The Impact of National Bank Regulation on Banks Performance: Evidence from the Private Banks of Ethiopia

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Abstract

The impact of National Bank regulation on banks performance: empirical study on private commercial banks in Ethiopia

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Addis Ababa University, 2014

The main objective of this study is to examine the impact of NBE regulations on private banks performance through the significant regulatory variables explaining the NBE directives, using bank-specific and macroeconomic variables as control variables. Balanced fixed effect panel regression was used for the data of six private commercial banks in the sample covered the period from 2004 to 2013. Three regulatory factors affecting banks performance in terms of return on asset and net interest margin were selected and analyzed. The results of panel data regression analysis showed that NBE Bill and Credit cap had negative and statistically significant impact on banks profitability but reserve requirement had negative and insignificant impact on profitability. While measuring banks cost of intermediation through Net Interest Margin three of the regulatory variables (i.e. NBE Bills, Reserve requirement and credit cap) had negative and statistically significant effect on net interest margin. Among the control variables bank size had positive and statistically significant effect on both performance measures, which means ROA & NIM. Operating efficiency and GDP had positive and statistically insignificant effect on ROA but both were statistically significant on NIM. Equity had positive and significant effect on ROA but had negative and statistically insignificant on NIM. Inflation had positive and insignificant effect on ROA but had positive and significant effect on NIM.

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List of Acronyms

AB……..….Abay Bank

AIB …….…..……Addis International Bank

AIB…….……..Awash International Bank

BIB…….Birihan International Bank

BOA…….Bank of Abyssinia

BUIB……...Buna International Bank

CBO……...Cooperative Bank of Oromiya

CC…….……Credit Cap

CLRM……Classical Linear Regression Model

DB…….Dashen Bank

DGB……...……Debub Global Bank

DW……..……..Durbin-Watson

EB……..Enat Bank

FEM……...…….Fixed Effect Model

GDP…….Gross domestic Product

IMF……..International Monetary Fund

INF……General Inflation Rate

LIB…….Lion International Bank

MENA……..…….Middle East and North Africa

MoFED……...….Ministry of Finance and Economic Development

NBE…….National Bank of Ethiopia

NIB……...Nib international Bank

NIM……....Net Interest Margin

OIB……..……..Oromiya International Bank

OLS……Ordinary Least Square

REM……..Random Effect Model

ROA……Return on Assets

RR……Reserve Requirement

UB……..United Bank

WB……Wogagen Bank

ZB……...Zemmen Bank

CHAPTER ONE

1. Introduction

1.1 Background of the study

Banks are a vital parts of a nation‟s economy. In their traditional role as financial intermediaries, banks ensure the transmission of funds from surplus to deficit units and serve to meet the demand of those who need funding. Banks facilitate spending and investment, which fuel growth in the economy. However, despite their important role in the economy, banks are nevertheless susceptible to failure. Banks, like any other business, can go bankrupt. However, unlike most other businesses, the failure of banks, especially very large ones, can have far-reaching implications. As we saw during the great depression and most recently, during the global financial crisis and the ensuing recession, the health of the bank system (or lack thereof) can trigger economic calamities affecting millions of people. Consequently, it is imperative that banks operate in a safe and sound manner to avoid failure. One way to ensure this is for governments to provide diligent regulation of banks. Yet, with the advent of globalization, banking activities are no longer confined to the borders of any individual country. With cross-border banking activities rapidly increasing, the need for international cooperation in bank regulation has likewise increased (Larson, 2011).

Regulation is defined as the public administrative policing of private activities based on a set of rules that are developed in the public interest. Thus the process consists of intentional restrictions over a subjects choice courses of operations by an intity not directly involved in that activity.

When this definition is applied to the financial system, it is termed financial regulation and refers to a process in which there is a monitoring of the financial institutions by a body that is directed by the government in an effort to achieve macroeconomic goals through monatery policies as well as other measures permissible by law. Thus regulations are concerned, they must be extensively considered and skillfully administered because in appropriate or ineffective regulatory measures results in catastropic economic problems (Kevin and Nicol, 2000).

Recent economic crises have revealed the importance of bank regulations to hedge against the high risk attributed to imbalances in banks‟ balance sheets. Nonetheless, excessive regulations may have adverse effects. On the one hand, they serve as prudential measures that mitigate the effects of economic crises on the stability of the banking system and subsequent accompanying macroeconomic results. On the other hand, excessive regulations may increase the cost of intermediation and reduce the profitability of the banking industry. Simultaneously, as banks become more constrained, their ability to expand credit and contribution to economic growth will be hampered (Naceurand Kandil, 2011).

It is argued (Adam, 2005) that economists disagree on the level of government intervention in economic and financial activities over the world while some believe that many regulations are necessary in order to protect the depositors funds. Nevertheless, others believed that the bank are overregulated (short and O‟Driscroll, 1983).

To sum up, as the prime movers of economic life, banks occupy a significant place in the economy of every nation. It is therefore not surprising that their operations are perhaps the most heavily regulated and supervised of all businesses. National Bank of Ethiopia put different regulation and supervision on the banking activities at different times. These regulations and supervisions are intended to stabilize the country‟s economic environment, but NBE does not seem consider the effect of such regulations and supervision on the banks performance. Thus, the researcher was interested to examine the impact of NBE regulations on the banks‟ performance.

1.2. Statement of the problem

Measuring bank regulation and supervision around the world is hard. Hundreds of laws and regulations, emanating from different parts of national and local governments, define policies regarding bank capital standards, the entry requirements of new domestic and foreign banks, bank ownership restrictions, and loan provision guidelines. Numerous pages of regulations in most countries delineate the permitted activities of banks and provide shape and substance to deposit insurance schemes and the nature and timing of the information that banks must disclose to regulators and the public. Extensive statutes define the powers of regulatory and supervisory officials over banks and the limits of those powers.

There are daunting challenges associated with acquiring data on all of the laws, regulations, and practices that apply to banks in countries and then aggregating this information into useful statistics that capture different and important aspects of regulatory regimes (R. Barth, Caprio and Levine, 2002).

In accordance with Article 55(1) of the constitution of the Federal Democratic Republic of Ethiopia, the NBE is established to control the financial system and monetary policy of the country. This monetary policy refers to a bundle of actions and regulatory stances taken by the central bank including; setting minimum interest rates on deposits or the rediscount rate charged to Commercial banks borrowing reserves, setting reserve requirements on various classes of deposits, increasing or decreasing commercial bank reserves through open market purchases or sales of government securities. Furthermore, regulatory actions to constrain commercial bank financial activity or to set minimum capital requirements, intervention in foreign exchange markets to buy and sell domestic currency for foreign exchange and decide on the level of required reserve of commercial banks total deposit.

In Ethiopia, National Bank exercises control over the banking sector through issuance of directives pertaining formation and operation of a banking business. Most of the directives on operation aim at reducing risk of liquidity and solvency in the banking system. Some of NBE‟s directives are issued as part of the central bank‟s conduct of monetary policy and some are issued to ensure that the sector plays adequate role in channeling funds to priority sectors of the economy. Most notable action by NBE is its revision of the reserve requirement to combat skyrocketing inflation in the country. The bank revised the reserve requirement from 5% to 10% in 2007 (NBE directive NO.SBB/42/2007) and to 15% in 2008 (NBE directive NO.SBB/45/2008). This was coupled with a credit cap aimed at calming down the seemingly overheating economy.

The long-standing credit ceilings imposed on Ethiopia‟s private banks were finally removed on April 1, 2011. This was done with several strings attached, however, including instructions that private banks henceforth offer involuntary bill purchases where banks are required to put 27% of loan able funds in government treasury bonds maturing in 5 year and do so at an interest rate of 3%. It is not difficult to imagine the effect of all these requirements on banks performance.

However, our understanding of all these regulatory actions of NBE on bank performance is limited due to lack of scientific study in the area. Therefore, this study tries to examine the effect of regulatory actions on banks performance by answering key research questions.

1.3. Objective of the study

1.3.1. General Objective

The general objective of this study is to examine the impact of National Bank regulation on private banks performance in Ethiopia.

1.3.2. Specific Objectives

The specific objectives are as follows:

- Evaluate the effect of setting up of reserve requirement on bank profitability.
- Assess the effect of credit cap on bank profitability.
- Evaluate the impact of bill purchases on bank profitability.

1.4. Research questions and hypothesis

1.4.1. Research Questions

RQ1: What is the impact of NBE Bills purchase on bank performance?

RQ2: How the continuous increase in reserve requirement affects bank profitability?

RQ3: What was the effect of credit cap on bank performance?

1.4.2. Research hypothesis

The following hypotheses are developed to break down the above research questions. Therefore, this study attempted to test the following hypotheses in the case of private banks in Ethiopia.

H1: NBE-Bills have a negative and significant effect on banks performance.

H2: Reserve requirement has a negative and significant effect on banks performance

H3: Credit cap has a negative and significant effect on banks performance.

1.5. Scope and Limitation of the Study

The study is limited to evaluate the impact of the regulatory variables on banks performance, which are applied by the National Bank of Ethiopia, observed for ten consecutive years: 2004-2013. The limitation that is faced by the researcher is lack of literature in National bank regulations and its impact on banks performance in Ethiopia.

1.6. Significance of the study

The study has the following significances for policy makers, companies and other stakeholders:

- It will enable policy makers to take deep-considerations on the impact regulations have on banks performance during policy formulation and implementation
- The results of this study will create awareness for banks about the effect of NBE regulation on their profitability; give the opportunity to influence NBE by providing feedback during policy formulation and implementation.
- It gives the researcher the opportunity to gain deep knowledge on the impact of national bank regulations on banks performance.
- In addition to the above points, the NBE can use the study or the recommendations included in this paper as a base to improve its policy\regulation after carefully evaluating its impact.

1.7. Organization of the paper

This research report is organized in five chapters. Chapter one provides the general introduction about the whole report. Chapter two describes the review of related literatures. Chapter three provide detail description of the methodology employed by the research. Chapter four contains data presentation, analysis and interpretation. Finally, the last chapter concludes the total work of the research and gives relevant recommendations based on the findings.

CHAPTER TWO: LITERATURE REVIEW

2.1. Theoretical Literature

Regulation is defined as the public administrative policing of private activities based on a set of rules that were developed in the public interest. Thus the process consists of intentional restrictions over a subjects choice courses of operations by an intity not directly involved in that activity. When the definition is applied to the financial system, it is termed financial regulation and refers to a process in which there is a monitoring of the financial institutions by a body that is directed by the government in an effort to achieve macroeconomic goals through monatery policies as well as other measures permissible by law. Thus regulations are concerned, they must be extensively considered and skillfully administered because in appropriate or ineffective regulatory measures results in catastropic economic problems (Greenidge and Browne, 2000).

“Regulation” refers to the set of laws and rules applicable to banking, and “supervision” is defined as the monitoring by authorities of banks‟ activities and the enforcement of banking regulations (Barth, Nolle, Phumiwasana and Yago 2003, p.70).

2.1.1. Regulation and Supervision of Banks

Who Supervises Banks?

Banking crises, rapid structural change, and the continuing globalization of banking have led national and multilateral policy makers to focus increased attention on the crucial role of banking supervision. This focus is reinforced by the fact that "…one of the important [international] trends has been, and continues to be, a move away from regulation and towards supervision." Policy discussions specifically focus on several issues that must be addressed in establishing and maintaining effective supervision, including who should supervise banks, i.e., the "structure" of bank supervision. Three issues for policy makers to address with respect to the structure of bank supervision are whether there should be a single bank supervisory authority, or multiple bank supervisors; whether the central bank should play a role in bank supervision; and whether the supervisor responsible for the banking industry should also have responsibility for other financial services, in particular the securities and insurance industries. How these issues are addressed is important because policies that fail to provide for an appropriate bank supervisory framework may undermine bank performance and even lead to full-scale banking crises (Barth, 2008).

Bank Supervisory Role of the Central Bank

Countries must also decide whether to assign responsibility for bank supervision to the central bank. As with the issue of single or multiple bank supervisors, the conceptual literature is split on the relative advantages and disadvantages of the central bank being a bank supervisor.

Perhaps the most strongly emphasized argument in favor of assigning supervisory responsibility to the central bank is that as a bank supervisor, the central bank will have first-hand knowledge of the condition and performance of banks. This in turn can help it identify and respond to the emergence of a systemic problem in a timely manner. Those pointing to the disadvantages of assigning bank supervision to the central bank stress the inherent conflict of interest between supervisory responsibilities and responsibility for monetary policy. The conflict could become particularly acute during an economic downturn, in that the central bank may be tempted to pursue a too-loose monetary policy to avoid adverse effects on bank earnings and credit quality, and/or encourage banks to extend credit more liberally than warranted based on credit quality conditions to complement an expansionary monetary policy. As with the single-multiple bank supervisor debate, a useful first step in addressing the debate over the bank supervisory role of the central bank is to ascertain basic facts. (R. Barth, 2008).

2.1.2. The financial regulations

Financial regulation can be classified into groups according to their aims and functions. The three most common classifications are the following; which are outlined in (Williams, 1996).

- Structural regulations: - are boundaries placed on commercial banks determining the activities in which they can participate from those from which they are debarred. Licensing of commercial banks and prohibitions from engaging in commercial activities, are examples of structural regulations used.

- Prudential regulation :- emphasizes the control of systematic risk through principally balance sheet constraint such as capital adequacy and permissible bank concentration (share of banks asset held by a particular body or individual) ratios; and it establishes guidelines to banks with the intension of maintaining safety and soundness of the banking system and protecting the users of financial services. E.g. Placing limits on loan to a single borrowers or groups.
- Monetary regulation: - is the process of setting monetary policy directives designed to bring about predetermined macroeconomic outcomes by focusing on interest rates, credit controls and primary and secondary reserve requirements. It impacts on the deposit taking and lending activities of commercial banks through adjustments in price, volume, portfolio change and risk taking.

2.1.3. The impact of regulatory measures

Regulations impact on the very structure of the banking system since they present the stipulations and restrictions that must be considered in the banks entire series of operations. But in terms of optimality, it remains to be answered whether all the restrictions in place are necessary. Bhattachyra (1998) had some notable conclusions when he set out to survey modern literature on bank regulation, exploring the implications for optimal regulation. Among the conclusions were:

i. Imposing restrictions on banks investment may limit the liability of the deposit insurance fund, affecting the optimal configuration of banking and may reduce charter values as a result.

ii. Risk sensitive capital requirements and risk calibrated deposit insurance premia are potentially useful regulatory tools in coping with moral hazard.

iii. If bank closure policy is improved and discipline brought to bear, it could attenuate the moral hazard problems related to deposit insurance.

iv. Increasing banks charter values can also help to dampen the risk-taking propensities of the insured banks.

v. If universal banking is permitted it facilitates reusability of information and stimulates investments.

Further Bhattachyra et al suggests that restricting banks to financing themselves does not sacrifice efficiency; bank sizes should not be restricted and financing with non traded demand deposit contracts without constraints on the associated interest rate patterns should be permitted.

Therefore, it can be concluded that although restrictions have their place in the financial system, they are no tall beneficial o the public nor the banking system and sometimes the economy as a whole.

Measures such as interest rate ceilings and floors, exchange and credit controls and reserve requirement are typical tools for the central bank to use in their effort to the banks. One school of thought is that where there is no deposit rate ceilings, banks will bid up deposit interest rates which in turn will cause them to seek out higher yielding riskier assets to justify the high deposit rates.

2.1.4. Banking Regulation: The Risk of Bank Runs and Of Moral Hazard in Banking and Their Effects on the Economy

As cited in Bonn (2005). It is widely accepted that in the absence of market failures, open and competitive markets yield strong incentives to efficiently meet the demands of consumers and to adapt to changing demands and technology over time. With very few exceptions, in the absence of a market failure there is no economic justification for regulation.

The most important rationale for regulation in banking is to address concerns over the safety and stability of financial institutions, the financial sector as a whole, or the payments system. The description and the evaluation that follows necessarily reflect the views of competition authorities. With only one exception, no bank regulator has reviewed this report, which therefore, does not necessarily reflect the positions and the opinions of bank regulators.

The risk of bank runs

All banks operate in conditions of fractional liquidity reserve. The great majority of banks liabilities are very liquid deposits redeemable on demand. The great majority of their assets are instead much more illiquid loans. This situation leads to the problem that if all depositors demanded their deposits back at the same time, any bank (even if perfectly solvent) would face serious problems in meeting its obligations vis à vis its depositors.

A single bank might obtain refinancing on the financial market but the problem would severely persist in cases of low liquidity on the market or if the issue concerned a big portion of the banking sector.

It is well known in the literature that whenever depositors start fearing the insolvency of their bank, their first most common reaction is to go and withdraw their deposits creating serious problems to the banks. Such behavior is normally referred to as a bank run.

The risk of excessive risk taking (moral hazard) in banking

Banks grant loans normally financed by the deposits they received. This is by itself a powerful incentive for banks to grant credit in a not sufficiently prudent way and to take in too much risk. In fact it is well known in the literature that with debt financing, while the risk of failure of the financed investment is mostly carried out by the bank depositors, in the case of success profits accrue mostly to the bank. A good example of this deviating behavior is the Asian financial crisis of 1997 that is mentioned furtherbelow. In general, however, this incentive is somehow mitigated by the possibility that the market, both via depositors and via other banks, could monitor the risks assumed by the bank‟s management.

The main purpose of regulation is to avoid the highly negative consequences for the economy of widespread bank failures. There are two main strands of arguments for banking regulation. The first focuses on the systemic dangers of bank failures, while the second on the need for security and stability in the payments system.

Systemic dangers of a bank failure

The main argument for bank regulation focuses on the possibility of systemic or system-wide consequences of a bank failure i.e. the possibility that the failure of one institution could lead to the failure of others. This argument is summarized by Feldstein as follows:

"The banking system as a whole is a „public good" that benefits the nation over and above the profits that is earns for the banks" shareholders. Systemic risks to the banking system are risks for the nation as a whole. Although the management and shareholders of individual institutions are, of course, eager to protect the solvency of their own institutions, they do not adequately take into account the adverse effects to the nation of systemic failure. Banks left to them will accept more risk than is optimal from a systemic point of view. That is the basic case for government regulation of banking activity and the establishment of capital requirements".

It is possible to distinguish two mechanisms by which the failure of one bank could lead to the failure of other banks or other non-bank firms:

(a) The failure of one bank leading to a decline in the value of the assets sufficient to induce the failure of another bank ("consequent failure") and

(b) The failure of one bank leading to the failure of another fully solvent bank, through some contagion mechanism ("contagion failure").

2.1.5. Supervisory policies and performance

Given the interconnectedness of the banking industry and the reliance that the national and global economy hold on banks, it is important for regulatory agencies to maintain control over the standardized practices of these institutions, government regulation and supervision of banks promotes their safety and soundness in order to protect the payments system from bank runs that contract bank lending and threaten macroeconomic stability. Protecting the payments system frequently involves deposit insurance. To the extent that the insurance is credible, it reduces depositors‟ incentive to run banks when they fear banks‟ solvency. Consequently, it reduces banks‟ liquidity risk and, to the extent it is underpriced, gives banks the incentive to take additional risk for higher expected return (R. Barth, 2008).

2.1.6. Theoretical and policy debates

As cited Bonn (2005) this section discusses seven policy issues. For each issue, the researcher : (1) stress the conflicting theoretical predictions and policy debates, (2) emphasize that specific regulations and supervisory practices are so inextricably interrelated it is important to examine them simultaneously.

Regulations on bank activities and banking-commerce links

There are five main theoretical reasons for restricting bank activities and banking commerce links. First, conflicts of interest may arise when banks engage in such diverse activities as securities underwriting, insurance underwriting, and real estate investment.

Such banks, for example, may attempt to "dump" securities on ill-informed investors to assist firms with outstanding loans. Second, to the extent that moral hazard encourages riskier behavior, banks will have more opportunities to increase risk if allowed to engage in a broader range of activities. Third, complex banks are difficult to monitor. Fourth, such banks may become so politically and economically powerful that they become "too big to discipline." Finally, large financial conglomerates may reduce competition and efficiency. According to these arguments, governments can improve banking by restricting bank activities.

There are alternative theoretical reasons for allowing banks to engage in a broad range of activities, however. First, fewer regulatory restrictions permit the exploitation of economies of scale and scope. Second, fewer regulatory restrictions may increase the franchise value of banks and thereby augment incentives for more prudent behavior. Lastly, broader activities may enable banks to diversify income streams and thereby create more stable banks.

Regulations on domestic and foreign bank entry

Economic theory provides conflicting views on the need for and the effect of regulations on entry into banking. Some argue that effective screening of bank entry can promote stability. Others stress that banks with monopolistic power possess greater franchise value, which enhances prudent risk-taking behavior Others, of course, disagree, stressing the beneficial effects of competition and the harmful effects of restricting entry.

Regulations on capital adequacy

Traditional approaches to bank regulation emphasize the positive features of capital adequacy requirements. Capital serves as a buffer against losses and hence failure. Furthermore, with limited liability, the proclivity for banks to engage in higher risk activities is curtailed with greater amounts of capital at risk. Capital adequacy requirements, especially with deposit insurance, play a crucial role in aligning the incentives of bank owners with depositors and other creditors.

Deposit insurance design

Countries adopt deposit insurance schemes to prevent widespread bank runs. If depositors attempt to withdraw their funds all at once, illiquid but solvent banks may be forced into insolvency.

To protect payment and credit systems from contagious bank runs, many favor deposit insurance plus powerful official oversight of banks to augment private-sector monitoring of banks.

Deposit insurance schemes come at a cost, however. They may encourage excessive risk-taking behavior, which some believe offsets any stabilization benefits. Yet, many contend that regulation and supervision can control the moral-hazard problem by designing an insurance scheme that encompasses appropriate coverage limits, scope of coverage, coinsurance, funding, premier structure, management and membership requirements.

2.1.7. Supervision

Some theoretical models stress the advantages of granting broad powers to supervisors. The reasons are as follows. First, banks are costly and difficult to monitor. This leads to too little monitoring of banks, which implies sub-optimal performance and stability. Official supervision can ameliorate this market failure. Second, because of informational asymmetries, banks are prone to contagious and socially costly bank runs. Supervision in such a situation serves a socially efficient role. Third, many countries choose to adopt deposit insurance schemes. This situation (1) creates incentives for excessive risk-taking by banks, and (2) reduces the incentives for depositors to monitor banks. Strong, official supervision under such circumstances can help prevent banks from engaging in excessive risk-taking behavior and thus improve bank development, performance and stability.

Alternatively, powerful supervisors may exert a negative influence on bank performance. Powerful supervisors may use their powers to benefit favored constituents, attract campaign donations, and extract bribes. Under these circumstances, powerful supervision will be positively related to corruption and will not improve bank development, performance and stability. From different perspective Kane (1990) and Boot and Thakor (1993) focus on the agency problem between taxpayers and bank supervisors. In particular, rather than focusing on political influence, Boot and Thakor (1993) model the behavior of a self-interested bank supervisor when there is uncertainty about the supervisor‟s ability to monitor banks.

Under these conditions, they show that supervisors may undertake socially sub-optimal actions. Thus, depending on the incentives facing bank supervisors and the ability of taxpayers to monitor supervision, greater supervisory power could hinder bank operations.

Regulations on private sector monitoring of banks

There are disagreements about the role of the private sector in monitoring banks. Some advocate more reliance on private sector monitoring, expressing misgivings with official supervision of banks. Recently, for instance, the Shleifer and Vishny (1998) view of government regulations specifically holds that banks will pressure politicians who, in turn, can unduly influence supervisory oversight.

Furthermore, in some countries, supervisors are not well compensated and hence quickly move into banking, resulting in a situation in which they may face mixed incentives when it comes to strictly enforcing the rules.

Since supervisors do not have their own wealth invested in banks, they also have different incentives than private creditors insofar as monitoring and disciplining banks. There are countervailing arguments, however. Countries with poorly developed capital markets, accounting standards, and legal systems may not be able to rely effectively on private monitoring.

Furthermore, the complexity and opacity of banks may make private sector monitoring difficult even in the most developed economies. From this perspective, therefore, excessively heavy reliance on private monitoring may lead to the exploitation of depositors and poor bank performance.

Government ownership of banks

Economists hold different views about the impact of government ownership of banks. One view holds that governments help overcome capital-market failures, exploit externalities, and invest in strategically important projects. According to this view, governments have adequate information and incentives to promote socially desirable investments.

Shleifer and Vishny (1998), in contrast, argue that governments do not have sufficient incentives to ensure socially desirable investments. Government ownership instead politicizes resource allocation, softens budget constraints, and hinders economic efficiency. Thus; government ownership facilitates the financing of politically attractive projects, not economically efficient ones.

2.2. Empirical Literature

2.2.1. Cross country Study

In this section empirical studies that have been made regarding the impact of central bank regulations on aspects of banks performance such as profitability, efficiency, liquidity, and risk taking across countries will be presented.

2.2.1.1 Developed countries

There is substantial heterogeneity of bank regulatory and supervisory policies across countries. And, although there has been some convergence over the last dozen years for some types of banking sector policies, bank regulatory and supervisory policies remain impressively diverse in 2011. This diversity in regulatory regimes provides enormous scope for research examining both the causes of these policy differences and the impacts of banking policies on the performance of banks, and the associated ramifications for the overall financial sector and real economy (Barth, Caprio, Levine 2013).

Georgios et al (2009) have studied "Bank supervision, regulation, and efficiency: Evidence from the European Union." by taking for a sample of 22 EU countries, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Nether-lands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and UK over 2000–2008.

They have used non-parametric Data Envelopment Analysis (DEA) technique to capture information about banks‟ efficiency, In addition to the traditional approach. They have employed generalized linear models and a truncated regression model combined with bootstrapped confidence intervals using a recently developed econometric framework by Simar and Wilson (2007). Also they have conducted a sensitivity analysis using fractional logit estimator to crosscheck the results. Their evidence suggests that there is a strong link between various forms of banking regulation and supervision and bank efficiency.

The effect on bank efficiency appears to change with the type of regulation, indicating that strengthening official supervisory power or increasing capital requirements can have a discernible positive impact on bank efficiency while restrictions on bank activities and excessive private monitoring can adversely affect the efficient operation of banks.

Where the level of bank performance was measured by two accounting ratios namely costs of intermediation (proxied by net interest margins) and cost effectiveness (the cost-to-income ratio). The regulatory and supervision variables used are CAPRQ, is an index of capital requirements accounting for both overall and initial capital stringency. The official supervisory power variable, SPOWER, measures the ability of supervisory authorities to take specific action in banking decisions to prevent and correct problems.

ACTRS, measures the degree to which banks may engage in real estate investments, insurance underwriting and selling, brokering and dealing in securities and all aspects of the mutual fund industry, and the variable PRMONIT measures the degree of information that is released to officials and the public, auditing related requirements and whether credit ratings are required.

The bank specific variables were includes three key bank-specific variables: size, measured as the natural logarithm of banks‟ total assets (LNTA); liquidity, that is captured by a crude ratio between total loans and total deposits (LIQ); and finally capitalization, proxied by the equity to assets ratio (EQAS). The vector of control variables contains measures of risk, market and economic conditions, and institutional environment. The probability of risk of insolvency is proxy by the Z score; higher values of the Z-score are associated with lower probabilities of failure. Thus, the more volatile the asset returns, the lower the Z-score.

To account for market condition used as structural indicator, the Herfindahl index, which is measured as the sum of squared market shares (in terms of total assets) of each bank in the sample Since the macroeconomic environment is also likely to impact on banks‟ efficiency levels, they also include the average annual growth rate of GDP per capita (GDPGR).

They have found that there is a strong link between various forms of banking regulation and supervision and bank efficiency.

The effect on bank efficiency appears to change with the type of regulation, indicating that strengthening official supervisory power or increasing capital requirements can have a discernible positive impact on bank efficiency while restrictions on bank activities and excessive private monitoring can adversely affect the efficient operation of banks.

2.2.1.2 Emerging countries

The main studies on the determinants of bank performance in emerging countries were carried out in Colombia (Barajas et al., 1999), Brazil (Afanasieff et al., 2002), Malaysia (Guru et al.2002) and Tunisia (Ben Naceur and Goaied, 2001). Barajas et al. (1999) document significant effects of financial liberalization on bank interest margins in Colombia. Although the overall spread has not declined after financial reform, the relevance of the different factors behind the bank spreads were affected by such measures. Another change linked with the liberalization process was the increase of the coefficient of loan quality after the liberalization.

Afanasieff et al. (2002) makes use of panel data techniques to uncover the main determinants of the bank interest spreads in Brazil. A two-step approach due to Ho and Saunders (1981) is used to measure the relative impact of the micro and macro factors. The results suggest that macroeconomic variables are the most relevant elements to explain bank interest spread in Brazil.

Ben Naceur and Goaied (2001) investigate the determinants of the Tunisian bank performances during the 1980-1995 periods.

They indicate that the best performing banks are those who have struggled to improve labor and capital productivity, those who have maintained a high level of deposit accounts relative to their assets and finally, those who have been able to reinforce their equity. Guru et al. (2002) attempt to identify the determinants of successful deposit banks in order to provide practical guides for improved profitability performance of these institutions. The study is based on a sample of seventeen Malaysian commercial banks over the 1986-1995 periods. The profitability determinants were divided in two main categories, namely the internal determinants (liquidity, capital adequacy and expenses management) and the external determinants (ownership, firm size and external economic conditions). The findings of this study revealed that efficient expenses management was one of the most significant in explaining high bank profitability. Among the macro indicators, high interest ratio was associated with low bank profitability and inflation was found to have a positive effect on bank performance.

Noor and Ahmad (2010) have studied "Determinants of Profitability & Efficiency Of World Islamic Banks" by taking a sample of 78 banks data for period of 1992-2009, where Profitability is measured using ROA, and they found that the ratio of Operating Expenses to Total Assets (OE/TA), which is used to provide information on bank"s efficiency of managing operating costs against asset have, exhibit positive relationship with bank profitability. Bank size has found to be positively related with profitability larger banks enjoy higher profit than smaller banks by exploiting economies of scale.

Referring to the impact of capitalization, it was found that EQUITY/TA exhibits positive relationship with profitability.

Providing support to the argument that well capitalized banks face lower costs of going bankrupt thus lowers their funding cost, or that they have lower needs for external funding resulting in higher profitability. Nevertheless, strong capital structure is essential for banks in emerging economies since it provides additional strength to withstand financial crises and increased safety for depositors during unstable macroeconomic conditions. But the model fails to include it risk exposure factors as determinants of efficiency and profitability.

2.2.1.3 Developing Countries

MENA (Middle East and North Africa)

Naceur and Omran (2008) conducted a research on the title "The Effects of Bank Regulations, Competition and Financial Reforms on MENA Banks" Profitability" by using 173 banks from 10 countries, (Tunisia, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia and United Arab Emirates) from 1988-2005 periods.

The parameters of the model are estimated using the unbalanced panel data regression. Because of many reasons the researchers used combinations of cross-section and time-series data.

To estimate the regressions, they have indicated measurement of variables as follows: (1) bank performance indicators are cost of intermediation means (*NIM*) which equals interest income minus interest expense divided by interest-bearing assets, operating performance mean total operating costs divided by the sum of total earning assets and total deposits.

profitability is measured by the return on assets (*ROA*) and is calculated as the net income divided by average total assets., (2) bank-specific characteristics as *Bank size* is equal to the logarithm of total bank assets, *Bank equity:* it refers to the book value of equity divided by total assets and *Bank risk:* is proxied by the ratio of net loans to total loans, (3)bank concentration equals the fraction of bank assets held by the three largest commercial banks in the country, (4) regulatory policies Reserve requirement is proxied by the ratio of non interest earning assets divided by total assets, (5) variables to control for cross-country differences in the macroeconomic environment and (6) financial structure and development indicators market-based indicators(stock market capitalization divided by GDP) and bank-based indicators(the size of the ratio of credit to the private sector as a percentage of the GDP), and(7) indicators of institutional development(three indicators are used 1. real per capita GDP 2law and order (LAW) index and 3. the corruption(COR) index).

The coefficients on the lagged dependant variables take a value of approximately 0.56 for NIM, 0.44 for cost efficiency and 0.31 for ROA, which means that the departure from a perfectly competitive market system in the MENA banking sector is larger for net interest margins than for profits and the efforts to instill competition should be focused on further freeing interest rates.

Turning to the other explanatory variables, they focus in the following sections on bank specific effects (bank characteristics), macroeconomics and financial sector environment, and regulatory, institutional and concentration settings.

The positive and highly significant impact of bank capitalization on net interest margin cost of efficiency and profits. The macro country characteristics, inflation and economic growth, have different impact on bank margins efficiency and profits. They found that reserve does have positive and significant effect on cost of intermediation.

Sub-Sahara Africa

Ahokpossi(2013) in his study Determinants of Bank Interest Margins in Sub-Saharan Africa" through taking a sample of 456 banks in 41 sub-Saharan African countries in 1995–2008 investigated the role of bank-specific factors (Credit risk, measured as the ratio of" loans/deposits and short-term funding", liquidity risk as the ratio "liquid assets/deposits and short-term funding.", Equity as measured by "equity/total assets" and overhead/average assets as a proxy for operational inefficiency), market structure (proxied by market share and structure), and macroeconomic factors(GDP and inflation) in determining interest rate margins.

They found that Bank liquidity risk, equity, and inefficiency all matter for the determination of interest margins. The liquidity ratio negatively and significantly affects interest margins, reflecting the possible need for less liquid banks (i.e., banks with high liquidity risk) to borrow emergency funds at a high cost. The results also highlight the importance of credit risk for the determination of interest margins, because credit risk is positively and significantly associated with net interest margins. The coefficient on equity is also positive and significant implying that banks in SSA charge a premium to account for the pressure of solvency regulations on lending activities. Bank inefficiency is associated with high interest margins.

Inefficient banks pass their high costs on to their customers, raising their lending rates and lowering their deposit rates. Inflation is positive and significant; On the other hand, the coefficient on GDP growth is insignificant. The author has failed to consider the size difference and its effect on net interest margin and that of regulatory issues which are varying among countries of sub Saharan countries.

Among the macroeconomic variables, inflation (INF) is found to be positively and significantly related to both ROA and NIM in this study. This implies that, with inflation, bank income increases more than bank costs. The results are parallel to Demirgüç-Kunt and Huizinga (1999), Kaya (2002) and Abreu and Mendes (2002) that reported positive relationships between inflation and NIM and ROA.

Kenya

Tarus, Chekol and Mutwol, in their study "Determinants of Net Interest Margins of Commercial Banks in Kenya: A Panel Study", have used bank specific factors (operating expense & credit risk), industry specific factor (concentration) and macroeconomic factors(GDP and inflation) as determinants of cost of intermediation(net interest margin), based on fixed effect model. Major findings include, operating expense (which is measured as the ratio of operating expense to total assets), has positive relationship with the net interest margin among the commercial banks in Kenya.

It is shown that banks that bear higher average operating expenses may out for higher margins to offset their higher transformation costs. Credit risk also tends to be positively associated with net interest margin.

They justify this as Banks that make risky loans may also be obliged to hold a higher amount of provisions. In turn, this may force them to charge higher margins in order to compensate for the higher risk of default, leading to a positive relationship of the macro economic variables inflation is found to have a positive relationship between inflation and the net interest margin. But Economic growth is found to be negatively related. This is evidence that the lower the economic growth the higher is the net interest margins. But they have used limited number of determinant factors.

2.3. Conclusions on the literature review and knowledge gaps

As per the theoretical and empirical review of literatures there are different rules and regulations which are imposed on banks activity and of course the regulations which exist in one country is not similar with that of the others even though there are international regulations in which all of the banks in every country should obey, each and every country have their own regulations which is issued by the central bank for the purpose of controlling the economic activity of the countries. The variables which are used to see the impact of central bank regulation on banks performance other than the control variables (bank specific and macroeconomic) is different from county to country. In Ethiopia there is no any empirical study which is conducted in this area, therefore this study is conducted to fill this knowledge gap by examining the impact of National bank regulation on banks performance.

CHAPTER THREE

3. Research design

In the preceding chapter both theoretical and empirical reviews were made and indicated the absence of empirical studies regarding National Bank regulation and its impact on bank‟s performance in Ethiopia.

The purpose of this chapter is to present model specification, hypotheses and research approach that are used in the study. The chapter is arranged as follow. Section 3.1 presents model specification, variable description and hypotheses for the study. This is followed by the research approach adopted by the study under section 3.2. Next, the population and sampling design for the study are explained in section 3.3. Finally, data collection, analysis and presentation techniques are explained under section 3.4.

3.1 Model specification, variable description and hypotheses

3.1.1. Model specification

The nature of data used in this study enabled to use panel data model which is deemed to have advantages over cross sectional and time series data. Panel data involves the pooling of observations on the cross-sectional over several time periods.

As Brook (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. The general model to be estimated is the following linear forms which, is adopted from **Ahokpossi (2013)**. Thus, the general panel regression model was as follows:

$$\mathbf{I_{ict} = \alpha + \beta_1 x^B_{i\,t} + \beta_2 x^S_{i\,t} + \beta_3 X^M_{i\,t} + \varepsilon_{i\,t}}$$

Where the subscripts *i, c* and *t* represent: respectively individual banks, a country, and the time variable. α is a constant term, β is coefficients for the respective variables, the dependent variable *I* represents bank interest margins. X^{B}, X^{S}, and X^{M} are respectively vectors of bank-specific variables, market structure variables and macroeconomic variables; ε represents the residuals.

Regression is more powerful than correlation. According to Brooks (2008), unlike correlation, in the case of regression if x has significant impact on y, thus change in y is influenced by change in x. Therefore, to see the impact of regulatory measures on banks performance, the significant factors affecting banks performance were used as the representatives for the variation in performance. Therefore the following regression models were used to see the impact of regulatory variables, while controlling bank specific and macroeconomic variables on banks performance.

The model can be rewritten as follows:

Model One: Profitability

$$ROA = \boldsymbol{\alpha} + \beta_1 SZ + \beta_2 CR + \beta_3 EFF + \beta_4 EQ + \beta_5 GDP + \beta_6 INF + \beta_7 NBB + \beta_8 RR + \beta_9 CC + \varepsilon$$

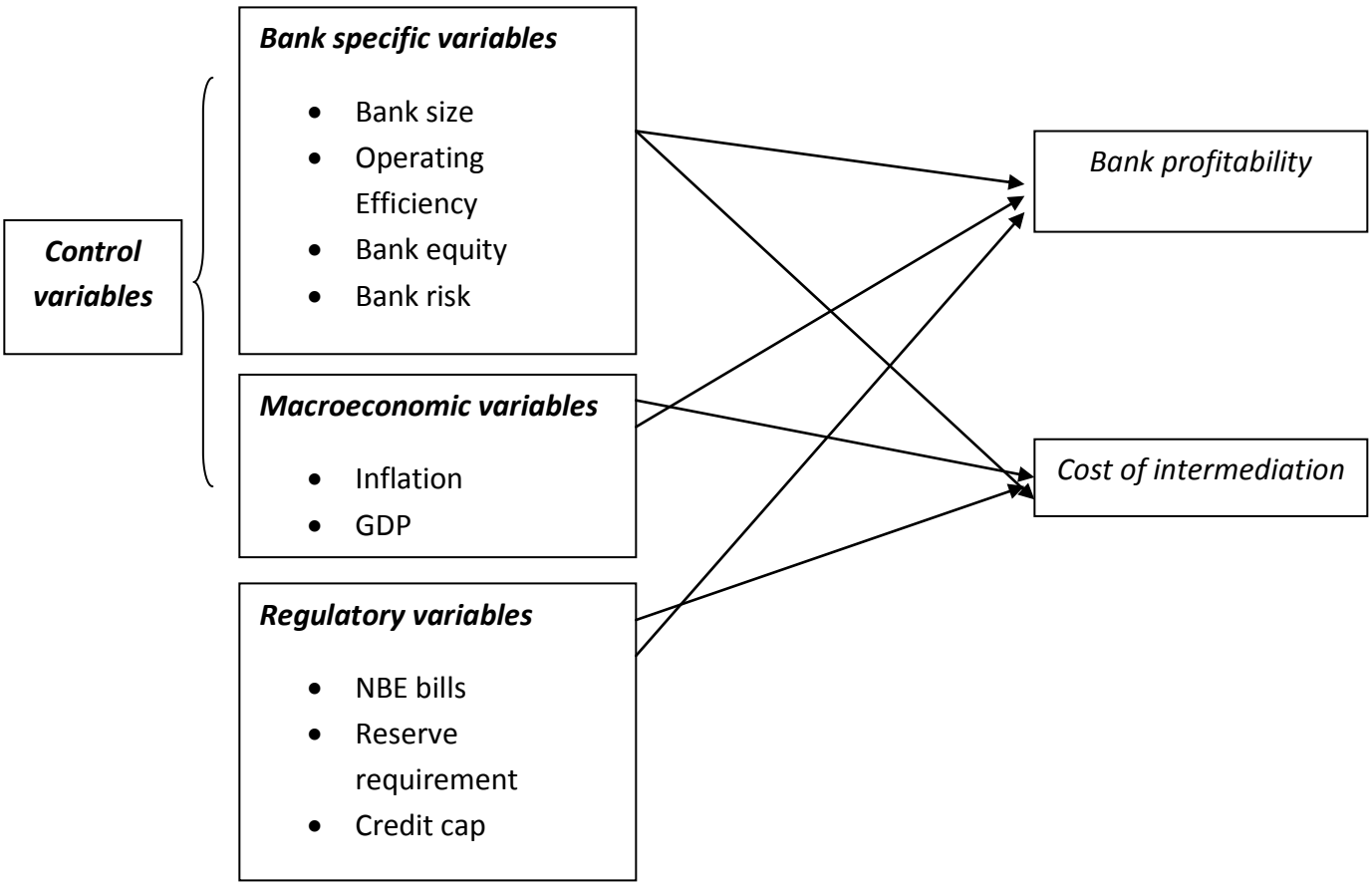
Model Two: Cost of Intermediation

$$NIM = \boldsymbol{\alpha} + \beta_1 SZ + \beta_2 CR + \beta_3 EFF + \beta_4 EQ + \beta_5 GDP + \beta_6 INF + \beta_7 NBB + \beta_8 RR + \beta_9 CC + \varepsilon$$

Summary of the operational panel regression model

The model guiding this research is shown in Figure 1. On the right hand, side represents Banks profitability and cost of intermediation. On the left hand side, three categories of antecedents are suggested as important influences on banks profitability and cost of intermediation.

Figure 3.1: Summary of the operational panel regression model



3.1.2. Variable description and research hypotheses

This research work attempted to see how national bank regulations influence private banks performance in Ethiopia. Therefore, the following hypotheses were developed to break down the stated research questions.

Dependent variables

Bank performance indicators are dependent variables.

Bank performance means the efficiency of banks and it is measured by two alternative measures: cost of intermediation and profitability.

***Cost of intermediation*:** is measured through Net Interest Margin/NIM/ which equals interest income minus interest expense divided by interest-bearing assets. The net interest margins measures the gap between what the bank pays the providers of funds and what the bank gets from firms and other users of bank credit. A decline in this ratio is interpreted as an increase in cost of intermediation (Naceur and Orman, 2008).

***Bank profitability*:** this is measured by the return on assets (ROA) and is calculated as the net income divided by total assets. The higher ROA, the higher the profitability will be. Bank profitability can be seen as indicator of the (in) efficiency of the banking system (Naceur and Orman, 2008).

Independent variables

The independent variables are categorized into three groups as regulatory, bank specific and macroeconomic. The researcher consider the bank specific and macroeconomic variables as control variables, since the objective of this study is to examine the impact of NBE regulation on banks performance in Ethiopian private banks.

A. Regulatory variables

NBE-Bills: represent amount of forced bill purchase by a bank, which is measured as log of investment in NBE-Bills. The researcher expects that it will have a negative effect on performance, while it increases cost of intermediation (or decreases NIM). ***H_1:*** NBE-Bills have a negative and significant effect on performance.

Reserve Requirement: is a portion of bank‟s asset in National Bank of Ethiopia with no interest and it will be proxied by ratio of Reserve Account in NBE to total assets. The researcher expects that it will have a negative effect on performance. ***H_2:*** reserve requirement has a negative and significant effect on performance.

Credit Cap: this refers a credit ceiling set by NBE. Since it is difficult to quantify the researcher has try to see its effect on performance through considering as dummy variable. (1 for time periods where credit cap was enforced 0 otherwise). The researcher expects that its effect will be similar with Reserve Requirement and NBE Bills. ***H_3:*** credit cap has a negative and significant effect on performance.

B. Bank specific characteristics (control variable)

Bank Size: this variable is set to be equal to the natural logarithm of total bank assets in millions of ETB. Size might be an important determinant of bank performance if there are increasing returns to scale in banking. However, size could have a negative impact when banks become extremely large due to bureaucratic and other reasons.

Operating Efficiency: measure of how the bank is managing operating costs; it will be measured as the ratio of operating expenses to total assets.

Bank Equity: it refers to the book value of equity divided by total assets (EQUITY). Some theories (Berger, 1995 and others) suggest that well-capitalized banks are subject to less expected bankruptcy costs and hence lower cost of capital. According to this view, higher bank equity ratios may influence bank performance positively when loan rates do not vary much with bank equity.

Bank Risk: is proxed by the ratio of loan loss provision to total loans (CREDIT RISK). Where net loan is the difference between total loan, and advances and provision for doubtful loan and advance, the researcher expect that a high credit risk ratio will be associated with higher interest margins due to risk and cost considerations. Higher credit risk ratio should improve bank incomes since loans are the most risky and, hence, the highest yielding type of assets. Other theory suggests that increased exposure to risk decrease profitability.

C. Macroeconomic Indicators (control variable)

The researcher has used two proxies for the macroeconomic environment: inflation (INF) and GDP per capita growth (GROWTH). Previous studies reported a positive association between inflation and bank profitability. High inflation rates are generally associated with high loan interest rates, and therefore, high incomes.

However, if inflation is not anticipated and banks are sluggish in adjusting their interest rates then there is a possibility that bank costs may increase faster than bank revenues and hence adversely affect bank profitability (Noor and Ahmad 2010).

The GDP growth is expected to have a positive impact on bank‟s performance according to the well-documented literature on the association between economic growth and financial sector performance.

Table 3.1 Summary of explanatory variables and their expected effect on the dependent variables

Classification	Variables	Measurements	Expected effect
Regulatory Variables	Reserve requirement (RR)	Reserve account in NBE / total asset	Negative
	NBE Bills (NBB)	log of investment in NBE-Bills	Negative
	Credit Cap (CC)	Dummy	Negative

3.2. Research approach

According to (Creswell, 2009) quantitative approaches employ closed-ended instrument based questions, performance data, attitude data, observational data, and census data statistical analysis. Therefore, the study used the quantitative approach to examine the impact of National bank regulation on private banks performance in Ethiopian.

3.3. Population and sampling procedure

Population of the study: The study population/participants are all private banks in Ethiopia. According to NBE (2012/13), report there are sixteen private banks in the year 2012/13 such as; Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of Oromia S.C (CBO), Berehan International Bank S.C (BIB), Buna International Bank S.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB), Addis International Bank S.C (AIB), Abay Bank S.C (AB), Enat Bank S.C (EB) and Debub Global Bank S.C (DGB)

Sampling Frame: The total population is sixteen but for the study purpose, the sample size is six. Among the non-probability, sampling techniques purposive sampling was used to select samples from the total population. Non-probability sampling technique is selected because random sampling is not appropriate for the study. Since the study covers a period of 10 years, there are banks with the age of less than ten years that is why purposive sampling is used. The study includes all private banks, with 10 and above establishment year. The sample size is six, which includes, Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB) and Bank of Abyssinia S.C (BOA). Therefore, the matrix for the frame is 10*6 that includes 60 observations.

3.4. Data Collection, Presentation and Analysis Techniques

3.4.1. Data and Data Collection Instruments

Only secondary data is used for the study. Applying appropriate data gathering instruments help researchers to combine the strengths and amend some of the inadequacies of any source of data to minimize risk of irrelevant conclusion. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul 2006). Data is collected from audited financial statements (balance sheet and income statement) of each private banks included in the sample and various directives, journals and publications of NBE and MoFED for the macroeconomic data from 2004 to 2013. All data was collected on annual base.

3.4.2 Method of data Presentation and analysis

To test the proposed hypotheses, statistical analyses have been carried out using the following methods: First, descriptive statistics of the variables (both dependent and independent) was calculated over the sample period and this was in line with Malhotra (2007), which states using descriptive statistics methods helps the researcher in picturing the existing situation and allows relevant information. Then, a correlation analysis between dependent and independent variables was made. Finally, ordinary least square/OLS regression approach including all of its assumptions was employed. Data collected from different sources was analyzed by using Eviews 6 software package.

CHAPTER FOUR

4. Data Presentation and Analysis

To meet the broad research objective and to answer research questions and to test research hypotheses the researcher used the methodologies discussed in the preceding chapter. In this chapter the collected data were presented and important findings of correlation and regression analysis were discussed. The current chapter has five sections. Under the first section (section 4.1.) the descriptive statistics of the dependent and independent variables were presented followed by correlation analysis under section 4.2. Section 4.3 presents the test for the classical liner 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 are presented bellow. The dependent variable is bank performance measured by two alternative measures profitability (ROA) and cost of intermediation (NIM). The independent variables were classified in to three the bank specific and macro economic factors which is considered as control variables and the regulatory variables were NBE Bill, Reserve requirement and Credit Cap which were used to see the impact of NBE regulations on banks performance.

Table 4.1 descriptive statistics of dependent and independent variables

Variables	Mean	Median	Maximum	Minimum	Std.Dev.	Observation
ROA	0.028	0.028	0.038	0.019	0.003	60
NIM	0.043	0.044	0.084	-0.021	0.013	60
SZ	9.675	9.696	10.295	8.828	0.329	60
CR	0.99	0.993	1	0.914	0.012	60
Eff	0.043	0.043	0.064	0.020	0.007	60
EQ	0.123	0.117	0.192	0.064	0.031	60
GDP	7.351	7.458	10.388	4.540	1.616	60
INF	17.056	10.783	55.241	2.382	16.275	60
NBB	2.756	0	9.497	0	4.247	60
RR	0.103	0.086	0.309	0.031	0.068	60
Cc	0.3	0	1	0	0.462	60

Source: Financial statement of sampled private commercial banks and own computation through Eviews 6.

ROA: Return on Asset, NIM: Net Interest Margin, SZ: Size, CR: credit Risk, EFF: Efficiency, EQ: Equity, GDP: Gross Domestic Product, INF: Inflation, NBB: National Bank Bill, RR: Reserve Requirement, CC: Credit Cap.

Table 4.1 provides a summary of the descriptive statistics of the dependent and independent variables. The profitability and cost of intermediation measurements ROA and NIM indicates that the Ethiopian private commercial banks have an average positive profit over past decade.

From the total of 60 observations the mean of ROA and NIM equals 2.8 and 4.3% with a minimum of 1.9 and -2.1% respectively and the a maximum of 3.8% and 8.4% respectively, that means the most profitable bank of the sample banks earned 3.8 cents of net income from a single birr of asset investment in line with this have the margin of 8.4% and the maximum losses of 2.1 margin and 1.9 cents on each birr of asset investment. Most of the remaining banks from the sample earned an average of 2.8 cents from each birr invested by the bank with the margin of 4.3%. And also the above table reveals that ROA and NIM are distributed around the mean, the variation of ROA and NIM is very low.

Table 4.1 also shows the descriptive statistics of regulatory variables that all variables namely NBE-Bills, reserve requirement and credit cap are normally distributed around the mean with minimum standard deviations. The mean of NBE-Bills is 2.756060 its maximum, minimum, and standard deviation are 9.497732, 0 and 4.247047 respectively. Reserve Requirement"s mean, maximum, minimum and standard deviation are 0.103125, 0.309240, 0.031039 and 0.068026 respectively. For the Credit Cap the mean is 0.3, maximum 1, minimum 0 and standard deviation is 0.462125.

4.2.Correlation analysis

Table 4.2 Correlation matrix among the dependent and independent variables

	ROA	NIM	SZ	CR	EFF	EQ	GDP	INF	NBB	RR	CC
ROA	1		0.198	0.317	-0.107	0.481	0.175	0.065	-0.174	-0.180	- 0.095
NIM		1	0.033	0.180	0.236	0.409	-0.144	0.119	-0.064	-0.023	-0.039

Source: Financial statement of sampled private commercial banks and own computation through Eviews 6.

According to Brooks (2008), if y and x are correlated, it means that y and x are being treated in a completely symmetrical manner. 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.

Output of correlation analysis (Table 4.2) represented in matrix of pair-wise correlation. This study has calculated correlation of dependent variables with bank specific, macroeconomic and regulatory variables. It was found that ROA is negatively correlated with reserve requirement, investment in NBE-Bills and credit cap with a correlation coefficient of -0.181, -0.175 and -0.096 respectively. Table 4.2 also shows that Net Interest Margin (NIM) is negatively correlated with investment in NBE-Bill, reserve requirement and credit cap with a correlation coefficient of -0.064, -0.023, and -0.039 respectively.

4.3. Testing assumptions of classical linear regression model (CLRM)

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

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated. Therefore, since the constant term (i.e. $\boldsymbol{\alpha}$) was included in the regression equation, the average value of the error term in this study is expected to be zero.

- **Test for homoscedasticity assumption (Var (ut) = σ2)**

It has been assumed that the variance of the errors is constant. This is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic.

To test this assumption the whites test was used having the null hypothesis of heteroskedasticity. Both F-statistic and chi-square (χ) 2 tests statistic were used. In the case of both ROA and NIM both the *F*- and χ2 -test statistic give the same conclusion that there is evidence for the absence of heteroscedasticity. Since the *p*-values in all of the cases were above 0.05, the null hypothesis of heteroscedasticity should be rejected (appendix 1). The null hypothesis of heteroscedasticity should be rejected at 5% level for the F-statistics (NIM) and at 10% level for the χ2 test statistic. In the case of ROA the null hypothesis of hetroscedasticity should be rejected even at 10% level of significance in both *F*- and χ2 test statistic. The third version of the test statistic, scaled explained SS, which as the name implies is based on a normalized version of the explained sum of squares from the auxiliary regression, also give the same conclusion. Generally, in all of the regression models used in this study it was proved that the variance of the error term is constant or homoscedastic and we had sufficient evidence to reject the null hypothesis of hetroscedasticity.

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

Assumption that is made of the CLRM‟s disturbance terms is that the covariance between the error terms over time (or cross-sectional, for that type of data) is zero.

In other words, it is assumed that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it would be stated that they are „auto correlated‟ or that they are „serially correlated‟. A test of this assumption is therefore required.

This test can be made through Breusch-Godfrey (BG) Serial Correlation LM Test, which is a more general test for autocorrelation up to the r^{th} order. In this case second order autocorrelation test was made.

Table 4.3 Autocorrelation Test

H_o there is no autocorrelation against H_1 there is autocorrelation						
Breusch-Godfrey(BG) Serial Correlation LM Test						
	ROA Model			**NIM Model**		
F statistic	1.090856	Prob. F(2,48)	0.3441	0.854545	Prob. F(2,48)	0.4318
Obs*R-squared	2.608575	Prob.Chi Square (2)	0.2714	2.062911	Prob.Chi Square (2)	0.3565

Source; Computed from Eviews result

*indicate accept the Ho hypothesis at 10% significant level

In the above table, the output of Eviews offers two versions of the test; an *F*-version and a $\chi 2$ version from the Breusch-Godfrey Serial Correlation LM Test. The conclusion from both versions of the test in this case is that the null hypothesis of no autocorrelation is accepted on both ROA and NIM models.

- **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 60 was equal to the frame was large; we considered the JB test also.

As shown in the histogram in the appendix (2) kurtosis approaches to 3 for ROA (i.e. 2.293), and kurtosis for NIM was 3.465 and the Jarque-Bera statistics was not significant even at 10% level of significance as per the P-values shown in the histogram in the appendix (i.e. 0.466 for ROA and 0.489 for NIM). Hence, the null hypothesis that is the error term is normally distributed should not be rejected and it seems that the error term in all of the cases follows the normal distribution.

- **Test for absence of series multicollinearity assumption**

This assumption is concerned with the relationship exist 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 and Trivedi 2009; Wooldridge 2006). According to Churchill and 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. While 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) 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 consistent argument on the level of correlation that causes multicollinearity.

Table 4.4 correlation matrix of explanatory variables

	SZ	CR	EFF	EQ	GDP	INF	NBB	RR	CC
SZ	1								
CR	0.393415	1							
EFF	-0.103645	-0.108726	1						
EQ	0.011983	0.106665	0.224214	1					
GDP	-0.266884	-0.424457	-0.012858	-0.209488	1				
INF	0.204155	0.085882	-0.111914	0.108967	-0.299452	1			
NBB	0.678670	0.288495	0.104805	0.246392	-0.656165	0.193907	1		
RR	-0.004442	-0.009899	-0.076228	-0.148186	-0.170796	0.188269	-0.279577	1	
CC	0.166645	0.047601	-0.032174	0.022631	-0.155665	0.190635	-0.428413	0.59051	1

According to Gujarati (2004), the standard statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in this study correlation matrix for nine of the independent variables shown above in the table had been estimated. The results in the above correlation matrix show that the highest correlation of 0.678 which is between size and NBE Bills. Since there is no correlation above 0.7, 0.75 and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, we can conclude that in this study 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. 10 year) is greater than the number of cross-sectional units (i.e. 6 private banks), FEM is preferable in this case.

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

4.4. Results of the regression analysis

On the regression outputs the beta coefficient may be negative or positive; beta indicates that each variable‟s level of influence on the dependent variable. P-value indicates at what percentage or precession level of each variable is significant. R^2 values indicate the explanatory power of the model and in this study adjusted R^2 value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models.

Model one: - the panel regression model used to find the statistically significant regulatory variables impact on banks performance measured by ROA was:

ROA= $\alpha + \beta_1 SZ + \beta_2 CR + \beta_3 EFF + \beta_4 EQ + \beta_5 GDP + \beta_6 INF + \beta_7$ NBB+ β_8 RR+ β_9 CC+ ε

Table 4.5 Regression results for profitability measured by Net Income to total asset ratio (ROA)

Variables	Coefficient	Std. Error	t-statistics	Prob.
C	-0.192165	0.081128	-2.368673	0.0218
SZ	0.012372	0.005232	2.364873	0.0220**
CR	0.091868	0.063732	1.441460	0.0957*
EFF	0.109179	0.095456	1.143761	0.2582
EQ	0.126363	0.027399	4.611979	0.0001***
GDP	0.000882	0.000816	1.080964	0.2849
INF	2.16E-05	4.67E-05	0.462695	0.6456
NBB	-0.000960	0.000456	-2.103224	0.0405**
RR	-0.006035	0.014125	-0.427235	0.6710
CC	-0.005715	0.003277	-1.744139	0.0873*

Source: Financial statement of sampled commercial banks and own computation through Eviews6

Notes: R^2 = 0.629272; Adj R^2 =0.530140; F-statistics = 7.539391and prob (F-statistics = 0.000028), and Durbin-Watson stat = 1.329443The starred coefficient estimates are significant at the 1 % (***), 5 % (**) and 10% (*) level.

The above table presents results of net income to total asset ratio (ROA) as dependent variable and bank specific and macroeconomic (control) and regulatory variables as explanatory variables for the sample of six private banks in Ethiopia. The adjusted R-square is 53%, which means 53% of the total variability of return on asset about their mean value is explained by the model. Thus a model is sufficient to explain variability of ROA. The regression *F*-statistic takes a value 7.539391. F-statistics tests the null hypothesis that all of the slope parameters (βs') are jointly zero. In the above case *p*-value of zero attached to the test statistic shows that this null hypothesis should be rejected even at 1% level of significance. As it is shown in the above table NBE bill and credit cap were the statistically significant regulatory variables affecting profitability of private banks in Ethiopia. Reserve requirement had negative and statistically insignificant impact on ROA even at 10% level of confidence. NBE bill and Credit cap had a negative and significant impact on ROA at 5% and 10% level of confidence respectively. Among control variables from bank specific variables Size had a positive effect and it is statistically significant at 5%, equity becomes positively and statistically significant at 1% and credit risk had a positive and statistically significant effect on ROA at 10% confidence level. From macroeconomic factors inflation and GDP positively affect ROA but both of them were insignificant.

Model two: - the panel regression model used to find the statistically significant regulatory variables impact on banks performance measured by NIM was:

NIM= $\alpha + \beta_1 SZ + \beta_2 CR + \beta_3 EFF + \beta_4 EQ + \beta_5 GDP + \beta_6 INF + \beta_7$ NBB+ β_8 RR+ β_9 CC+ ε

Table 4.6 Regression results for cost of intermediation measured by interest income-interest expense divided by interest bearing assets (NIM)

Variables	coefficient	Std. Error	t-statistics	Prob.
C	-2.666064	1.597823	-1.668560	0.1021
SZ	0.170905	0.092532	1.846994	0.0713*
CR	0.051716	1.280249	0.040395	0.9680
EFF	3.048622	1.772396	1.720058	0.0923*
EQ	0.628825	0.688774	0.912963	0.3661
GDP	0.046645	0.020307	2.296969	0.0263**
INF	0.000157	0.000867	0.181611	0.0856*
NBB	-0.026584	0.006082	-4.371101	0.0001***
RR	-0.296736	0.295714	-1.003458	0.0321**
CC	-0.130269	0.046015	-2.830996	0.0069***

Source: Financial statement of sampled commercial banks and own computation through Eviews6

Notes: R2 = 0.681583; Adj R2 =0.575421; F-statistics = 9.863098and prob (F-statistics = 0.000272), and Durbin-Watson stat = 1.903595The starred coefficient estimates are significant at the 1 % (***), 5 % (**) and 10% (*) level.

The regression result of the above table for Net Interest Margin, which is a measure of cost of intermediation, reveals that the F-statistic and p-value of the model are 9.863098 and almost zero, respectively.

The adjusted R-square value for the model is 57%, which means 57% of the total variability on Net Interest Margin is caused by a change in explanatory variables taken together.

Among the statistically significant factors affecting the efficiency of private banks in Ethiopia, all of the regulatory variables (i.e. NBE bill, reserve requirement and credit cap) had negative and statistically significant impact on banks NIM at 1%, 5% and 1% respectively. Among the control variables bank size and efficiency were positively and statistically significant at 10% level of significance. On the other hand, among macro economic factors both GDP and inflation were positively and statistically significant at 5% and 10% level of significance respectively.

4.5. Discussion of the regression results

Table 4.5&4.6 present regression out puts for profitability (ROA) and cost of intermediation (NIM) on bank specific, macroeconomic, and regulatory variables. The results were discussed as follows.

Regulatory variables

As we have observed the model estimates there are three regulatory variables that are used in this study namely investment in NBE Bills, reserve requirement and credit cap. The result of regression output varies depending on model used.

- **Investment in NBE Bills and Profitability**

According to Table 4.5 investment in NBE-Bills is negatively related with profitability (ROA) with a coefficient estimate of -0.00096. Holding other factors constant, a 100% increase in investment in NBE Bill reduces ROA by 0.096% and the p value of NBB (i.e. 0.0405) reveals that it is statistically significant at 5% level of significance and also it was in line with the first hypothesis. This is because the net income that a given bank gain decrease as almost one third of the total loan that a bank gives to borrowers is invested in government bill with the interest rate of 3%. Generally, we fail to reject the first research hypothesis (i.e. there is a negative and significant relationship between NBB and ROA).

On the other hand, according to Table 4.6 investment in NBE Bills had negative and statistically significant impact on banks cost of intermediation measured by NIM with the coefficient estimates -0.026584 and with p-value of 0.0001 which is highly significant at 1% level of significance. By holding other factors constant, a 100% increase in NBE Bills investment will result in 2.6% decline in NIM.

This is because as investment in NBE Bills increase, banks will lose a benefit if it would have invested in relatively high interest bearing assets, like giving loans to borrowers with an interest rate of at least 12% but NBE Bills generate only 3% return which results in an opportunity cost of 9%.

- **Reserve Requirement with profitability and cost of intermediation**

According to table 4.5 reserve requirement had negative but statistically insignificant impact on banks performance measured by ROA. The coefficient estimate and the p value was -0.006035 and 0.6710 respectively which was insignificant even at 10% confidence level. Reserve requirement in this equation was opposite to hypothesis (2). Since the coefficient was statistically insignificant we could not say it show negative impact on banks profitability.

However according to table 4.6 reserve requirement is negatively and statistically significant on Net Interest Margin with a coefficient estimate of -0.296736 and the p-value was 0.0321 which was statistically significant at 5% level of confidence. Holding other factors constant, a 100% increase in reserve requirement will leads to a decline in Net Interest Margin by 29.6%. This is because reserve requirement do not generate any return since it doesn't bear any interest at all.

Thus, regulatory variables increase cost of intermediation, which was consistent with our expectation and in line with the findings of Nacuer and Orman (2008).

- **Credit Cap with Profitability and cost of intermediation**

According to table 4.5 credit cap had a negative and statistically significant impact on banks profitability measured by Return on Asset with a coefficient estimate of -0.005715 and with p value of 0.0873 which was statistically significant at 10% level of confidence. Holding other factors constant when credit cap occurs to the banks their profitability will decrease by 0.57%.

On the other hand table 4.6 shows that there exist a negative and statistically significant relationship between credit cap and net interest margin with the coefficient estimates of -0.130269 and the p value was 0.0069 which was highly significant at 1% significance level. Holding other factors constant when credit cap occurs to the banks their NIM will decrease by 13%. This is because, since there was credit ceiling any bank cannot give the amount of loan above that ceiling so the interest income generated from loans will decrease but the bank will pay an interest expense for the depositors no matter what amount the banks get an interest income from the loan. This result was consistent with our expectation of hypothesis 3.

Control variables

The researcher used two major control variables in both regression models namely; bank specific factors and macroeconomic factors.

Bank specific factors proxies were size, credit risk, efficiency and equity and the Macroeconomic factors were proxied with inflation and GDP.

The regression output in Table 4.5&4.6, reveals that the researcher find bank size has a positive and significant effect on profitability in terms of asset return at 5% significant level. This direct relationship between bank size and profitability in return on asset, suggests that larger banks tend to earn higher profits. This is consistent with prior empirical evidence Noor M. and Ahmad H (2010), Suggesting that exploiting the economies of scale for large banks than smaller banks. The finding of this study implies that in Ethiopia banking industry large size banks are enjoying profits by their size. In addition to asset performance, bank size also affects the interest margin of the sampled banks positively and it is statistically significant at 10% significance level.

Operating efficiency is found to be positively and statistically insignificant even at a significance level of 10% with ROA. However, it is found that operating efficiency is positively and statistically significant at 10% level of significance with NIM. These results are consistent with the findings of Naceur and Omran (2008) among others.

The third bank specific factor was equity (portion of bank"s asset financed by stockholders). It is positively and statistically significant at 1% level of confidence with ROA, but equity was negatively and statistically insignificant with NIM. The effect of equity on ROA and NIM is consistent with the findings of Naceur and Omran (2008).

Credit risk is found to be positively and statistically significant at 10% confidence level with ROA this is due to risk and cost consideration credit to risk ratio improves banks income since loans are the most risky and, hence, the highest yielding type of asset this result was consistent with the findings of Naceur and Omran (2008).

On the other had credit risk has found positively but statistically insignificant with net interest margin.

The macroeconomic factors proxies were GDP and Inflation, GDP was found to be positive but statistically insignificant with return on asset and positively and statistically significant with net interest margin at 5% significance level.

The other macroeconomic factor was inflation and it was found to be positive and statistically insignificant with ROA and found to be positively and statistically significant at 10% level of significance with net interest margin, this is because with inflation banks income increase more than banks cost . This result was consistent with Tarus, et al (2012).

CHAPTER FIVE

5. Conclusion and recommendations

The aim of this paper was to see the impact of regulatory actions taken by the National Bank of Ethiopia on the private commercial banks. Three regulatory variables affecting banks performance were chosen and analyzed. The panel data was used for a sample of six private commercial banks in Ethiopia from 2004 to 2013. Data was presented by using descriptive statistics, the balanced correlation and regression analysis for two performance measures was conducted. Before performing OLS regression the models were tested for the classical linear regression model assumptions, the models fulfill all assumptions of the CLRM. Fixed effect model/FEM was used based on convenience. Variables were classified in to three as regulatory, bank specific and macroeconomic but the last two variables were control variables. From the list of possible explanatory (i.e. regulatory) variables, most of them are statistically significant and the results of models enable us to make following conclusions.

- NBE-Bill purchase has negative and significant effect on banks performance measured through both Return on Asset and Net Interest Margin. The researcher concludes that investment in NBE Billsresults a negative impact due to the lesser amount of interest rate compared to the amount of interest rate if the amount invested on the Bill was invested on other investments.

- Change in reserve requirement has negative and significant effect on the banks cost of intermediation measured through Net Interest Margin. This is due to the reason that banks reserve which is hold by National Bank of Ethiopia do not generate any return since it doesn‟t bear any interest at all.
- Credit cap has negative and statistically significant effect on banks performance measured through both Return on Asset and Net Interest Margin. The researcher concludes that credit cap has a negative impact on banks performance and this is due to since there was credit ceiling any bank cannot give the amount of loan above that ceiling so the interest income generated from loans will decrease but the bank will pay an interest expense for the depositors no matter what amount the banks get an interest income from the loan.

5.2 Recommendation and Further Research

Based on the findings of the research and the conclusions made the following recommendations are forwarded:

- NBE requires each bank to purchase bill which is 27% of their total loan with 3% interest rate. This in turn affects banks profitability, therefore it is better if policy makers minimize either the percentage of total loan required to purchase the bill or increase the interest rate paid for the bill.

For banks they need to exert their maximum effort to mobilize deposit and use aggressive branch opening strategy, in order to mobilize substantial amount of deposits and increase their market share and it is advisable to open many branches in strategic areas of both in the capital city and outline areas of the country.

- It‟s been four years that the credit cap is removed and also the reserve requirement becomes 5% before a year but such regulatory variables increase cost of intermediation which creates the ultimate burden on customers, NBE has to consider the effect of such policy changes on banks profitability and their overall performance. On the other hand banks need to increase operating efficiency to trade off such effects and to serve their customers as usual to create long-lasting relationship when such kinds of regulations are imposed.
- Regulatory bodies need to consider the far-reaching effect of increase in cost of intermediation as a result of such frequent regulatory changes. Because, banks tend to transfer such costs to their customer which in turn increases cost of getting finance. The higher the cost of finance, the higher its effect on investment would be. Due to this the country at large would be affected. If investment becomes worse because of increase in cost of finance, production and employment opportunity will be affected negatively.

Regarding this research area, future researchers shall conduct research on the issue of such regulatory actions and would be better if they can show their effect on the liquidity of commercial banks.

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Appendices

Appendix-1 Hetroskedasyicity Test

Hetroskedasyicity test for ROA

Heteroskedasticity Test: White

F-statistic	1.062421	Prob. F(52,7)	0.5167
Obs*R-squared	53.25256	Prob. Chi-Square(52)	0.4258
Scaled explained SS	23.92661	Prob. Chi-Square(52)	0.9997

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/29/14 Time: 02:15

Sample: 1 60

Included observations: 60

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.111692	0.065386	-1.708190	0.1314
SZ	0.019694	0.009157	2.150654	0.0685
SZ^2	-0.000143	0.000249	-0.573637	0.5842
SZ*CR	-0.016295	0.007492	-2.175083	0.0661
SZ*EFF	-0.018902	0.008181	-2.310455	0.0542
SZ*EQ	0.000604	0.002937	0.205740	0.8428
SZ*GDP	-3.03E-05	7.75E-05	-0.391438	0.7071
SZ*INF	6.72E-06	6.13E-06	1.095993	0.3094
SZ*NBB	8.33E-06	3.56E-05	0.234109	0.8216
SZ*RR	-2.21E-05	0.000842	-0.026278	0.9798
SZ*CC	0.000103	0.000284	0.363146	0.7272
CR	-0.011378	0.088399	-0.128710	0.9012
CR^2	0.080468	0.050560	1.591517	0.1555

CR*EFF	-0.292142	0.113112	-2.582772	0.0363
CR*EQ	-0.056694	0.028112	-2.016719	0.0835
CR*GDP	0.002808	0.001514	1.855145	0.1060
CR*INF	1.30E-05	3.88E-05	0.336640	0.7463
CR*NBB	0.002676	0.001000	2.677142	0.0317
CR*RR	-0.026957	0.020140	-1.338451	0.2226
CR*CC	0.016941	0.005804	2.919042	0.0224
EFF	0.473671	0.164953	2.871553	0.0239
EFF^2	-0.098240	0.049339	-1.991137	0.0867
EFF*EQ	0.016704	0.026743	0.624591	0.5520
EFF*GDP	-0.000356	0.000673	-0.528008	0.6138
EFF*INF	-3.65E-05	5.20E-05	-0.701537	0.5056
EFF*NBB	0.002055	0.000890	2.309758	0.0542
EFF*RR	-0.020570	0.017650	-1.165447	0.2820
EFF*CC	0.012851	0.005254	2.445924	0.0444
EQ	0.048696	0.030007	1.622829	0.1487
EQ^2	-0.002219	0.005071	-0.437663	0.6748
EQ*GDP	0.000183	0.000366	0.497995	0.6337
EQ*INF	3.32E-05	3.44E-05	0.965277	0.3666
EQ*NBB	5.34E-05	0.000189	0.282816	0.7855
EQ*RR	-0.003563	0.006225	-0.572318	0.5850
EQ*CC	0.000551	0.001466	0.375643	0.7183
GDP	0.000796	0.002507	0.317686	0.7600
GDP^2	-0.000105	0.000105	-0.996686	0.3521
GDP*INF	-0.000143	7.39E-05	-1.937527	0.0939
GDP*NBB	0.001101	0.000565	1.948252	0.0924
GDP*RR	-0.000104	0.000122	-0.850260	0.4233
GDP*CC	-0.006199	0.003126	-1.983088	0.0878
INF	0.001596	0.000860	1.855505	0.1059
INF^2	-1.79E-05	8.96E-06	-2.002383	0.0853
INF*NBB	7.15E-05	3.81E-05	1.879128	0.1023

INF*RR	7.07E-06	1.28E-05	0.553228	0.5973
INF*CC	0.000660	0.000330	2.001635	0.0854
NBB	-0.011194	0.005018	-2.230705	0.0609
NBB^2	3.72E-05	2.31E-05	1.611323	0.1511
NBB*RR	0.000115	0.000189	0.609320	0.5616
RR	0.029749	0.023684	1.256070	0.2494
RR^2	-0.003540	0.002408	-1.469997	0.1850
RR*CC	0.000515	0.000542	0.950979	0.3733
CC	0.021962	0.017727	1.238905	0.2553

R-squared	0.887543	Mean dependent var	8.85E-06
Adjusted R-squared	0.052146	S.D. dependent var	1.01E-05
S.E. of regression	9.88E-06	Akaike info criterion	-20.59402
Sum squared resid	6.83E-10	Schwarz criterion	-18.74402
Log likelihood	670.8206	Hannan-Quinn criter.	-19.87038
F-statistic	1.062421	Durbin-Watson stat	2.052283
Prob(F-statistic)	0.516688		

Hetroskedasyicity test for NIM

Heteroskedasticity Test: White

F-statistic	2.012970	Prob. F(44,15)	0.0707
Obs*R-squared	51.31028	Prob. Chi-Square(44)	0.2089
Scaled explained SS	40.89479	Prob. Chi-Square(44)	0.6055

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/29/14 Time: 08:46

Sample: 1 60

Included observations: 60

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003773	0.006317	0.597291	0.5592
SZ^2	-0.000259	0.001804	-0.143795	0.8876
SZ*CR	0.011068	0.036865	0.300237	0.7681
SZ*EFF	-0.023712	0.034732	-0.682724	0.5052
SZ*EQ	-0.028089	0.020234	-1.388243	0.1853
SZ*GDP	-0.000147	0.000353	-0.415806	0.6834
SZ*INF	-1.21E-06	3.45E-05	-0.035195	0.9724
SZ*NBB	-0.000216	0.000269	-0.801288	0.4355
SZ*RR	-0.003404	0.005759	-0.591189	0.5632
SZ*CC	-0.000424	0.001837	-0.230933	0.8205
CR^2	-0.106956	0.186660	-0.572999	0.5751
CR*EFF	0.307375	0.377119	0.815060	0.4278
CR*EQ	0.283425	0.203406	1.393393	0.1838
CR*GDP	0.005877	0.003687	1.594147	0.1318
CR*INF	-1.96E-05	0.000312	-0.062999	0.9506
CR*NBB	0.003106	0.004054	0.766139	0.4555
CR*RR	0.029808	0.057607	0.517442	0.6124
CR*CC	-0.008138	0.023745	-0.342727	0.7366
EFF^2	0.110620	0.283178	0.390638	0.7016

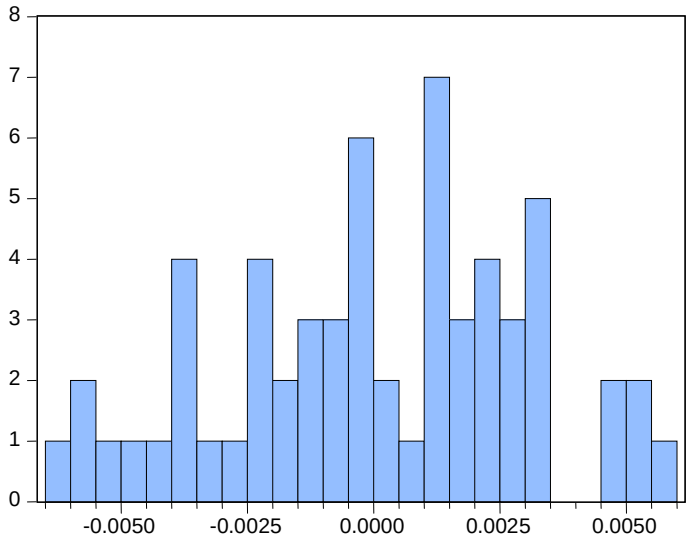
EFF*EQ	-0.381450	0.185612	-2.055099	0.0577
EFF*GDP	-0.004993	0.005053	-0.988063	0.3388
EFF*INF	-0.000483	0.000374	-1.293170	0.2155
EFF*NBB	0.000333	0.002442	0.136233	0.8934
EFF*RR	0.039668	0.088570	0.447873	0.6606
EFF*CC	0.007060	0.017086	0.413229	0.6853
EQ^2	0.038128	0.037766	1.009595	0.3287
EQ*GDP	-0.001018	0.002197	-0.463586	0.6496
EQ*INF	-1.09E-05	0.000198	-0.055005	0.9569
EQ*NBB	0.001568	0.001409	1.112743	0.2833
EQ*RR	0.024120	0.034260	0.704025	0.4922
EQ*CC	6.00E-05	0.009962	0.006018	0.9953
GDP^2	-0.000236	0.000227	-1.042676	0.3136
GDP*INF	-1.23E-05	5.83E-05	-0.210753	0.8359
GDP*NBB	-0.000547	0.000381	-1.435248	0.1717
GDP*RR	-0.000188	0.000730	-0.257888	0.8000
GDP*CC	0.000252	0.002487	0.101331	0.9206
INF^2	4.89E-06	5.05E-06	0.966971	0.3489
INF*NBB	-5.01E-05	3.82E-05	-1.313857	0.2086
INF*RR	4.06E-05	8.12E-05	0.499561	0.6246
INF*CC	-0.000178	0.000196	-0.909768	0.3773
NBB^2	0.000309	0.000104	2.971856	0.0095
NBB*RR	0.003868	0.001788	2.163235	0.0471
RR^2	0.002145	0.016427	0.130558	0.8979
RR*CC	-0.001974	0.004005	-0.493016	0.6291

CC^2	0.011990	0.023248	0.515763	0.6135

R-squared	0.855171	Mean dependent var	8.97E-05
Adjusted R-squared	0.430341	S.D. dependent var	0.000134
S.E. of regression	0.000101	Akaike info criterion	-15.44058
Sum squared resid	1.54E-07	Schwarz criterion	-13.86982
Log likelihood	508.2174	Hannan-Quinn criter.	-14.82617
F-statistic	2.012970	Durbin-Watson stat	2.491710
Prob(F-statistic)	0.070688		

Appendix-2 Normality Test

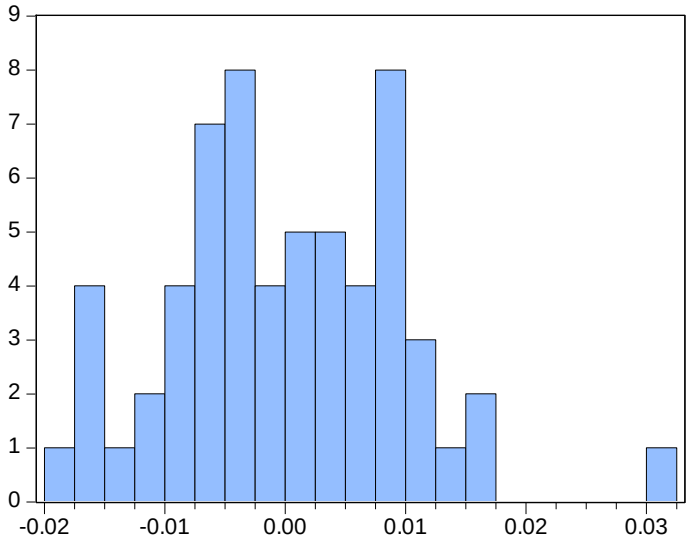
Normality test for ROA



Series: Standardized Residuals
Sample 2004 2013
Observations 60

Mean	0.027830
Median	0.000120
Maximum	0.005571
Minimum	-0.006254
Std. Dev.	0.006777
Skewness	-0.167327
Kurtosis	2.293997
Jarque-Bera	1.526086
Probability	0.466245

Normality test for NIM



Series: Standardized Residuals
Sample 2004 2013
Observations 60

Mean	-4.58e-17
Median	-0.001571
Maximum	0.030322
Minimum	-0.019827
Std. Dev.	0.009503
Skewness	0.297626
Kurtosis	3.465960
Jarque-Bera	1.428613
Probability	0.489532

Appendix-3 Autocorrelation Test

Autocorrelation for ROA

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.090856	Prob. F(2,48)	0.3441
Obs*R-squared	2.608575	Prob. Chi-Square(2)	0.2714

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/02/14 Time: 00:20
Sample: 1 60
Included observations: 60
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.013286	0.084470	0.157289	0.8757
SZ	-0.000353	0.004015	-0.087975	0.9303
CR	-0.005328	0.067462	-0.078985	0.9374
EFF	-0.026020	0.096482	-0.269690	0.7886
EQ	-0.008522	0.026096	-0.326577	0.7454
GDP	-0.000191	0.001166	-0.163499	0.8708
INF	-3.25E-06	5.06E-05	-0.064327	0.9490
NBB	8.97E-06	0.000329	0.027228	0.9784

RR	-0.002764	0.013365	-0.206838	0.8370
CC	-0.000308	0.002691	-0.114381	0.9094
RESID(-1)	-0.211002	0.154177	-1.368576	0.1775
RESID(-2)	-0.124371	0.150786	-0.824820	0.4136

R-squared	0.043476	Mean dependent var	-7.17E-17
Adjusted R-squared	-0.175727	S.D. dependent var	0.004944
S.E. of regression	0.005360	Akaike info criterion	-7.442737
Sum squared resid	0.001379	Schwarz criterion	-7.023868
Log likelihood	235.2821	Hannan-Quinn criter.	-7.278894
F-statistic	0.198338	Durbin-Watson stat	1.939168
Prob(F-statistic)	0.996967		

Autocorrelation for NIM

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.854545	Prob. F(2,48)	0.4318
Obs*R-squared	2.062911	Prob. Chi-Square(2)	0.3565

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 05/02/14 Time: 00:12

Sample: 1 60

Included observations: 60

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.297852	1.565838	0.190219	0.8499

SZ	0.021212	0.075278	0.281786	0.7793
CR	-0.496989	1.306408	-0.380424	0.7053
EFF	0.138208	1.751643	0.078902	0.9374
EQ	0.039218	0.472381	0.083023	0.9342
GDP	-0.001601	0.021275	-0.075233	0.9403
INF	-5.93E-05	0.000925	-0.064130	0.9491
NBB	-0.001136	0.006055	-0.187530	0.8520
RR	0.010196	0.237847	0.042866	0.9660
CC	-0.006984	0.049395	-0.141392	0.8882
RESID(-1)	-0.191653	0.151870	-1.261955	0.2131
RESID(-2)	0.028552	0.149055	0.191556	0.8489

R-squared	0.034382	Mean dependent var	-3.88E-16
Adjusted R-squared	-0.186906	S.D. dependent var	0.090184
S.E. of regression	0.098251	Akaike info criterion	-1.625731
Sum squared resid	0.463354	Schwarz criterion	-1.206863
Log likelihood	60.77194	Hannan-Quinn criter.	-1.461889
F-statistic	0.155372	Durbin-Watson stat	1.952690
Prob(F-statistic)	0.999002		

Appendix-4 fixed effect regression out puts

Dependent Variable: ROA

Method: Panel Least Squares

Date: 04/28/14 Time: 22:43

Sample: 2004 2013

Periods included: 10

Cross-sections included: 6

Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.192165	0.081128	-2.368673	0.0218
SZ	0.012372	0.005232	2.364873	0.0220
CR	0.091868	0.063732	1.441460	0.0957
EFF	0.109179	0.095456	1.143761	0.2582
EQ	0.126363	0.027399	4.611979	0.0001
GDP	-0.000882	0.000816	-1.080964	0.2849
INF	2.16E-05	4.67E-05	0.462695	0.6456
NBB	-0.000960	0.000456	-2.103224	0.0405
RR	-0.006035	0.014125	-0.427235	0.6710
CC	-0.005715	0.003277	-1.744139	0.0873

R-squared	0.629272	Mean dependent var	0.027838
Adjusted R-squared	0.530140	S.D. dependent var	0.006777
S.E. of regression	0.005209	Akaike info criterion	-7.525743

Sum squared resid	0.001357	Schwarz criterion	-7.176686
Log likelihood	235.7723	Hannan-Quinn criter.	-7.389208
F-statistic	7.539391	Durbin-Watson stat	1.329443
Prob(F-statistic)	0.000028		

Dependent Variable: NIM

Method: Panel Least Squares

Date: 04/29/14 Time: 08:35

Sample: 2004 2013

Periods included: 10

Cross-sections included: 6

Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.666064	1.597823	-1.668560	0.1021
SZ	0.170905	0.092532	1.846994	0.0713
CR	0.051716	1.280249	0.040395	0.9680
EFF	3.048622	1.772396	1.720058	0.0923
EQ	0.628825	0.688774	0.912963	0.3661
GDP	0.046645	0.020307	2.296969	0.0263
INF	0.000157	0.000867	0.181611	0.0856
NBB	-0.026584	0.006082	-4.371101	0.0001
RR	-0.296736	0.295714	-1.003458	0.0321
CC	-0.130269	0.046015	-2.830996	0.0069

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.681583	Mean dependent var	-1.368330
Adjusted R-squared	0.575421	S.D. dependent var	0.117429
S.E. of regression	0.090615	Akaike info criterion	-1.752071
Sum squared resid	0.369500	Schwarz criterion	-1.228485
Log likelihood	67.56213	Hannan-Quinn criter.	-1.547268
F-statistic	9.863098	Durbin-Watson stat	1.903595
Prob(F-statistic)	0.000272		

Appendix-5 Multicoliniarity Test

	ROA	NIM	SZ	CR	EFF	EQ	GDP	INF	NBB	RR	CC
ROA	1		0.198	0.317	-0.107	0.481	0.175	0.065	-0.174	-0.180	-0.095
NIM		1	0.033	0.180	0.236	0.409	-0.144	0.119	-0.064	-0.023	-0.039
SZ	0.198	0.033	1	0.393	-0.103	0.011	-0.266	0.204	0.678	-0.004	0.166
CR	0.317	0.180	0.393	1	-0.108	0.106	-0.424	0.085	0.288	-0.009	0.047
EFF	-0.107	0.236	-0.103	-0.108	1	0.224	-0.012	-0.111	0.104	-0.076	-0.032
EQ	0.481	0.409	0.011	0.106	0.224	1	-0.209	0.108	0.246	-0.148	0.022
GDP	0.175	-0.144	-0.266	-0.424	-0.012	-0.209	1	-0.299	-0.656	-0.170	-0.155
INF	0.065	0.119	0.204	0.085	-0.111	0.108	-0.299	1	0.193	0.188	0.190
NBB	-0.174	-0.064	0.678	0.288	0.104	0.246	-0.656	0.193	1	-0.279	-0.428
RR	-0.180	-0.023	-0.004	-0.009	-0.076	-0.148	-0.170	0.188	-0.279	1	0.590
CC	-0.095	-0.039	0.166	0.047	-0.032	0.022	-0.155	0.190	-0.428	0.590	1