	251.7768	Hannan-Quinn criter.	-4.612734
F-statistic	17.20230	Durbin-Watson stat	1.805026
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.614106	Prob. F(12,71)	0.8234
Obs*R-squared	9.027130	Prob. Chi-Square(12)	0.7006

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/22/15 Time: 17:09
Sample: 1 96
Included observations: 96
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	0.013475	0.056072	0.240316	0.8108
DAR	0.004040	0.044978	0.089828	0.9287
LAR	-0.005273	0.049211	-0.107155	0.9150
LPR	0.018193	0.076415	0.238086	0.8125
LOG(NIM)	0.002747	0.009759	0.281475	0.7792
LOG(RAR)	-0.000612	0.024270	-0.025220	0.9800
ROA	-0.354215	0.528501	-0.670225	0.5049
ROE	0.020438	0.029727	0.687522	0.4940
GDP	-0.008928	0.071459	-0.124933	0.9009
SIZE	-0.002867	0.012729	-0.225199	0.8225
LOG(LQR)	0.000169	0.008574	0.019750	0.9843
INF	-0.001642	0.025487	-0.064427	0.9488
LOG(NPL)	-0.003675	0.006560	-0.560281	0.5771
RESID(-1)	-0.100915	0.132530	-0.761452	0.4489
RESID(-2)	-0.040662	0.131743	-0.308644	0.7585
RESID(-3)	-0.064299	0.128198	-0.501564	0.6175
RESID(-4)	0.033083	0.136907	0.241642	0.8098
RESID(-5)	0.095402	0.132506	0.719985	0.4739
RESID(-6)	0.088954	0.132620	0.670743	0.5046
RESID(-7)	-0.216328	0.133616	-1.619026	0.1099
RESID(-8)	0.110141	0.132743	0.829728	0.4095
RESID(-9)	-0.076178	0.141908	-0.536814	0.5931
RESID(-10)	-0.002081	0.142121	-0.014642	0.9884
RESID(-11)	-0.117754	0.139295	-0.845356	0.4008
RESID(-12)	0.080624	0.137686	0.585565	0.5600

R-squared	0.094033	Mean dependent var	-1.66E-16
Adjusted R-squared	-0.212210	S.D. dependent var	0.020074
S.E. of regression	0.022102	Akaike info criterion	-4.567147
Sum squared resid	0.034683	Schwarz criterion	-3.899348
Log likelihood	244.2230	Hannan-Quinn criter.	-4.297212
F-statistic	0.307053	Durbin-Watson stat	1.982046
Prob(F-statistic)	0.999026		

APPENDIX- 4 CORRELATION MATRIXES

	DAR	LAR	LPR	LOG(NIM)	LOG (RAR)	ROA	ROE	GDP	SIZE	LOG (LQR)	INF	LOG (NPL)
CAR	-0.25787	-0.351366	-0.350512	0.376673	-0.127753	0.345876	-0.136349	0.024568	0.138645	0.071869	0.252046	-0.391358
DAR	1.000000	-0.024593	-0.056786	-0.05521	-0.081094	-0.094255	0.052843	0.052224	0.225349	0.136767	-0.04993	-0.134336
LAR	-0.02459	1.000000	-0.174389	0.298671	0.808528	-0.167782	-0.305344	-0.081897	-0.758546	-0.011431	-0.26481	0.244499
LPR	-0.05679	-0.174389	1.000000	-0.579775	-0.363966	-0.407869	-0.137526	-0.084805	0.105969	0.203819	-0.1559	0.673282
LOG (NIM)	-0.05521	0.298671	-0.579775	1.000000	0.506957	0.490147	0.107853	0.133025	-0.257258	-0.093393	0.297545	-0.508643
LOG (RAR)	-0.08109	0.808528	-0.363966	0.506957	1.000000	0.167057	-0.1845	0.025947	-0.746134	0.105806	-0.07629	0.009098
ROA	-0.09426	-0.167782	-0.407869	0.490147	0.167057	1.000000	0.680294	0.290303	0.298540	-0.282804	0.465915	-0.636453
ROE	0.052843	-0.305344	-0.137526	0.107853	-0.1845	0.680294	1.000000	0.168823	0.510582	-0.353765	0.342215	-0.402516
GDP	0.052224	-0.081897	-0.084805	0.133025	0.025947	0.290303	0.168823	1.000000	0.160906	-0.133281	-0.04259	-0.188353
SIZE	0.225349	-0.758546	0.105969	-0.257258	-0.746134	0.298540	0.510582	0.160906	1.000000	-0.350649	0.390744	-0.428244
LOG (LQR)	0.136767	-0.011431	0.203819	-0.093393	0.105806	-0.282804	-0.353765	-0.133281	-0.350649	1.000000	-0.2528	0.389071
INF	-0.04993	-0.264806	-0.155901	0.297545	-0.076288	0.465915	0.342215	-0.04259	0.390744	-0.2528	1.000000	-0.384824
LOG (NPL)	-0.13434	0.244499	0.673282	-0.508643	0.009098	-0.636453	-0.402516	-0.188353	-0.428244	0.389071	-0.38482	1.000000

APPENDIX-5 DURBIN-WATSON SIGNIFICANCE TABLES

Durbin-Watson Statistic: 5 Per Cent Significance Points of dL and dU

Table A-2
Models with an intercept (from Savin and White)

Durbin-Watson Statistic: 5 Per Cent Significance Points of dL and dU

	k'*=1		k'=2		k'=3		k'=4		k'=5		k'=6		k'=7		k'=8		k'=9		k'=10	
n	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
6	0.610	1.400	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
7	0.700	1.356	0.467	1.896	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
8	0.763	1.332	0.559	1.777	0.367	2.287	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
9	0.824	1.320	0.629	1.699	0.455	2.128	0.296	2.588	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
10	0.879	1.320	0.697	1.641	0.525	2.016	0.376	2.414	0.243	2.822	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
11	0.927	1.324	0.758	1.604	0.595	1.928	0.444	2.283	0.315	2.645	0.203	3.004	-----	-----	-----	-----	-----	-----	-----	-----
12	0.971	1.331	0.812	1.579	0.658	1.864	0.512	2.177	0.380	2.506	0.268	2.832	0.171	3.149	-----	-----	-----	-----	-----	-----
13	1.010	1.340	0.861	1.562	0.715	1.816	0.574	2.094	0.444	2.390	0.328	2.692	0.230	2.985	0.147	3.266	-----	-----	-----	-----
14	1.045	1.350	0.905	1.551	0.767	1.779	0.632	2.030	0.505	2.296	0.389	2.572	0.286	2.848	0.200	3.111	0.127	3.360	-----	-----
15	1.077	1.361	0.946	1.543	0.814	1.750	0.685	1.977	0.562	2.220	0.447	2.471	0.343	2.727	0.251	2.979	0.175	3.216	0.111	3.438
16	1.106	1.371	0.982	1.539	0.857	1.728	0.734	1.935	0.615	2.157	0.502	2.388	0.398	2.624	0.304	2.860	0.222	3.090	0.155	3.304
17	1.133	1.381	1.015	1.536	0.897	1.710	0.779	1.900	0.664	2.104	0.554	2.318	0.451	2.537	0.356	2.757	0.272	2.975	0.198	3.184
18	1.158	1.391	1.046	1.535	0.933	1.696	0.820	1.872	0.710	2.060	0.603	2.258	0.502	2.461	0.407	2.668	0.321	2.873	0.244	3.073
19	1.180	1.401	1.074	1.536	0.967	1.685	0.859	1.848	0.752	2.023	0.649	2.206	0.549	2.396	0.456	2.589	0.369	2.783	0.290	2.974
20	1.201	1.411	1.100	1.537	0.998	1.676	0.894	1.828	0.792	1.991	0.691	2.162	0.595	2.339	0.502	2.521	0.416	2.704	0.336	2.885
21	1.221	1.420	1.125	1.538	1.026	1.669	0.927	1.812	0.829	1.964	0.731	2.124	0.637	2.290	0.546	2.461	0.461	2.633	0.380	2.806
22	1.239	1.429	1.147	1.541	1.053	1.664	0.958	1.797	0.863	1.940	0.769	2.090	0.677	2.246	0.588	2.407	0.504	2.571	0.424	2.735
23	1.257	1.437	1.168	1.543	1.078	1.660	0.986	1.785	0.895	1.920	0.804	2.061	0.715	2.208	0.628	2.360	0.545	2.514	0.465	2.670
24	1.273	1.446	1.188	1.546	1.101	1.656	1.013	1.775	0.925	1.902	0.837	2.035	0.750	2.174	0.666	2.318	0.584	2.464	0.506	2.613
25	1.288	1.454	1.206	1.550	1.123	1.654	1.038	1.767	0.953	1.886	0.868	2.013	0.784	2.144	0.702	2.280	0.621	2.419	0.544	2.560
26	1.302	1.461	1.224	1.553	1.143	1.652	1.062	1.759	0.979	1.873	0.897	1.992	0.816	2.117	0.735	2.246	0.657	2.379	0.581	2.513
27	1.316	1.469	1.240	1.556	1.162	1.651	1.084	1.753	1.004	1.861	0.925	1.974	0.845	2.093	0.767	2.216	0.691	2.342	0.616	2.470
28	1.328	1.476	1.255	1.560	1.181	1.650	1.104	1.747	1.028	1.850	0.951	1.959	0.874	2.071	0.798	2.188	0.723	2.309	0.649	2.431
29	1.341	1.483	1.270	1.563	1.198	1.650	1.124	1.743	1.050	1.841	0.975	1.944	0.900	2.052	0.826	2.164	0.753	2.278	0.681	2.396
30	1.352	1.489	1.284	1.567	1.214	1.650	1.143	1.739	1.071	1.833	0.998	1.931	0.926	2.034	0.854	2.141	0.782	2.251	0.712	2.363
31	1.363	1.496	1.297	1.570	1.229	1.650	1.160	1.735	1.090	1.825	1.020	1.920	0.950	2.018	0.879	2.120	0.810	2.226	0.741	2.333
32	1.373	1.502	1.309	1.574	1.244	1.650	1.177	1.732	1.109	1.819	1.041	1.909	0.972	2.004	0.904	2.102	0.836	2.203	0.769	2.306
33	1.383	1.508	1.321	1.577	1.258	1.651	1.193	1.730	1.127	1.813	1.061	1.900	0.994	1.991	0.927	2.085	0.861	2.181	0.796	2.281
34	1.393	1.514	1.333	1.580	1.271	1.652	1.208	1.728	1.144	1.808	1.079	1.891	1.015	1.978	0.950	2.069	0.885	2.162	0.821	2.257
35	1.402	1.519	1.343	1.584	1.283	1.653	1.222	1.726	1.160	1.803	1.097	1.884	1.034	1.967	0.971	2.054	0.908	2.144	0.845	2.236
36	1.411	1.525	1.354	1.587	1.295	1.654	1.236	1.724	1.175	1.799	1.114	1.876	1.053	1.957	0.991	2.041	0.930	2.127	0.868	2.216
37	1.419	1.530	1.364	1.590	1.307	1.655	1.249	1.723	1.190	1.795	1.131	1.870	1.071	1.948	1.011	2.029	0.951	2.112	0.891	2.197
38	1.427	1.535	1.373	1.594	1.318	1.656	1.261	1.722	1.204	1.792	1.146	1.864	1.088	1.939	1.029	2.017	0.970	2.098	0.912	2.180
39	1.435	1.540	1.382	1.597	1.328	1.658	1.273	1.722	1.218	1.789	1.161	1.859	1.104	1.932	1.047	2.007	0.990	2.085	0.932	2.164
40	1.442	1.544	1.391	1.600	1.338	1.659	1.285	1.721	1.230	1.786	1.175	1.854	1.120	1.924	1.064	1.997	1.008	2.072	0.952	2.149
45	1.475	1.566	1.430	1.615	1.383	1.666	1.336	1.720	1.287	1.776	1.238	1.835	1.189	1.895	1.139	1.958	1.089	2.022	1.038	2.088
50	1.503	1.585	1.462	1.628	1.421	1.674	1.378	1.721	1.335	1.771	1.291	1.822	1.246	1.875	1.201	1.930	1.156	1.986	1.110	2.044
55	1.528	1.601	1.490	1.641	1.452	1.681	1.414	1.724	1.374	1.768	1.334	1.814	1.294	1.861	1.253	1.909	1.212	1.959	1.170	2.010
60	1.549	1.616	1.514	1.652	1.480	1.689	1.444	1.727	1.408	1.767	1.372	1.808	1.335	1.850	1.298	1.894	1.260	1.939	1.222	1.984
65	1.567	1.629	1.536	1.662	1.503	1.696	1.471	1.731	1.438	1.767	1.404	1.805	1.370	1.843	1.336	1.882	1.301	1.923	1.266	1.964
70	1.583	1.641	1.554	1.672	1.525	1.703	1.494	1.735	1.464	1.768	1.433	1.802	1.401	1.838	1.369	1.874	1.337	1.910	1.305	1.948
75	1.598	1.652	1.571	1.680	1.543	1.709	1.515	1.739	1.487	1.770	1.458	1.801	1.428	1.834	1.399	1.867	1.369	1.901	1.339	1.935
80	1.611	1.662	1.586	1.688	1.560	1.715	1.534	1.743	1.507	1.772	1.480	1.801	1.453	1.831	1.425	1.861	1.397	1.893	1.369	1.925
85	1.624	1.671	1.600	1.696	1.575	1.721	1.550	1.747	1.525	1.774	1.500	1.801	1.474	1.829	1.448	1.857	1.422	1.886	1.396	1.916
90	1.635	1.679	1.612	1.703	1.589	1.726	1.566	1.751	1.542	1.776	1.518	1.801	1.494	1.827	1.469	1.854	1.445	1.881	1.420	1.909
95	1.645	1.687	1.623	1.709	1.602	1.732	1.579	1.755	1.557	1.778	1.535	1.802	1.512	1.827	1.489	1.852	1.465	1.877	1.442	1.903
100	1.654	1.694	1.634	1.715	1.613	1.736	1.592	1.758	1.571	1.780	1.550	1.803	1.528	1.826	1.506	1.850	1.484	1.874	1.462	1.898
150	1.720	1.747	1.706	1.760	1.693	1.774	1.679	1.788	1.665	1.802	1.651	1.817	1.637	1.832	1.622	1.846	1.608	1.862	1.593	1.877
200	1.758	1.779	1.748	1.789	1.738	1.799	1.728	1.809	1.718	1.820	1.707	1.831	1.697	1.841	1.686	1.852	1.675	1.863	1.665	1.874

*k` is the number of regressors excluding the intercept

	k'=11		k'=12		k'=13		k'=14		k'=15		k'=16		k'=17		k'=18		k'=19		k'=20	
n	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
16	0.098	3.503	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
17	0.138	3.378	0.087	3.557	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
18	0.177	3.265	0.123	3.441	0.078	3.603	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
19	0.220	3.159	0.160	3.335	0.111	3.496	0.070	3.642	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
20	0.263	3.063	0.200	3.234	0.145	3.395	0.100	3.542	0.063	3.676	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
21	0.307	2.976	0.240	3.141	0.182	3.300	0.132	3.448	0.091	3.583	0.058	3.705	-----	-----	-----	-----	-----	-----	-----	-----
22	0.349	2.897	0.281	3.057	0.220	3.211	0.166	3.358	0.120	3.495	0.083	3.619	0.052	3.731	-----	-----	-----	-----	-----	-----
23	0.391	2.826	0.322	2.979	0.259	3.128	0.202	3.272	0.153	3.409	0.110	3.535	0.076	3.650	0.048	3.753	-----	-----	-----	-----
24	0.431	2.761	0.362	2.908	0.297	3.053	0.239	3.193	0.186	3.327	0.141	3.454	0.101	3.572	0.070	3.678	0.044	3.773	-----	-----
25	0.470	2.702	0.400	2.844	0.335	2.983	0.275	3.119	0.221	3.251	0.172	3.376	0.130	3.494	0.094	3.604	0.065	3.702	0.041	3.790
26	0.508	2.649	0.438	2.784	0.373	2.919	0.312	3.051	0.256	3.179	0.205	3.303	0.160	3.420	0.120	3.531	0.087	3.632	0.060	3.724
27	0.544	2.600	0.475	2.730	0.409	2.859	0.348	2.987	0.291	3.112	0.238	3.233	0.191	3.349	0.149	3.460	0.112	3.563	0.081	3.658
28	0.578	2.555	0.510	2.680	0.445	2.805	0.383	2.928	0.325	3.050	0.271	3.168	0.222	3.283	0.178	3.392	0.138	3.495	0.104	3.592
29	0.612	2.515	0.544	2.634	0.479	2.755	0.418	2.874	0.359	2.992	0.305	3.107	0.254	3.219	0.208	3.327	0.166	3.431	0.129	3.528
30	0.643	2.477	0.577	2.592	0.512	2.708	0.451	2.823	0.392	2.937	0.337	3.050	0.286	3.160	0.238	3.266	0.195	3.368	0.156	3.465
31	0.674	2.443	0.608	2.553	0.545	2.665	0.484	2.776	0.425	2.887	0.370	2.996	0.317	3.103	0.269	3.208	0.224	3.309	0.183	3.406
32	0.703	2.411	0.638	2.517	0.576	2.625	0.515	2.733	0.457	2.840	0.401	2.946	0.349	3.050	0.299	3.153	0.253	3.252	0.211	3.348
33	0.731	2.382	0.668	2.484	0.606	2.588	0.546	2.692	0.488	2.796	0.432	2.899	0.379	3.000	0.329	3.100	0.283	3.198	0.239	3.293
34	0.758	2.355	0.695	2.454	0.634	2.554	0.575	2.654	0.518	2.754	0.462	2.854	0.409	2.954	0.359	3.051	0.312	3.147	0.267	3.240
35	0.783	2.330	0.722	2.425	0.662	2.521	0.604	2.619	0.547	2.716	0.492	2.813	0.439	2.910	0.388	3.005	0.340	3.099	0.295	3.190
36	0.808	2.306	0.748	2.398	0.689	2.492	0.631	2.586	0.575	2.680	0.520	2.774	0.467	2.868	0.417	2.961	0.369	3.053	0.323	3.142
37	0.831	2.285	0.772	2.374	0.714	2.464	0.657	2.555	0.602	2.646	0.548	2.738	0.495	2.829	0.445	2.920	0.397	3.009	0.351	3.097
38	0.854	2.265	0.796	2.351	0.739	2.438	0.683	2.526	0.628	2.614	0.575	2.703	0.522	2.792	0.472	2.880	0.424	2.968	0.378	3.054
39	0.875	2.246	0.819	2.329	0.763	2.413	0.707	2.499	0.653	2.585	0.600	2.671	0.549	2.757	0.499	2.843	0.451	2.929	0.404	3.013
40	0.896	2.228	0.840	2.309	0.785	2.391	0.731	2.473	0.678	2.557	0.626	2.641	0.575	2.724	0.525	2.808	0.477	2.829	0.430	2.974
45	0.988	2.156	0.938	2.225	0.887	2.296	0.838	2.367	0.788	2.439	0.740	2.512	0.692	2.586	0.644	2.659	0.598	2.733	0.553	2.807
50	1.064	2.103	1.019	2.163	0.973	2.225	0.927	2.287	0.882	2.350	0.836	2.414	0.792	2.479	0.747	2.544	0.703	2.610	0.660	2.675
55	1.129	2.062	1.087	2.116	1.045	2.170	1.003	2.225	0.961	2.281	0.919	2.338	0.877	2.396	0.836	2.454	0.795	2.512	0.754	2.571
60	1.184	2.031	1.145	2.079	1.106	2.127	1.068	2.177	1.029	2.227	0.990	2.278	0.951	2.330	0.913	2.382	0.874	2.434	0.836	2.487
65	1.231	2.006	1.195	2.049	1.160	2.093	1.124	2.138	1.088	2.183	1.052	2.229	1.016	2.276	0.980	2.323	0.944	2.371	0.908	2.419
70	1.272	1.987	1.239	2.026	1.206	2.066	1.172	2.106	1.139	2.148	1.105	2.189	1.072	2.232	1.038	2.275	1.005	2.318	0.971	2.362
75	1.308	1.970	1.277	2.006	1.247	2.043	1.215	2.080	1.184	2.118	1.153	2.156	1.121	2.195	1.090	2.235	1.058	2.275	1.027	2.315
80	1.340	1.957	1.311	1.991	1.283	2.024	1.253	2.059	1.224	2.093	1.195	2.129	1.165	2.165	1.136	2.201	1.106	2.238	1.076	2.275
85	1.369	1.946	1.342	1.977	1.315	2.009	1.287	2.040	1.260	2.073	1.232	2.105	1.205	2.139	1.177	2.172	1.149	2.206	1.121	2.241
90	1.395	1.937	1.369	1.966	1.344	1.995	1.318	2.025	1.292	2.055	1.266	2.085	1.240	2.116	1.213	2.148	1.187	2.179	1.160	2.211
95	1.418	1.930	1.394	1.956	1.370	1.984	1.345	2.012	1.321	2.040	1.296	2.068	1.271	2.097	1.247	2.126	1.222	2.156	1.197	2.186
100	1.439	1.923	1.416	1.948	1.393	1.974	1.371	2.000	1.347	2.026	1.324	2.053	1.301	2.080	1.277	2.108	1.253	2.135	1.229	2.164
150	1.579	1.892	1.564	1.908	1.550	1.924	1.535	1.940	1.519	1.956	1.504	1.972	1.489	1.989	1.474	2.006	1.458	2.023	1.443	2.040
200	1.654	1.885	1.643	1.896	1.632	1.908	1.621	1.919	1.610	1.931	1.599	1.943	1.588	1.955	1.576	1.967	1.565	1.979	1.554	1.991

*K' is the number of regressors excluding the intercept

APPENDIX-6 SAMPLE FORMAT USED FOR REPORTING OF CAPITAL ADEQUACY RATIO TO NATIONAL BANK OF ETHIOPIA

Bank_____

Period Covered_____

Table A : On Balance Sheet Assets
(In thousands of birr)

Code	ASSETS	Amount	Weight (%)	Weighted Assets
		A	B	C = A x B
7100	Cash on hand (local and foreign currency)		0	
7200	Claims on Banks			
7210	National Bank		0	
7220	Other Banks (Domestic & foreign)			
7221	*Less than 1 year maturity*		20	
7222	*over 1 year maturity*		100	
7300	Claims on Government			
7310	Central Government		0	
7320	Regional Government		20	
7400	Loans & Advances (net)			
7410	secured by cash, central government securities or guaranteed by central government		0	
7420	secured/guaranteed by regional government		20	
7430	Residential Mortgage Loans		50	
7440	Others		100	
7500	Securities (non-government)		100	
7600	Investments		100	
7700	Fixed Assets (net)		100	
7800	Other Assets		100	
7810	Accounts receivable		100	
7820	Supplies stock a/c		100	
7830	Customers' Liab. for L/C		0	
7900	Total RWBSA*	XXXXXXXXX	XXXXXXX	

* RWBSA =Risk Weighted Balance Sheet Assets

Prepared by:_____ Approved By:_____

Signature :_____ Signature :_____

Table B : Off Balance Sheet Assets
(In thousands of birr)

Code	Off–balance sheet assets (OBSA)	Face Value A	Credit Conv. Factor (%) B	Amount C = A x B	Weight (%) D	Credit Equ. E = C x D
8100	Commitments to purchase and/or sell F/CY		100		100	
8200	Standby Letters of Credit					
8210	*guaranteed by :*					
8211	Central government		100		0	
8212	Regional government		100		20	
8213	Bank (dom./foreign)		100		20	
8214	All others		100		100	
8300	Loan Commitments					
8310	guaranteed by :					
8311	Central government		50		0	
8312	Regional government		50		20	
8313	Bank (dom./foreign)		50		20	
8314	All others		50		100	
8400	Guarantees (bid bonds, performance bonds, etc.)					
8410	*If counterparty is:*					
8411	Central government		50		0	
8412	Regional government		50		20	
8413	Bank (dom./foreign)		50		20	
8414	All others		50		100	
8500	Others**					
8600	Total Risk weighted Off–BSA	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	

** Factor to be determined on a case–by–case basis in consultation with NBE.

Prepared by:_____ Approved By:_____
Signature :_____ Signature :_____

CV

* The weights to be applied are the following:

0% - if the counterparty is central government
20% - if the counterparty is regional government
20% - if the counterparty is a bank, wether domestic or foreign
100% - all other counterparties.

** Factor to be determined on a case-by-case basis.

Table C : Components of Capital
(In thousands of birr)

Code	Description
8700	TOTAL CAPITAL (8710+8720)
8710	Primary Capital
8711	Equity Capital
8712	General Reserve
8713	Legal Reserve
8720	Supplementary Capital (Specify)

Appendix 7: RAW DATA

Name of the Bank	YEAR	CAR	size	ROA	ROE	NIM	LQR	LAR	DAR	LPR	NPL	RAR	GDP	INF
CBE	2002	0.11	22,146.00	(2.16)	(44.23)	0.95	35.81	0.44	0.84	0.25	52.09	0.33	1.60	(10.60)
CBB	2002	0.73	958.00	0.41	5.48	2.26	18.68	0.75	0.63	0.10	41.55	0.11	1.60	(10.60)
DB	2002	0.12	1,486.00	1.86	22.33	3.35	34.25	0.59	0.80	0.03	14.22	0.71	1.60	(10.60)
AIB	2002	0.15	1,112.00	1.19	10.21	3.80	36.24	0.57	0.84	0.04	34.02	0.81	1.60	(10.60)
BOA	2002	0.17	1,142.00	(0.20)	(1.39)	4.08	38.09	0.59	0.80	0.06	37.95	0.71	1.60	(10.60)
WB	2002	0.10	646.00	0.98	9.84	4.68	44.27	0.63	0.80	0.05	12.94	0.97	1.60	(10.60)
UB	2002	0.39	314.00	1.52	5.30	7.52	45.22	0.52	0.60	0.01	15.95	0.71	1.60	(10.60)
NIB	2002	0.20	534.00	2.99	16.15	4.52	48.41	0.61	0.65	0.04	8.64	0.92	1.60	(10.60)
CBE	2003	0.10	24,200.00	2.35	51.76	2.01	56.42	0.35	0.82	0.29	53.50	0.50	(2.10)	10.90
CBB	2003	0.11	942.00	1.15	15.07	2.85	23.46	0.75	0.65	0.11	40.09	0.79	(2.10)	10.90
DB	2003	0.90	1,991.00	1.55	21.51	3.13	32.60	0.64	0.81	0.04	8.89	0.07	(2.10)	10.90
AIB	2003	0.13	1,401.00	1.11	10.45	2.63	39.61	0.57	0.83	0.06	25.13	0.77	(2.10)	10.90
BOA	2003	0.15	1,333.00	0.48	4.14	3.66	38.03	0.61	0.81	0.08	28.43	0.76	(2.10)	10.90
WB	2003	0.12	889.00	1.43	14.01	3.52	44.60	0.64	0.79	0.05	10.86	0.91	(2.10)	10.90
UB	2003	0.21	469.00	1.28	5.59	5.28	36.89	0.62	0.61	0.02	9.93	0.91	(2.10)	10.90
NIB	2003	0.17	885.00	1.83	11.61	3.84	41.50	0.62	0.66	0.04	12.34	0.84	(2.10)	10.90
CBE	2004	0.11	27,975.00	1.28	24.09	1.76	59.41	0.30	0.81	0.24	37.68	0.47	11.70	7.30
CBB	2004	0.73	1,057.00	0.40	5.00	2.26	31.50	0.69	0.65	0.13	35.47	0.11	11.70	7.30
DB	2004	0.12	2,677.00	2.40	37.21	3.45	32.57	0.63	0.81	0.04	7.44	0.55	11.70	7.30
AIB	2004	0.15	1,770.00	1.64	17.81	2.71	42.88	0.53	0.84	0.08	18.39	0.60	11.70	7.30
BOA	2004	0.17	1,585.00	2.60	22.22	5.38	39.62	0.61	0.80	0.08	17.51	0.70	11.70	7.30
WB	2004	0.10	1,140.00	3.15	28.83	5.20	46.69	0.65	0.77	0.06	12.24	1.11	11.70	7.30
UB	2004	0.39	674.00	1.22	7.49	4.66	43.03	0.57	0.79	0.04	9.90	0.36	11.70	7.30
NIB	2004	0.20	1,247.00	3.28	23.49	4.28	39.78	0.63	0.67	0.04	8.77	0.69	11.70	7.30
CBE	2005	0.10	33,169.00	1.87	39.11	1.73	52.67	0.29	0.76	0.21	27.52	0.41	12.60	6.10
CBB	2005	0.11	1,832.00	1.23	18.38	1.90	33.79	0.47	0.58	0.13	27.76	0.55	12.60	6.10
DB	2005	0.90	3,420.00	2.33	34.22	4.07	29.85	0.65	0.83	0.03	6.72	0.08	12.60	6.10
AIB	2005	0.13	2,226.00	1.90	19.84	3.34	38.90	0.58	0.87	0.06	12.02	0.81	12.60	6.10
BOA	2005	0.15	2,057.00	3.35	27.29	5.05	36.90	0.60	0.79	0.05	12.40	0.84	12.60	6.10
WB	2005	0.12	1,616.00	3.48	31.07	4.29	48.14	0.62	0.80	0.05	8.41	0.96	12.60	6.10
UB	2005	0.21	1,073.00	3.55	28.05	5.21	45.11	0.55	0.81	0.04	8.45	0.54	12.60	6.10
NIB	2005	0.17	1,732.00	3.09	23.17	4.43	26.79	0.65	0.71	0.04	11.22	0.77	12.60	6.10
CBE	2006	0.11	35,849.00	2.32	54.65	1.88	59.16	0.26	0.79	0.18	22.45	0.37	11.50	10.60
CBB	2006	0.73	1,797.00	3.92	46.67	4.22	31.16	0.66	0.54	0.11	19.42	0.12	11.50	10.60
DB	2006	0.12	4,546.00	3.34	42.29	4.68	25.27	0.70	0.81	0.03	6.21	0.73	11.50	10.60
AIB	2006	0.15	2,954.00	3.01	29.32	3.65	31.45	0.63	0.87	0.05	9.56	0.71	11.50	10.60
BOA	2006	0.17	2,834.00	3.48	25.91	5.72	27.56	0.69	0.77	0.03	4.94	0.82	11.50	10.60
WB	2006	0.10	2,259.00	3.66	32.64	4.62	37.18	0.71	0.79	0.05	4.85	1.11	11.50	10.60
UB	2006	0.39	1,599.00	3.29	27.85	6.06	37.09	0.63	0.76	0.03	4.18	0.30	11.50	10.60
NIB	2006	0.20	2,027.00	3.09	22.79	4.40	21.46	0.73	0.72	0.03	8.47	0.70	11.50	10.60

CBE	2007	0.10	43,456.00	2.18	30.18	2.08	59.05	0.22	0.76	0.14	14.52	0.93	11.80	15.80
CBB	2007	0.11	1,889.00	3.01	35.22	5.49	30.70	0.70	0.60	0.14	17.06	1.06	11.80	15.80
DB	2007	0.90	6,041.00	3.53	40.19	4.87	27.66	0.66	0.80	0.02	5.95	0.10	11.80	15.80
AIB	2007	0.13	3,830.00	4.22	38.78	5.19	29.45	0.66	0.81	0.04	7.36	0.89	11.80	15.80
BOA	2007	0.15	3,396.00	2.15	16.65	5.14	30.09	0.68	0.80	0.05	10.54	0.81	11.80	15.80
WB	2007	0.12	3,480.00	3.90	34.04	4.55	48.47	0.62	0.78	0.04	5.25	1.00	11.80	15.80
UB	2007	0.21	2,182.50	3.38	23.23	6.50	34.73	0.65	0.71	0.03	4.59	0.77	11.80	15.80
NIB	2007	0.17	2,607.00	3.28	21.41	5.08	26.70	0.70	0.72	0.04	5.56	-	11.80	15.80
CBE	2008	0.11	50,416.11	2.90	31.00	2.55	35.38	0.34	0.75	0.06	5.33	0.80	11.20	25.30
CBB	2008	0.73	2,392.02	4.02	40.46	6.12	39.03	0.58	0.62	0.13	15.56	0.15	11.20	25.30
DB	2008	0.12	7,828.59	3.45	37.50	4.92	37.24	0.56	0.79	0.02	5.89	0.80	11.20	25.30
AIB	2008	0.15	4,820.22	3.30	27.71	4.26	38.26	0.57	0.80	0.05	8.66	0.85	11.20	25.30
BOA	2008	0.17	4,269.94	0.38	3.54	5.11	33.79	0.66	0.81	0.09	12.87	0.57	11.20	25.30
WB	2008	0.10	4,124.89	3.65	27.54	5.00	60.80	0.57	0.72	0.06	8.39	1.44	11.20	25.30
UB	2008	0.39	3,249.96	3.35	22.00	7.55	42.64	0.57	0.75	0.03	3.98	0.37	11.20	25.30
NIB	2008	0.20	3,650.11	3.61	22.10	6.45	36.51	0.58	0.68	0.05	6.73	-	11.20	25.30
CBE	2009	0.10	59,411.45	3.50	40.01	3.66	26.29	0.35	0.73	0.03	3.66	0.81	10.00	36.40
CBB	2009	0.11	2,592.15	3.28	30.57	5.34	36.46	0.61	0.71	0.12	11.45	0.98	10.00	36.40
DB	2009	0.90	9,732.58	2.85	30.49	4.58	48.32	0.46	0.81	0.02	7.39	0.10	10.00	36.40
AIB	2009	0.13	6,422.55	2.54	21.23	4.40	49.62	0.42	0.77	0.05	5.78	0.92	10.00	36.40
BOA	2009	0.15	5,476.62	2.06	21.40	5.31	49.23	0.49	0.82	0.10	14.75	0.65	10.00	36.40
WB	2009	0.12	5,118.31	3.91	25.06	5.90	78.20	0.41	0.73	0.06	7.70	1.41	10.00	36.40
UB	2009	0.21	4,651.70	2.37	18.95	7.59	53.43	0.46	0.78	0.03	4.62	0.52	10.00	36.40
NIB	2009	0.17	4,806.50	3.63	23.16	7.33	48.57	0.46	0.69	0.04	11.16	-	10.00	36.40
CBE	2010	0.11	74,186.91	2.95	37.15	3.32	21.03	0.32	0.74	0.02	1.88	0.66	10.60	2.80
CBB	2010	0.73	3,161.66	3.30	31.64	5.33	39.43	0.55	0.74	0.11	6.56	0.14	10.60	2.80
DB	2010	0.12	12,353.38	2.93	31.89	2.68	42.54	0.41	0.82	0.02	3.00	0.78	10.60	2.80
AIB	2010	0.15	7,944.78	3.45	29.29	2.91	50.88	0.40	0.77	0.05	5.47	0.81	10.60	2.80
BOA	2010	0.17	6,279.54	2.39	25.45	3.55	47.17	0.50	0.82	0.07	6.98	0.54	10.60	2.80
WB	2010	0.10	5,741.93	4.11	23.66	4.54	77.39	0.43	0.68	0.04	3.47	1.80	10.60	2.80
UB	2010	0.39	5,896.23	3.31	30.14	7.66	55.54	0.44	0.80	0.04	3.76	0.28	10.60	2.80
NIB	2010	0.20	5,970.51	3.73	24.42	4.79	51.39	0.43	0.69	0.04	7.37	0.77	10.60	2.80
CBE	2011	0.10	114,264.93	3.04	48.46	3.17	26.48	0.31	0.74	0.02	0.86	0.52	11.40	18.10
CBB	2011	0.11	3,504.87	2.58	25.13	4.95	39.75	0.49	0.72	0.10	6.81	0.98	11.40	18.10
DB	2011	0.90	14,659.79	3.34	35.77	2.75	42.47	0.42	0.81	0.02	3.38	0.11	11.40	18.10
AIB	2011	0.13	10,115.78	3.99	32.08	2.73	40.02	0.39	0.77	0.04	3.81	1.02	11.40	18.10
BOA	2011	0.15	7,277.96	2.67	29.04	4.41	39.79	0.46	0.83	0.03	3.97	0.62	11.40	18.10
WB	2011	0.12	8,061.05	4.68	27.06	4.41	69.51	0.36	0.74	0.05	3.51	1.44	11.40	18.10
UB	2011	0.21	7,725.62	3.40	30.13	8.23	46.07	0.42	0.79	0.03	3.35	0.54	11.40	18.10
NIB	2011	0.17	7,111.52	3.77	23.61	5.57	51.24	0.39	0.73	0.03	5.04	0.98	11.40	18.10
CBE	2012	0.11	158,814.43	3.98	77.71	3.68	15.80	0.39	0.73	0.02	2.00	0.43	8.70	33.80
CBB	2012	0.73	5,946.60	2.43	27.32	2.50	46.24	0.30	0.59	0.10	9.70	0.11	8.70	33.80
DB	2012	0.12	17,520.04	4.05	40.44	3.69	32.96	0.46	0.80	0.02	2.15	0.90	8.70	33.80
AIB	2012	0.15	11,936.68	3.58	27.03	4.01	26.48	0.46	0.77	0.03	2.70	0.93	8.70	33.80
BOA	2012	0.17	8,239.51	2.79	27.60	4.68	30.62	0.47	0.82	0.03	2.60	0.63	8.70	33.80
WB	2012		8,347.15		22.86		48.47							

		0.10		4.10		4.81		0.43	0.69	0.02	2.40	1.89	8.70	33.80
UB	2012	0.39	8,786.86	3.61	29.74	10.78	32.58	0.46	0.77	0.02	2.33	0.32	8.70	33.80
NIB	2012	0.20	8,275.70	3.72	21.21	5.80	36.02	0.45	0.71	0.03	3.00	0.92	8.70	33.80
CBE	2013	0.10	197,104.24	3.43	72.83	4.13	18.01	0.36	0.77	0.03	0.99	0.44	9.80	13.50
CBB	2013	0.11	6,699.50	2.20	24.32	2.21	45.70	0.29	0.61	0.04	10.00	0.94	9.80	13.50
DB	2013	0.90	19,747.17	3.26	31.33	3.51	30.69	0.45	0.80	0.02	2.25	0.12	9.80	13.50
AIB	2013	0.13	14,858.82	3.79	28.03	4.37	24.04	0.52	0.84	0.02	60.04	1.07	9.80	13.50
BOA	2013	0.15	10,129.37	2.36	21.48	3.84	19.46	0.46	0.84	0.02		0.75	9.80	13.50
WB	2013	0.12	10,393.80	3.66	19.99	5.09	36.75	0.45	0.73	0.02	0.41	1.52	9.80	13.50
UB	2013	0.21	9,977.67	2.28	18.56	11.95	20.67	0.47	0.81	0.02	0.33	0.56	9.80	13.50
NIB	2013	0.17	9,144.54	178.64	974.32	7.63	24.66	0.50	0.73	0.03	0.30	1.08	9.80	13.50