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Measuring the Relationship between Profitability and Asset Liability
Management in Ethiopian Commercial Banks: A Ratio Approach

By

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Declaration

Here with I, declare that, this thesis prepared for the partial fulfillment of the requirements for MSc Degree in Accounting and Finance entitled "*Measuring the Relationship between Profitability and Asset Liability Management in Ethiopian Commercial Banks: A Ratio Approach*". This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic Degree or Diploma except where otherwise indicated.

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Here with I state that Abel Seid has carried out this research work on the topic entitled "*Measuring the Relationship between Profitability and Asset Liability Management in Ethiopian Commercial Banks: A Ratio Approach*" under my supervision. This work is original in nature and has not been presented for a degree in any University and it is sufficient for submission for the partial fulfillment for the award of MSc degree in Accounting and Finance.

Ulaganathan S. (PhD)

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Abstract

This study is designed to analyze the relationship between the balance sheet components and profitability of Ethiopian Commercial Banks for the period 2001 to 2010. In order to carry out the study, balanced panel data comprising a sample of 80 observations from the balance sheets and the profit and loss accounts of 8 Commercial Banks were gathered. Two of them are public while the rest are private Banks. The relationship between profitability and Asset Liability Management (ALM) was tested using the Statistical Cost Accounting (SCA) model. Two measures of profitability were used to signify the relationship between profitability and ALM. Those are Total Income and Net Income. The results of the analysis showed that public Banks balance sheet components of Loans and Advances, Saving Deposits, and external factors –GDP growth rate and Market concentration significantly affect their total income, while net income of public Banks is significantly affected by Balance Sheet Unrelated Items, Loans and Advances , Saving Deposits, Inflation ,GDP growth rate and Market concentration. Private Banks' total income is found to be significantly affected by Balance Sheet Unrelated Items, Placings with other banks, Sum of Investments, Fixed Deposits and Other Liabilities, and their net income is impacted by Off-Balance Sheet Items, Saving Deposits, Fixed /Time Deposits, Other Liabilities and external factors. Consequently, Bank managers are advised to pay attention to these items in their profit planning in order to enhance their performance.

Key words: ALM; SCA; Commercial Banks

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Acronyms

ALCO	Asset Liability Committee
ALM	Asset Liability Management
CBB	Construction and Business Bank
CBE	Commercial Bank of Ethiopia
CBs	Commercial Banks
CPI	Consumer Price Index
DBE	Developmental Bank of Ethiopia
ECBs	Ethiopian commercial Banks
GDP	Gross Domestic Product
HI	Herfindhal index
NBE	National Bank of Ethiopia
RSA	Rate Sensitive Asset
SCA	Statistical Cost Accounting
EPLF	Ethiopian People Revolutionary Democratic Front
LCs	Letters of Credits

CHAPTER ONE

1. INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Banks are the heart beat of an economy. They play an immense role in fostering the development of a nation being an intermediary in between the fund user and fund source. According to Jean Dermine (2003) the economics of banking distinguishes five functions of banks. Those are underwriting and placement, portfolio management, payment mechanism, monitoring and information related functions, and risk sharing services.

A Commercial Bank is set up with the primary objective of generating profit. Its revenues depend on the kinds of services it provides. A Commercial Bank can render all functions of a bank concurrently. But, it is obvious that services provided by a bank depend on the technological advancement, this in turn on economical development. For instance, you do not expect Ethiopian banks to have typically similar banking services like banks in Europe.

Banking was introduced during the regime of Emperor Minelik II, with an intention of drawing modernized Ethiopia. The first bank, named Abyssinia, started operation in Feb, 16, 1906, after an agreement had been reached in 1905 with British owned

national bank of Egypt (Sofia and Abrha, 2010). Since then the banking sector has been subject to different political structures. Government owned banks were giant participants in the banking sector. There were foreign owned banks during Emperor Haileselassie I regime. During reign of the Emperor, contribution of the private segment to the economy was, apparently, not significant. Foreign private banks were nationalized; therefore, the participation of the private sector has been totally band by the military rule of Derg in pursuit of exercising the socialist hegemony. In the new regime of Ethiopian People's Revolutionary Democratic Front (EPRDF), before new thriving private banks came, commercial banking was first entrusted to the state owned Commercial Bank of Ethiopia (CBE). Construction and Business Bank (CBB), yet lately, launched its commercial services addressing the public (Bekezela Ncube, 2010).

The 2009/10 report of NBE exhibits fourteen commercial banks and one specialized bank, Developmental Bank of Ethiopia (DBE). Two new banks (Addis international bank and Abay international bank) were licensed during 2011. Consequently, number of commercial banks reaches sixteen. Five more banks (Debab, Enat, Hawassa, Noah, and Zam-Zam) are raising capital from the public to join the industry . Commercial banks, in Ethiopia, contemporarily are engaged in providing loans and receiving deposits, foreign exchange dealing and money transfer at commission .Their major revenue is interest charge on money lent (Annual Reports of Banks under Study).

The entry of new banks, added to the very rapid growth of microfinance institutions creates a challenging environment for the existing banks at least in reducing their market share, among other things. Indeed, given still largely huge and still an unmet financial intermediation needs in Ethiopia, there will not be fundamental change to the high growth, high profit banking environment (Access Capital, 2010). Unsatisfied intermediation allows banks to generate higher income and pay higher dividends to shareholders. This continues as long as the number of banks is not sufficient to handle the demand at hand. As time drags on, it is inevitable that the number of banks increases (under a less regulated environment) and the diversity of services as well.

In course of time, banks are not only prone to reduced market share due to potential increase in participants but also are to risk. Risk is inherent to any business, but it can be controlled to mitigate its impact on profitability. Therefore, profitability is not only attributable to unmet intermediation. If uninterrupted profitability is sought, risks that a bank could encounter should be managed. Risks, if not managed, would lead banks to loss a portion of possible revenue that might have been realized as those risks were managed well. Therefore, extent of profitability of a bank depends on the effective management of balance sheet contents – assets and liabilities. This is assured via Asset Liability Management (ALM).

Various researchers have pointed out what an ALM is in their investigations. Among them, Charumathi (2008) explained assets and liabilities management as a

dynamic process of planning, organizing, coordinating and controlling the assets and liabilities ,their mixes, volumes, maturities, yields and costs ...He noted how ALM can be employed to manipulate net interest income (NII) despite the fluctuation of interest rates(interest rate risk) in the Indian banking industry. Gup and Brooks (1993) argued that asset and liability management in banks is the simultaneous planning of all asset and liability positions on the bank's balance sheet under consideration of the different bank management objectives and legal, managerial and market constraints, for the purpose of mitigating interest rate risk, providing liquidity and enhancing the value of the bank.

The core issue of Asset-Liability Management (ALM) is the bank's balance sheet and the main question is: Given a certain level of risk, government regulation, globalization, competitors, and alternative choices of investment, and liquidity and interest rate changes in the market, what should be the composition of a bank's assets and liabilities in order to maximize the bank's profit? What should be the optimal combination of ALM? These are the two questions raised by Kosmidou et al (2004) who argued that the optimal balance between these factors cannot be found without considering important interactions that exist between the structure of a bank's liability and capital and the compositions of its assets.

ALM involves a set of actions and procedures designed to control banks risks and financial positions. The ALM process rests on three pillars: ALM information systems (Management information system, Information availability, accuracy,

adequacy and expediency), ALM organization (Structure and responsibilities, Level of top management responsibilities) and, ALM process (Risk parameters, Risk identification, Risk measurement, Risk management Risk policies and tolerance) (A Guideline of Banks in India).

One of the key motivators of asset-liability management worldwide was the Basel Committee. The Basel Committee on Banking Supervision (2001) formulated broad supervisory standards and guidelines and recommended statements of best practice in banking supervision. The purpose of the committee was to encourage global convergence toward common approaches and standards. In particular, the Basel II norms (2004) were proposed as an international standard for the amount of capital that banks need to set aside to guard against the types financial and operational risks they face. Basel II proposed setting up rigorous risk and capital management requirements designed to ensure that a bank holds capital reserves appropriate to the risk the bank exposes itself to through its lending and investment practices. Generally speaking, these rules mean that the greater risk to which the bank is exposed, the greater the amount of capital the bank needs to hold to safeguard its solvency and overall economic stability. This would ultimately help protect the international financial system from the types of problems that might arise should a major bank or a series of banks collapse.

1.2. PROBLEM STATEMENT

Many new banks are joining the banking sector by pooling funds through shares. A proclamation to operate in a banking business is vested in proclamation No592/2008. Even though the sector has expanded, banks in the sector still are not enough to satisfy the needs arising from different users. Because of the increasing number of customers and unsatisfied demand of these customers banks enjoy profits. But, this does not stay long when the rivalry among banks hikes due to the expansion in the industry. Banks, thus, are persuaded to control mix of their balance sheet in such a way that the optimum combination between asset and liabilities could bring them the maximum possible profit. Shortly, banks should, in planned way, understand the relationship between their balance sheet components and also the influence on each other. The objective of ALM is to make banks fully prepared to face the emerging challenges (Mihir and Ravi, 2009). Measuring the relationship between asset and liability has been a subject of various researches, such as Pearson's correlation coefficient, regression analysis and canonical correlations as applied in a recent study by Mihir and Ravi (2009) and formerly by Simonson et al. (1983). The starting point of all these measures is the pairwise correlation coefficients (Christoph and Andrea, 2009).

To control profitability and risks banks usually set up Asset Liability Committee (ALCO). Banks might not have an organized unit that is assigned to lead the management of balance sheet. But, they always manage their balance sheet in

advent of reducing bankruptcy due to risks covered in ALM frame work. The risks are interest rate risk, liquidity risk, exchange risk, and credit risk (Mihir and Ravi, 2009). The degree of managing assets and liabilities affects a profitability of banks through reducing loss of revenue due to potential risks banks may face (Muhammad and Mohammad, 2009). In addition, different market and macroeconomic factors also influence the ability of the banks to make profits (Short, 1979; Molyneux and Thornton, 1992; Athanasoglou et al, 2008).

1.3. OBJECTIVE OF THE STUDY

The general objective of the paper is to find out the status of asset liability management in the Ethiopian commercial banks (ECBs). It specifically attempts to study the impact of ALM on the profitability of the bank and strength of relationship between assets and liability in commercial banks.

1.4. SIGNIFICANCE OF THE STUDY

Asset liability management is the set of actions and procedures designed to control the risks and financial conditions. Without proper management of risks and financial condition there won't be any manner banks could strive for a maximum profit. The study caters the know-how in asset liability management (ALM) for banks as a crucial part of committing strategy planning, thereby reducing the gap in information prevalence on the topic. Multiple regressions applied to reach at the

findings would, the researcher hope, give a clue to interested researchers as to the use of the techniques on ground of the study's attempt.

1.5. ORGANIZATION OF THE PAPER

The remaining chapters of this paper are organized as follows: chapter two reviews some of the theoretical and empirical literatures; chapter three demonstrates the research methodology; chapter four reports the findings and discussion; finally, the fifth chapter demonstrates the conclusions and recommendations reached at from findings.

CHAPTER TWO

1. LITERATURES REVIEW

2.1. INTRODUCTION

This chapter reviews the theoretical and empirical literatures on ALM in banks. The next section (section 2.2) covers the theoretical and practical frameworks of ALM, followed by an overview of ALM models (section 2.3). Then, it demonstrates (in section 2.4) review of empirical studies related to the impact of ALM on profitability of banks. Finally, conclusions on literature review are presented (section 2.5).

2.2 THEORETICAL AND PRACTICAL FRAMEWORKS OF ALM

This section demonstrates the definition of ALM and over view of techniques used in ALM. It presents classification and definition of banking risks.

2.2.1. KEY CONCEPTS OF ASSET LIABILITY MANAGEMENT

ALM has evolved through different stages. It was developed as a hedging reaction against the risk of financial intermediation. As a discipline, ALM has been functioning since the beginning of 1970s. At the initial stage, the management was based on the simple gap model that analyzes risk in terms of cash flows and the gaps or mismatches between assets and liabilities. As the experiences of financial

institutions with risk management evolved, the cash flow gap models gradually gave way to duration gap models, which look more at the market value of the bank's rate-sensitive assets and rate-sensitive liabilities (to changes in interest rates) rather than just at the difference between them. At present, the rapid development in the ALM field is driven by such forces like: recent growth in the capital markets, advancement in the theory and technology of risk analysis, education of financial intermediaries in the necessity as well as in implementation of ALM (katarzyna zawalińska, 1999).

Fabozzi et al. (1998) identifies three requirements for a successful implementation of ALM. A thorough understanding of the ALM concept is the first among these requirements. It refers to a comprehensive recognition of the banking risk. Besides serving as a venue for understanding the scope of risk, ALM allows for the quantifiable assessment and effective management of various risk categories. Even in the absence of a formal ALM program, the understanding of these concepts provides a picture of the risk/reward trade-off in which the financial institutions are engaged. The second step or requirement for the implementation of ALM is the development of an information system. Risk management involves gathering and monitoring relevant data. The set of data alone is likely to provide valuable information about the degree of financial risk affecting the institution. The third step involves a design and implementation of the ALM decision making process. The Asset Liability Committee (ALCO) usually carries out this process.

2.2.2 BANKING RISK

Banking risk is an integral part of financial activities, and the management of risk is central to the bank financial management (katarzyna zawalińska, 1999).

Fabozzi et al (1998) distinguished, as in the previous section that the first step for a successful implementation of ALM is to have a complete understanding of risks in banking institutions. Therefore, this section demonstrates an overview of various risk, their measurement and management techniques.

2.2.2.1. BANKING RISK CLASSIFICATION

A useful definition of banking risk is provided by Saunders (1997). According to his view, banking risk is “a probability that the actual return on banking investment will differ from its expected return due to internal and/or external factors”. The literature divides banking risk into six distinctively different categories: 1) Balance sheet risk, 2) Regulatory risk, 3) Technological risk, 4) Operational risk, 5) Strategic risk, and 6) Affiliation risk (Sinkey, 1998). Only the balance sheet risk is the area of interest and is discussed below.

The balance sheet risk incorporates various types of portfolio risk recognition and assessment, which is particularly important to bank's management. The balance sheet risk (portfolio risk) in banking can be further classified into (katarzyna zawalińska, 1999): Interest rate risk, Credit risk, Liquidity risk, Foreign exchange risk, Insolvency risk and Costs of fund risk.

All these diverse types of portfolio risk require application of different tools and techniques for its measurement and management. They are examined in the next section.

2.2.2.2. BALANCE SHEET RISK MEASUREMENT AND MANAGEMENT

Hedging and minimizing the risk are the main functions of risk management. In general terms, risk management techniques can be grouped into three categories (Saunders, 1997):

1. On-balance sheet matching of assets and liabilities in terms of reprising. For that technique such tools like GAP analysis and duration analysis are in use.
2. Off-balance sheet hedging of one or more risk categories. Among main tools here are derivatives, financial futures, etc.
3. Securitization of assets. This technique takes the risk out of balance sheet by exchanging the assets into securities and selling them to investors.

All those risk management and measurement techniques are described in the next sections with reference to particular types of risk.

INTEREST RATE RISK

Among the main tools used for interest rate risk measurement are GAP analysis, duration analysis, and the combination of the two. GAP measures the difference

between rate-sensitive assets (RSA) and rate-sensitive liabilities (RSL) over a particular time horizon. It provides a proxy measure of the bank interest income.

CREDIT RISK

Credit risk is the uncertainty associated with a borrower's loan repayment. If the expected probability of default is d , then the expected probability of receiving payment is $(1-d)$ (Sinkey, 1998). Banks must protect their interests by monitoring closely potential and existing borrowers. In order to diminish the probability of default, banks must screen out the good credit risks from the bad ones. According to katarzyna zawalińska (1999), specialization in lending, long term customer relationships and loan commitment are mentioned as techniques of credit risk management.

LIQUIDITY RISK

From the point view of Anthony M. Santomero (1997) liquidity risk, "can be described as the risk of a funding crisis. While some would include the need to plan for growth and unexpected expansion of credit, the risk here is seen more correctly as the potential for a funding crisis. Such a situation would inevitably be associated with an unexpected event, such as a large charge off, loss of confidence, or a crisis of national proportion such as a currency crisis".

Saunders (1997) and sinkey(1998) figured out that net liquidity position , peer group comparison, and application of liquidity index and measuring financing GAP and financing requirements as ways of measuring liquidity exposure of banks.

FOREIGN EXCHANGE RISK

The currency risk is that of incurring losses due to changes in the exchange rates. Variations in earnings result from the indexation of revenues and charges to exchange rates or of changes of the values of assets and liabilities denominated in foreign currencies (Joel Bessis, 2002). There are, in principle, two ways in which banks can manage the foreign risk exposure: on-balance-sheet hedging and off-balance-sheet hedging.

2.3. ALM MODELS

There are many asset-liability management models in the practice. Looking to the past, the first mathematical models in the field of bank management are found. Asset and liability management models can be deterministic or stochastic (Kosmidou and Zopounidis, 2001). Deterministic models use linear programming, assume particular realizations for random events, and are computationally tractable for large problems. The deterministic linear programming model of Chambers and Charnes (1961) is the pioneer in ALM. Chambers and Charnes were concerned with formulating, exploring and interpreting the use and construction which may be derived from a mathematical programming model which expresses the actual

conditions of current operations more realistically than past efforts. Their model corresponds to the problem of determining an optimal portfolio for an individual bank over several time periods in accordance with requirements laid down by bank examiners which are interpreted as defining limits within which the level of risk associated with the return on the portfolio is an acceptable one.

Cohen and Hammer (1967), Robertson (1972), Lifson and Blackman (1973), Fielitz and Loeffler (1979) have realized successful applications of Chambers and Charnes' model. Even though these models have differed in their treatment of disaggregation, uncertainty and dynamic considerations, they all have in common the fact that they are specified to optimize a single objective profit function subject to the relevant linear constraints.

Eatman and Sealey (1979) developed a multi-objective linear programming model for commercial bank balance sheet management considering profitability and solvency objectives subject to policy and managerial constraints.

Giokas and Vassiloglou (1991) developed a goal-programming model for bank asset and liability management. They supported the idea that apart from attempting to maximize revenues, management tries to minimize risks involved in the allocation of the bank's capital, as well as to fulfill other goals of the bank, such as retaining its market share, increasing the size of its deposits and loans, etc. Conventional linear programming is unable to deal with this kind of problem, as it can only handle a

single goal in the objective function. Goal programming is the most widely used approach that solves large scale multi-criteria decision making problems.

Apart from the deterministic models, several stochastic models have been proposed since the 1970s. These models, including the use of chance-constrained programming (Charnes and Thore, 1966; Charnes and Littlechild, 1968; Pogue and Bussard, 1972), dynamic programming (Samuelson, 1969; Merton, 1969, 1990; Eppen and Fama, 1971), sequential decision theory (Wolf, 1969; Bradley and Crane, 1972) and stochastic linear programming under uncertainty (Cohen and Thore, 1970; Booth, 1972; Crane, 1971; Kallberg et al. 1982), presented computational difficulties. The stochastic models, in their majority, originate from the portfolio selection theory of Markowitz (1959) and they are known as static mean-variance methods. Pyle (1971) and Brodt (1978) adapted Markowitz's theory and presented an efficient dynamic balance sheet management plan that considers only the risk of the portfolio and not other possible uncertainties or maximizes profits for a given amount of risk over a multi-period planning horizon respectively. Wolf (1969) proposed the sequential decision theoretic approach that employs sequential decision analysis to find an optimal solution through the use of implicit enumeration.

An alternative approach in considering stochastic models is the stochastic linear programming with simple recourse. Kusy and Ziemba (1986) employed a multi-period stochastic linear program with simple recourse to model the management of assets and liabilities in banking while maintaining computational feasibility. Their

results indicate that the proposed ALM model is theoretically and operationally superior to a corresponding deterministic linear programming model and that the computational effort required for its implementation is comparable to that of the deterministic model. Another application of the multistage stochastic programming is the Russell-Yasuda Kasai model (Carino et al., 1994), which aims at maximizing the long term wealth of the firm while producing high income returns.

Mulvey and Vladimirov (1992) used dynamic generalized network programs for financial planning problems under uncertainty and they developed a model in the framework of multi-scenario generalized network that captures essential features of various discrete time financial decision problems.

Mulvey and Ziemba (1998) present a more detailed overview of various asset and liability modeling techniques, including models for individuals and financial institutions such as banks and insurance companies.

Moreover, over the years, many models have been developed in the area of financial analysis and financial planning techniques. Kvanli (1980), Lee and Lerro (1973), Lee and Chesser (1980), Baston (1989), Sharma et al. (1995), among others have applied goal programming to investment planning. Booth et al. (1989), Giokas and Vassiloglou (1991), Seshadri et al. (1999) presented bank models using goal programming.

Hester & Zoellner (1966) employed statistical cost accounting (SCA) model on US banks. Mihir & Ravi (2009) implemented the canonical analysis to assess the nature of relationship between assets and liabilities setting the hypothesis assets influence liabilities. This method was also used by Seem Jawal (2010), who found that strong canonical correlation between asset and liability accounts, indicating high asset-liability dependency and the canonical correlation in each sector (public , private and foreign banking sectors) of banks in India under study declined from the period 1997-2000 to 2005-2008.

2.4. ALM AND PROFITABILITY

Banks' profitability is of utmost concern in modern economy. Banks are in a business to receive deposits or liabilities and to issue debt securities on the one hand and create or invest in assets on the other hand (Fama 1980). Commercial Banks incur costs for their liabilities and earn income from their assets. Thus profitability of banks is directly affected by management of their assets and liabilities. In addition, different market and macroeconomic factors also influence the ability of the banks to make profits (Short 1979, Molyneux, and Thornton 1992, Athanasoglou et al. 2008).

Different studies are done explaining the influence of composition of assets and liabilities on banks' profitability. Hester & Zoellner(1966); Kwast & Rose,(1982); Vasiliou, (1996);Kosmidou et al, (2004); and Asiri, (2007) can be mentioned.Hester & Zoellner (1966) employed statistical cost accounting (SCA) method on US banks and found statistically significant coefficients for most of the categories of assets and

liabilities and rejected the null hypothesis that there is no relationship between them. Vasiliou (1996), by employing SCA method, suggests that asset management rather than liability management play more prominent role in explaining inter-bank differences in profitability. However, these findings contrast with the findings of Kosmidou et al., (2004) who find that liability management contributes more in creating the profitability differences among the banks. These authors did not incorporate the variables relating to macro economic and market structure in their model. In fact, a number of bank specific or macroeconomic factors such as market structure, Inflation, gross domestic product (GDP) growth rate, etc do impact bank's net earnings which were ignored by these authors. With this view, Kwast & Rose (1982) expanded the traditional SCA model by including market structure and macro economic variables. Nonetheless, their model found no evidence that differential returns and costs on different categories of assets and liabilities exist between high and low profit banks. In a recent study, Asiri (2007) has applied SCA method and finds that assets are positively and liabilities are negatively related to the profitability of the Kuwaiti banks.

Muhammad & Mohammad (2009), in their application of SCA to assess ALM impact on profitability they recognized that Private BCBs are better than public banks in terms of asset management, but they do not have any superiority over public banks in terms of liability management. This does not provided them conclusive support that ALM in private banks is superior to ALM in public banks. Thus, study could not explain the profitability differences between these two sets of

banks through analyzing ALM. Their study considered the market concentration index and GDP growth rate, unlike the previous ones.

Muhammad and Mohammad (2009) measured profitability by assuming two levels of measures of income: total income and net operating income.

2.4.1. TOTAL INCOME

Total income consists; income from interest charge, service fees and commissions. Interest income can emanate from loans and advances and surplus funds. Interest charge is subject a revision of lower floor and upper ceiling rate by the regulation of the national bank of Ethiopia. The remaining sources of income can be captioned as "other income", which includes Service revenue, transaction fee (letter of credit opening charges), commission income, gain on foreign exchange, investment (rental or dividend) revenue... etc(Annual Reports of Banks Under Study).

2.4.2. NET INCOME

Net income is found after deducting interest expense sourced from deposits and other liabilities, and administrative expenses from total income (Muhammad and Mohammed, 2009). Accordingly, expenses other than interest, as can be seen from the profit and loss accounts of the banks are salaries and benefits, rent, general and administrative, and so on.

2.4.3. ASSETS AND LIABILITIES

Depending on the classification basis, assets and liabilities of various natures can be observed on banks’ balance sheet. The classification is more or less similar among banks. Literature suggests some models on which assets and liability contents of the balance sheet can be labeled. The next section takes a quick glance at the models.

2.4.3.1. A NEOCLASSICAL MODEL

The simplest model is the neoclassical model of the banking firm developed by Klein (1971) and Monti (1972). The asset side of the balance sheet of the bank consists of reserves with the central bank loans, and market-traded assets such as government bonds or inter-bank loans. The liability side includes deposits and equity. The balance sheet is as follows:

<u>Asset</u>	<u>Liabilities and Shareholders’ Equity</u>
Reserves	
Loan	Deposits
Bonds	Equity

2.4.3.2. A MULTI-PERIOD NEOCLASSICAL MODEL

In the one-period model, the relevant transfer price for pricing and for the evaluation of profitability is the matched-maturity market rate. A six-month inter-

bank rate is the relevant rate to price a six-month deposit. However, two additional features can introduce a multi-period consideration (Dermine, 1984; Hannan and Berger, 1991). The first is that the supply of deposits can be a lagged function of past deposit rates. This is likely to be the case in the retail sector in which customers, facing switching costs, will display some form of loyalty. This creates a lag in the deposit supply function. The second reason for dynamic consideration is that, for marketing reasons, it can be costly to continuously adjust the deposit rate.

2.4.3.3 A VALUATION MODEL

The valuation model of the banking firm has different scenarios - with no tax, no risk, no growth, to more complete models with tax and risk. It is based on Dermine (1985, 1987), and Dermine and Hillion (1992). The balance sheet of the bank without considering risk and tax is given below

<u>Assets</u>	<u>Liabilities and Shareholders' Equity</u>
Loans	Deposits
Bonds	Equity

The balance sheet of a position where corporate tax and risk are considered is as follows:

Loan	Equity
------	--------

2.4.4 INFLATION (CPI)

Many economic transactions require commitment to exchange money at some future time, credit transactions are a good example of this. Since inflation reduces the future value of money, it pays people (both potential borrowers and lenders) to try to forecast inflation over the relevant time period. This forecast is called anticipated inflation. As the name suggests, anticipated inflation is forward-looking. It is the rate of change in the general price level that people think will occur during some specific future time period. The accuracy of forecasts depends on future events and circumstances that are unknown when the forecast is made. Consequently, these forecasts generally will be “wrong”. Any difference between actual (or realized) inflation and anticipated inflation is called unanticipated inflation (G.J. Santoni, 1986).

2.4.5. GROSS DOMESTIC PRODUCT (GDP) GROWTH RATE

GDP measures the monetary value of final goods and services—that is, those that are bought by the final user—produced in a country in a given period of time (say a quarter or a year). It counts all the output generated within the borders of a country. GDP is composed of goods and services produced for sale in the market and also include some nonmarket production, such as defense or education services provided by the government. An alternative concept, gross national

2.4.6. THE HERFINDAHL INDEX (HI)

The Herfindahl index (HI), also known as the concentration index, measures industry concentration by summing the squared market shares of the firms in the industry. It is commonly used to support antitrust claims. The index can be large or small, but decreases are indicative of a loss in pricing power and/or increased competition while increases suggest the opposite.

A recent study by Faris (2010) included the Herfindahl index to comprehend the influence of market concentrations of banks in profitability. Macroeconomic factors, which in fact were ignored in previous studies, have significant effect on ALM. Had they been included they would have made the researches reach to a different findings. Shortly, the inclusion of such factors would increase the trustability of findings.

2.5. CONCLUSION

A number of empirical studies are available on ALM. Some of these have been presented pertaining to their resemblance to this study. The studies major emphasis were identifying the relationship between asset and liability (Hester and Zoellner, 1966), the cause of difference in inter-bank profitability- whether it is asset or liability management (Vasiliou, 1996), the impact of ALM on profitability (Muhammad and Mohammed , 2009), the nature of dependency between asset and liabilities (Seema Jaiswal, 2010) and so on. SCA regression and the canonical

correlations analysis are used particular to the research objectives. Using the SCA regression, Hester & Zoellner , assured that there is a relationship between asset and liabilities of US banks. Vasiliou achieved that the interbank profitability difference is well explained by asset management, which actually was opposite to the finding of Kosmidou et al., (2004)-liability management explains profitability difference between banks. Seema Jaiswal (2010) indicted a higher asset liability dependency administering canonical correlation analysis. Mehir & Ravi (2009) and inferred assets influence liabilities.

Many studies addressing ALM in developed and some developing economies are available and they would be of great value for related literatures. But, scant attention has been given to cover an assessment of ALM in the banks of least developed countries, like Ethiopia, whose economy is booming unprecedented. Consequently, application of mathematical model to unveil ALM problems would be of interest to other researcher in finance.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. SCOPE AND LIMITATION OF STUDY

The achievement of the study is limited to only the balance sheet of commercial banks for the period 2001-2010. It is also restricted to unavailability of sufficient data. It is vivid that the more the data in the ambiance of study is available the more it becomes possible to make a binding inference to a problem at hand. Lack of adequate data for a longer study year coinciding with ECBs' similar operating years hampers the study not to go far it would go, had overlapping data for all banks included in the study been available for a longer time period.

3.2. HYPOTHESIS

Most of the empirical investigations on ALM consider the impact of ALM and other macroeconomic factors on profitability. This section attempts to demonstrate the relationships existing in between profitability and ALM along with other factors through developing a testable hypothesis. The study conducts two sets of regressions assuming two income measures-total income and net operating income. The variables considered are; assets, liabilities, inflation, GDP growth rate, and the Herfindahl index.

3.2.1. ASSET

Bank balance sheet assets are earning items. According to Kwast and Rose (1992) when total income is used as measure of profitability, assets directly contribute in increasing in marginal rate of return which in turn increases total income. Even, when net income is used as a profit measure a net return from assets is still positive. The SCA model adopted by Hester and Zoellener (1966) marks a positive relationship between assets and profitability of a bank. Based on the nature of assets and SCA model the researcher hypothesizes that:

Hypothesis one: There is a positive relationship between assets and total income.

Hypothesis two: There is a positive relationship between assets and net income.

3.2.2. LIABILITIES

Liabilities are reasons for incurring costs. These liabilities emerge from deposits and other borrowings. Since it is customary that banks impose service charges on deposit accounts and non -other deposits liabilities , the return on liability should be positive (Muhammad and mohammed,2009) . This holds true so long as total income is taken. When the net counterpart is taken, a liability's marginal cost is deemed. Apparently; operating costs are generally higher than the service charges earned from deposits, which would signify a negative return of liabilities (Muhammad and mohammed, 2009,).Thus, based on this the researcher hypothesizes that :

Hypothesis three: There is a positive relationship between liabilities and total income.

Hypothesis four: There is a negative relationship between liabilities and net income.

3.2.3. INFLATION

Inflation is a recurrent increase in price. Profitability is adversely affected by inflationary situation which make banks vulnerable to default risks, interests rate risk and liability risk. Due to the onslaught of so many risks, bank may face huge amount of loss in a variable inflationary environment (Oguzsoy and Guven, 1997).Based on this the researcher hypothesize that:

Hypothesis five: There is a negative relationship between inflation and total income.

Hypothesis six: There is a negative relationship between inflation and net income.

3.2.4. GDP (GROSS DOMESTIC PRODUCT) GROWTH RATE

GDP shows the total contribution of sectors of an economy to economic growth of a country. Sectoral breakdown of GDP encompasses financial sector. The more the financial sector glares the more its contribution to economic growth would be. The more it contributes to the economic growth the more participants evolved in it enjoy profit. Based on this the researcher hypothesizes that:

Hypothesis seven: There is a positive relationship between GDP and total income.

Hypothesis eight: There is a positive relationship between GDP and Net Income.

3.2.5. THE HERFINDAHL INDEX (HI)

The Herfindahl Index is the sum of the squared market shares of the firms in the market. Pasiouras and Kosimidou (2007) found a direct relationship between market concentration and firm profitability. Based on this the researcher hypothesizes that:

Hypothesis nine: There is a positive relationship between HI and total income.

Hypothesis ten: There is a positive relationship between HI and net income.

3.3. RESEARCH APPROACH

The study applies quantitative research approach. A quantitative approach is one in which the investigator primarily uses postpositive claims for developing knowledge, i.e., cause and effect relationship between known variables of interest (Cresswell 2003).

Cresswell (2003) further noted that a quantitative research approach employs strategies of inquiry such as experiments and surveys, and collect data on predetermined instruments that yield statistics. Quantitative research employs a review of the existing literature to deductively develop theories and hypotheses to be tested i.e., in this approach, the research problem is translated to specific variables and hypotheses (Yesegat, 2009).

Specifically, this study employs a survey design administered through structured record review. It is employed in order to infer from a sample to population. Survey

method is preferred because of its high-speed in data collection and its being economical. In line with this, a panel balance sheet data, i.e., Panel balance sheet data have the dimensions of both time series and cross-sections (Brooks), for eight ECBs was collected for 2001-2010 study period. The advantage of using the panel data set is that, because of the several data points, collinearity among the explanatory variables is reduced, thus improving the efficiency of econometric estimates and it takes into account a greater degree of the heterogeneity that characterizes firms (Daskalakis and Psillaki, 2008). A great deal of information has also been collected from banks via unstructured interview.

3.4. SAMPLING DESIGN

W.G. Cochran defined the term sampling as "In every branch of science we lack the resources, to study more than a fragment of the phenomena that might advance our knowledge." In this definition a 'fragment' is the sample and 'phenomena' is the 'population'. The sample observations are applied to the phenomena i.e. generalization.

'Sampling design' in fact means the joint procedure of selection and estimation. Sampling should be such that error of estimation is minimum.

Three indispensable factors are the concern of sampling design -sample frame, sample size, the technique used to select the sample size. If a study applies the sample observation to make generalization to the phenomena, the samples taken

ought to be representative of the population. According to Yogesh (2006), population or universe means, the entire mass of observations, this is the parent group from which a sample is to be formed. The sample observations provide only an estimate of the population.

In the study, the sampling frame is the total number of commercial banks (14) reported by the NBE as of 2010. Of all the banks listed on NBE's report, it is only DBE that was not included in the sampling frame, for it is not a commercial bank.

For the choice of the desired sample size, Fowler (1984) noted that although there is no a single right way for the determination of sample size, a sample of 150 people will describe a population of 15,000 or 15 million with virtually the same degree of accuracy, assuming all other aspects of the sample design and sampling procedures are the same. Thus, the researcher selected 8 CBs for the period from 2001 -2010 out of 14 ECBs. The others were excluded from the study due to paucity of adequate data for the same period.

Among the sample taken, 6 banks are categorized as private banks and 2 banks are categorized to be public banks. These two disproportionate stratum are created based on the criteria involving personal judgment and convenience to the researcher. Stratified sampling, as it been regarded by Yogesh (2006), gives a sample a virtue of a good representativeness of the population so that observations can be used for inferential purpose.

Employing purposive sampling, the researcher is able to select 8 commercial banks (ECBs) out of 14. Of which 6 are Private and 2 Public. The criteria to draw a sample of 8 CBs are the ease with which sample groups data can be matched and homogeneity of subjects used in the sample (Yogesh, 2006).

The total number of observations is 80. Of which 60 observations are for private banks and the rest 20 are for public banks. The sources of bank specific audited balance sheet and profit and loss accounts are the banks' headquarters. The period 2001 -2010 is used to test the variability of time since data for prior subsequent period were not found from any source. The assets and liabilities are classified according to their presentation on balance sheets of the banks. NBE annual report for the year 2009/10 was a major ingredient for the study to incorporate macroeconomic data.

3.5. VARIABLES IN THE RESEARCH

The study consists of two dependent variables (total income and net income) and five independent variables (Assets, Liabilities, GDP Growth Rate, Inflation Rate, and Herfindahl index). All variables are measured by using their book values. Muhammad and Mohammad (2009) use book values for assets and liabilities in such a way that beginning and ending book values are added to compute the average book values. These values are divided by average total asset of the year to express them as ratios for the same period.

3.5.1. DEPENDENT VARIABLES

3.5.1.1. TOTAL INCOME

Though, major means of income for all of banks in Ethiopia happen to be interest from loans, there are a number other means. Despite, the dissimilarities in accounts maintained by banks total income is taken as the aggregate of the book value of the income accounts as listed in each bank's income statements.

3.5.1.2. NET INCOME

Net income is measured as a figure remaining after interest and non-interest expenses are deducted from total income.

3.5.2. INDEPENDENT VARIABLES

Based on the suggestions and deeds of previous empirical studies (section 2.4.), this study uses five independent variables .i.e. assets, liabilities, inflation rate, GDP growth rate, and Herfindahl Index (HI).

3.5.2.1. ASSETS

This study accounts the book value of assets. Notes to the financial statements' of banks excerpt that financial statements are prepared in accordance with the historical cost convention, generally accepted accounting principles and the laws and regulations of Ethiopia. Average variable are computed by adding beginning

and ending book values and dividing by two. These values are further divided by average total assets of the year to express them in ratios for the same period. Explanatory variable assets are described in the following table.

Table 3.1 Explanatory variables included in the model and description relating to ECBs' assets.

Variable	Description
Assets	
A1	Loans and Advances
A2	Deposits and Placements to Banks
A3	Sum of Investments* (i.e. short-term inv. + equity inv. + other inv.)

* Incase of variable A3 the researcher decided to use aggregated accounts instead of individual accounts that are shown in brackets. Disaggregating these variables and entering the individual accounts into equation, would introduce many zero values, which could distort our result.

3.5.2.2. LIABILITIES

Like the assets counter parts liabilities figures show book values. Averages are taken and then are divided for average total assets to come with ratios. Liabilities included from the balance sheet are described in the subsequent table.

Table 3.2 Explanatory variable and descriptions relating to ECBs’ liabilities

Variable	Description
Liabilities	
L1	Saving deposit
L2	Demand deposit
L3	Fixed deposit
L4	Other liabilities* (inter bank borrowing ,dividend payable, accounts payable ,other liabilities)

* Aggregated accounts are used as used in some assets that would introduce too many zero values.

3.5.2.3. INFLATION (CPI)

Consumer price index is a key inflation indicator. It is gauged based on data related to consumer spending habits and the prices paid for a variety of goods, including food, clothing, medications, energy, homes and furnishings. In the study the general inflation (CPI) rate is taken from the 2009/10 annual report of national bank of Ethiopia.

3.5.2.4. GDP

GDP or Gross Domestic Product is a measure of all the services and products made domestically. The components of GDP are therefore the sectors of an economy which

include consumer spending, industry investment, differential for imports and exports, and government spending. The challenge is in finding a proxy to measure these components. The basic formula for calculating GDP is: $y = c + i + e + g$, where y = GDP, c = consumer spending, i = industry investment, e = excess of exports over imports and g = government spending.

3.5.2.5. HERFINDHAL INDEX

HI is the sum of the squared market shares of the firms in the market (Pasiouras and Kosimidou, 2007). In this study it appears to serve a market structure variable. It is computed as; $(\text{Company 1 market share})^2 + (\text{Company 2 market share})^2 + (\text{Company 3 market share})^2 + (\text{Company 4 market share})^2 + (\text{Company 5 market share})^2 + \dots (\text{company N market . market share})^2$ i.e. in the case of this study market share signifies branch net work of banks. Where N stands for the number of banks in the industry

Market share = The number of branches a company operates in a specific year

The total number of branches' of companies for the same year

3.6. DATA ANALYSIS

The statistical cost accounting (SCA) multivariate model is employed to figure out the effect of explanatory variables (section 3.5.2) on the explained variable (section 3.5.1). The study conducts two multivariate regressions for each set of bank, assuming total income and net income.

The traditional model (Hester and Zoellenr, 1966) suggests an equation for showing the variations in banks' net income, y_{bt} expressed for bank b and time t in terms of variations of assets and liabilities in the following way:

$$Y_{bt} = \alpha_1 + \sum \alpha_{2i} A_{ibt} + \sum \alpha_{3j} L_{jbt} + e_{bt}$$

Where,

A_i = i^{th} asset.

L_j = j^{th} liability.

α_1 = net fixed income that is not dependent on assets and liabilities.

e_{bt} = stochastic term.

α_{2i} = marginal rate of return on assets.

α_{3j} = marginal cost of liabilities

As the banks have wide variations in their business volume, all variables of equation (1) are divided by a bank's average total assets (TA_{bt}) (kosmidou et al, 2004). Thus equation (1) takes the form of:

$$Y_{bt} / TA_{bt} = \alpha_1 / TA_{bt} + \sum \alpha_{2i} A_{ibt} / TA_{bt} + \sum \alpha_{3j} L_{jbt} / TA_{bt} + u_{bt} \dots\dots\dots (2)$$

Where, the stochastic term $u_{bt} = e_{bt} / TA_{bt}$

The structure of the traditional SCA model implies that all banks experience identical interest rates on bank's assets and liabilities (Muhammad and Mohammad, 2009). In reality, a number of factors affect bank's earning and cost relating to assets and liabilities. These factors are market structure and macroeconomic conditions. If these factors are not included in the model, regressions results will be unreliable and coefficients biased. Kwast & Rose (1982) incorporated the influences of these factors and presented a modified model as equation 3. This model is applied to this study.

$$Y_{bt} / TA_{bt} = \alpha_1 / TA_{bt} + \sum \alpha_{2i} A_{ibt} / TA_{bt} + \sum \alpha_{3j} L_{jbt} / TA_{bt} + \sum \alpha_{4f} M_{ft} + \sum \alpha_5 R + \sum \alpha_6 H + u_{bt} \dots\dots\dots (3)$$

Where, M = Inflation as a variable for number of years.

R= Real GDP growth rate for each study year

H= Herfindhal index of market concentration associated with each bank.

As discussed earlier (section 3.5.1) since income is measured for each set of bank assuming two dependent variables- total income and net income , the study conducts two different regressions .i.e. $Y1_{bt}$ and $Y2_{bt}$ respectively.

When total income ($Y1_{bt}$) is the dependent variable in the first regression, each element of α_{2i} should approximate the market rate of return earned on the appropriate asset and should have a positive value. At the same time α_{3j} , the return on liability, should also be positive or zero, since it is customary that banks impose service charges on deposit accounts and other non-deposit liabilities. The α_1 coefficient, the constant term, will measure income flows that are unrelated to balance sheet items. In the total income regression, α_1 is expected to be positive.

Net income ($Y2_{bt}$) is the portion of total income that is left out after deducting all costs from the total income. Thus, when this variable provides the income measure in the second regression, the α_{2i} estimates net rates of return on assets. Similarly, the liability coefficients may be interpreted as the marginal cost of a particular liability (Muhammad sand Mohammad, 2009).

The sign of each α_{3j} should, therefore, be negative or zero because operating costs are generally higher than the service charges earned from the deposits. The α_1 coefficient reflects net income (costs) which are related to off-balance sheet items. Thus, the sign of α_1 may be positive or negative. Moreover, since α_1 reflects a net income variable, it may be interpreted as a measure of economies of scale (Kwast & Rose, 1982). Since any differences between the coefficients of these two regressions are costs,

comparisons between the two sets of regressions should provide insight regarding operating costs per portfolio item.

The study does not use net income after tax as a dependent variable as tax rate is fixed by the government from time to time and not influenced by ALM. All assets and liabilities are not included as independent variables in the model. This is done to avoid perfect collinearity with in the independent variables. Hence, cash and fixed assets on the assets side and equity capital on the liabilities side are excluded from the model (Muhammad and Mohammad, 2009).

CHAPTER FOUR

4. ANALYSIS AND DISCUSSION

4.1. PRELIMINARIES ON ECONOMETRIC ANALYSIS

The study, as indicated in methodology section, constitutes the use of balanced panel data where an observation is made for the variables in the model for the firms taken from the banking sector along with the time period for the study. The time period covers ten consecutive years (2001-2010), while the total number of cross sections is eight, namely- Awash Bank, Dashen Bank, Commercial Bank of Ethiopia, United Bank, Construction and Business Bank, Bank of Abyssinia, Nib Bank and Wegagen Bank. Banks have been classified in the category of ownership as public and private. Of the total banks understudy (8) two of them are under government ownership while the rest are under private ownership. Measurement of the impact of ALM with market structure and macroeconomic variables on the profitability of the banks is carried out by employing the modified SCA (statistical cost accounting) model. For the traditional model ignores the external factors which have influence on the modeling of profitability of banks, the research takes a proxy of the modified model (model 3).

All Variables, including components of assets and liabilities to be comprehended in model 3 are described in methodology section. Panel data models are usually

estimated using either fixed effect or random effect techniques. According to Judge et al., (1988), if the number of time series data (T) is large and the number of cross-sectional units (N) is small, there is likely to be little difference in the values of parameters estimated by the two models. Hence the regressions in this study are estimated by the fixed effect model. The suitability of the model to explain the variability of dependent variable and the joint insignificance of variables are tested through adjusted R^2 & F-statistic respectively. Basic regression model tests such as, heteroskedasticity and normality tests have been conducted using the chi (χ^2)-squared static. Durbin Watson test which does not follow either F-statistic or chi (χ^2)-squared static is also used to test for autocorrelation.

4.2. SUMMARY STATISTICS

Tables 4.1 and 4.2 depict summary results of descriptive statistics for variables in the regressions run for $Y1_{bt}$ and $Y2_{bt}$ respectively for each stratum (public and private banks). Since ratios, rather than absolute figures, are fed in the regression, dependent variables in the regressions represent average profit to asset ratios. The net income measure of profitability, thus, is ROA (return on asset) ratio. The averages (mean and median) for variables included in each of the regressions along with their minimum, maximum and standard deviation values are outlined in the tables. The statistics on regression variables for both public banks and private banks indicates negative minimum values for inflation and real growth domestic product

rate. These result due to the inclusion of negative values for macroeconomic variables.

The tables 4.1 below exhibits total income of public banks on average registers 6.5% of total average assets while the minimum and maximum total income to average asset ratios are 4.3% & 10.2 % respectively. The net income (Y2) measure of profitability, which simply is return on asset ratio (ROA), is 2.4%. This means that public commercial banks were able to generate 2.4% net return from the average total assets employed during the study year. The minimum and maximum values for net income ratios are 4.3% & 4.6% respectively.

Table 4.1 Summary statistics of variables in regressions run for Public Banks

Variables	Mean	Med.	Min.	Max.	Std.dev
Y1	0.065	0.062	0.043	0.102	0.017
Y2	0.024	0.027	0.004	0.045	0.015
A1	0.447	0.439	0.202	0.783	0.187
A2	0.102	0.088	0.025	0.231	0.062
A3	0.251	0.253	0.058	0.481	0.159
L1	0.350	0.351	0.292	0.455	0.422
L2	0.272	0.298	0.047	0.448	0.170
L3	0.076	0.056	0.006	0.194	0.068
L4	0.155	0.147	0.039	0.324	0.072
M	0.104	0.089	-0.106	0.364	0.128
R	0.086	0.108	-0.021	0.126	0.048
H	0.272	0.271	-0.204	0.375	0.057

Source: Eviews 6 out put

Table 4.2 Summary statistics of variables in regressions run for Private Banks

Variables	Mean	Med.	Min.	Max.	Std.dev
Y1	0.078	0.078	0.058	0.108	0.011
Y2	0.031	0.033	0.005	0.052	0.010
A1	0.546	0.548	0.344	0.732	0.083
A2	0.166	0.142	0.073	0.432	0.049
A3	0.038	0.006	0.000	0.220	0.065
L1	0.436	0.423	0.246	0.581	0.051
L2	0.195	0.175	0.108	0.349	0.092
L3	0.091	0.081	0.013	0.238	0.051
L4	0.066	0.061	0.035	0.126	0.023
M	0.104	0.089	-0.106	0.364	0.126
R	0.086	0.108	-0.021	0.126	0.047
H	0.272	0.271	0.204	0.375	0.056

Source: Eviews 6 out put

The above table (table 4.2) depicts that total income ratio for private banks on average amounts 7.8% which is a higher value than public banks. Still, the mean of net income ratio of private banks is higher. But a slight decrease in net income ratio compared to total income ratio of private banks may signify increased expenses in their operations than public banks.

The first level measure of profitability (Y1) experiences minimum and maximum ratio values of 5.8 % and 10.8 % respectively, with 1.12% deviation from the mean. The net level measure of profitability for private banks demonstrates 0.58% and 5.3% minimum and maximum values respectively.

4.3. CORRELATION MATRIX

Table 4.3 Correlation matrix of independent variables in regressions run for Public Banks

A1	A2	A3	L1	L2	L3	L4	M	R	H	
1.0000	0.7101	-0.9301	0.5311	-0.9351	0.9577	-0.2052	-0.2091	-0.2778	0.2957	A1
	1.0000	-0.6921	0.2513	-0.7607	0.7183	0.3394	-0.1851	-0.0670	0.2730	A2
		1.0000	-0.6960	0.9627	-0.9342	0.0480	0.0652	0.1229	-0.1185	A3
			1.0000	-0.5400	0.5221	-0.2466	-0.1171	-0.2814	0.0512	L1
				1.0000	-0.9688	-0.0130	0.0174	0.0708	-0.0729	L2
					1.0000	-0.1912	-0.1692	-0.2152	0.2631	L3
						1.0000	0.3992	0.5542	-0.5123	L4
							1.0000	0.3472	-0.7336	M
								1.0000	-0.4171	R
									1.0000	H

Source: Eviews 6 out put

The above table purports a strong correlation between some independent variables. The highest negative correlation (96.88) is observed between fixed /time deposit (L3) and demand deposit (L2). Both of them represent obligations of a bank though their maturity differs. Demand deposits have no fixed maturity date, for their withdrawal depends on the discretion of the customer. But, fixed/time deposits have a virtue as implied in their name. Thus, the significant correlation coefficient in between these obligations entails that the movement of the obligations on average is related to a strong inverse relationship. Correlation (93.42%) between sum of investment (A3) and fixed time deposits (L3) is another tight inverse relationship, and there is also a

stiff negative relationship between L2& A1 (93.5 %) as well. Since, demand deposits have more or less short maturity bucket that depends on the demand of deposit customers it is more likely that their average movement relates inversely with loans and advances which in fact represents the major source of revenue for banks. The lowest inverse relationship (1.3%) appears in between demand deposits and other liabilities (L4).

Table 4.3 also depicts a substantial positive relation in between some other independent variables. From positive significant correlation values the one (96.27%) in between demand deposit (L2) and sum of investments (A3) is striking. L3 and A1 are the second highly correlated variables(95.7%) signifying the probability of an arrangement to fund loans and advances out of fixed time deposits ,no matter how fixed time deposits are small compared to annul mobilization of loans by public banks(See ,appendix to compare amounts of deposits for period 2001-2010). From external factor independent variables i.e., inflation rate (CPI), real GDP rate and market concentration (H), above 50% correlation is marked by the last two variables- GPD rate and the market structure variable-HI. The above matrix in addition shows a positive linear relationship (55.4%) between real GDP(R) and other liabilities (L4) while opposite relationship appears between H (Herfindhal Index) & M (inflation) and H& other liabilities, 73.4% & 51.2% respectively.

Table 4.4 below demonstrates that surprisingly with the exception of the correlation between external factors (between H and M), which is already explained on scenario

of public banks, all higher up 50% correlations occurs amongst fixed time deposit and some other independent variable. Specifically, the most prominent opposite relation come in between fixed deposits (L3) and sum of investment (A3) as it is true in the case of public banks.

Table 4.4 Correlation matrix of independent variables in regressions run for Private

A1	A2	A3	L1	L2	L3	L4	M	R	H	
1.0000	-0.0576	-0.4121	-0.0652	0.0687	0.4549	0.0562	-0.0455	0.0710	0.2572	A1
	1.0000	-0.4626	-0.4443	0.4804	0.5351	-0.4612	-0.0183	0.0546	-0.1254	A2
		1.0000	0.4216	-0.3654	-0.5831	0.0615	-0.1771	-0.1741	0.1879	A3
			1.0000	-0.4591	-0.5314	-0.1852	-0.0398	0.0626	-0.0537	L1
				1.0000	0.3292	-0.1895	0.1540	0.1860	-0.2488	L2
					1.0000	-0.1042	0.0917	0.0298	0.0008	L3
						1.0000	-0.0386	-0.1420	0.0882	L4
							1.0000	0.3472	-0.7336	M
								1.0000	-0.4171	R
									1.0000	H

Sources: Owns calculation and Eviews 6 out put

There is also a liner direct relationship (53.5%) amongst L3 & A2 (deposits and placements with other banks).Likewise, L3 and L1 are positively correlated at 45%.

4.4. FINDINGS ON THE REGRESSIONS

Table 4.5 -Regression results for public and private ECBs, Dependent variable - Y1
(p- value in parentheses of column 2 and 3)

Variables	Public Banks	Private Banks
1/TA	-0.1887 (0.3094)	0.1453 (0.0000) ***
A1	0.1749 (0.0389)**	-0.0073 (0.6905)
A2	0.0937 (0.4702)	-0.0539 (0.0491) **
A3	-0.0373 (0.7002)	-0.0924 (0.0063) ***
L1	0.2673 (0.0810)*	0.0202 (0.5056)
L2	0.2558 (0.4084)	-0.0926 (0.1634)
L3	0.4096 (0.4112)	-0.0565 (0.1068) *
L4	0.1388 (0.2054)	-0.3513 (0.0001) ***
M	0.0273 (0.3437)	-0.0028 (0.8150)
R	0.1452 (0.0999) *	-0.0066 (0.7784)
H	-0.2059 (0.0996) *	-0.0411 (0.1823)
R-squared	0.921345	0.712118
Adjusted R-squared	0.813194	0.613977
F-statistic	8.519096	7.256031
Prob(F-statistic)	0.0000	0.0000
Durbin-Watson stat	1.76	1.30

*** Significant @ 1%

** Significant @ 5%

* Significant @ 10%

Source: Gretl out put

Table 4.6 Regression results for private and public ECBs, dependent variable - Y2 (p-value in parentheses of column 2 and 3)

Variables	Public Banks	Private Banks
1/TA	-0.3152 (0.0581)**	0.1050 (0.0000) ***
A1	0.2028 (0.0082) ***	- 0.0227 (0.1452)
A2	-0.0568 (0.5905)	-0.0077 (0.7327)
A3	0.0356 (0.6548)	-0.0425 (0.1243)
L1	0.2451 (0.0561)**	-0.0424 (0.1014)*
L2	0.4118 (0.1252)	-0.0787 (0.1594)
L3	0.5694 (0.1799)	-0.0873 (0.0042) ***
L4	0.2016 (0.0405)**	-0.2446 (0.0019) ***
M	0.0417 (0.09823)*	-0.0198 (0.06182)*
R	0.2277 (0.0074) ***	0.0854 (0.0000) ***
H	-0.1865 (0.0737) *	-0.1114 (0.00008) ***
R-squared	0.932624	0.773086
Adjusted R-squared	0.839983	0.695729
F-statistic	10.06702	9.993719
Prob (F-statistic)	0.0000	0.0000
Durbin-Watson stat	2.39	1.36

*** Significant @ 1%
 ** Significant @ 5%
 * Significant @ 10%
 Source: Gretl out put

Table 4.7 Tests for the Regressions

Dependent variables	Bank category	Distribution free wald test for Heteroskedasticity($\text{var}(u_i) = \sigma^2 < \infty$)		Normality test for residuals ($u_i \sim N(0, \sigma^2)$)	
		Null hypothesis: the units have a common error variance		Null hypothesis: error is normally distributed	
		Chi-square(Asymptotic test statistic)	p-value(@ Chi-square)	Chi-square	p-value(@ Chi-square)
(Y1)	Public banks	2.13627	0.343648	1.572	0.45556
	Private banks	13.5119	0.0355901	2.07329	0.354642
(Y2)	Public banks	0.117424	0.942978	1.36457	0.50546
	Private banks	11.3189	0.0790075	0.839047	0.65736

Source: Gretl out put

Tables 4.5 and 4.6 report the empirical estimations of equation (3) for Y1 and Y2. The explanatory power (in terms of adjusted R^2) of the SCA model is higher in both measures for all classes of banks, while all F-statistics for all regressions is significant at 1% level. Chi- squared tests for each set of regressions as shown above assure the presence of common error variance and normality among errors. The Durbin-Watson statistics on Y1 for public and private banks are 1.76 and 1.3 respectively which don't lie in the hypothesis (uncorrelated errors) rejection region (the critical values can be read from DW table). Negative autocorrelation is detected on public banks regression on dependent variable Y.

4.4.1. DISCUSSION ON THE REGRESSIONS FINDINGS

The two regressions results using total income (Y1) and net income (Y2) as dependent variables are shown in Table 4.5 and 4.6 respectively.

Table 4.5 shows the results of regressions that use Y1 as a dependent variable for public and private ECBs. Accordingly, the intercept $1/TA$ has insignificant negative impact on Y1 of public banks, where as private banks regression function designates at a 1% significant level positive coefficient for $1/TA$. It was explained in the methodology section that $1/TA$ measures income flows unrelated to the balance sheet items. It evident from the table that of the assets taken to deal with model Y1 for public banks, only A1 (loans and advances) has been found to be significant at 5% and verify the hypothesis that A1 (as an asset) is positively related with total income (Y1). Contrary to this, the impact of loans and advances on the profitability of private banks is negative as opposed to the hypothesis albeit it is insignificant. It is apparent that loans and advances are the largest segment of interest bearing assets and their return is expected to have a positive relationship with bank profitability. Other things being constant, the more the deposits that are transformed into loans, the higher the level of profit will be. However, it could be, as in this case, that banks that are rapidly increasing their loan books have to pay a higher cost for their funding requirements, and this could lead to a negative impact on profitability

It is also observable from table 4.5 that sum of investments (A3) and inflation (M) rejected the hypothesis that they are related positively and negatively with total

income of public banks respectively. The negative coefficient of A3s for public banks is clearly insignificant. A3 are assets that generate return from short-term, equity and other investments. Thus, it is rational to expect direct relationship with profitability. But, the regression result rejects this conjecture indicating that for each birr added on A3 the cost paid to cover the fund requirement escalated incommensurately with the return achieved. The impact of inflation is positive had it been significant this would imply that during the period of this study the level of inflation were anticipated by public commercial banks' management and the management was forced to increase price as a consequence of inflation. Alternatively, this would mean that during the period of the study inflation was anticipated which gave public banks the opportunity to adjust the interest rates accordingly, resulting in revenues that increased faster than costs, with a positive impact on profitability. For private banks A3 exhibited significant negative impact on total income at 1% significant level. Similar reasoning could be drawn as was made for public banks. Inflation responded as it was hypothesized having a negative influence on profitability. Unexpected raises in inflation cause cash flow difficulties for borrowers, which can lead to premature termination of loan arrangements and precipitate loan losses.

Deposit and placements with other banks (A2) is found to be insignificant. One birr increase in the amount of A2 would trigger 0.094 cents increase on profitability of public banks which in fact is a token. The private banks' coefficient discloses a negative 5% level significant relationship between A2 and Y1, which is interpreted as a one birr increase on A2s would expose a banks to a 0.0539 cents decrease on Y1.

Turning to liabilities, public banks L1, L2, L3 and L4 have assured the hypothesis those assets are positively related with total income. But, it just saving deposits (L1) only found to be significant to Y1 at 10% level yet. The coefficients of three out of four liabilities are not significant implying that public banks are earning very nominal or zero return from these liabilities. For private banks three of the four liabilities namely, L2 (demand deposit), L3 (fixed/time deposit) and L4 (other liabilities) are discovered to have negative touch with total income, but only L4 is significant at 1% level. Thus, the effect of L2 and L3 inclines to be negligible. Saving deposits (L2) have a significant positive impact on total income at 10%.

R (real GDP growth rate) & H (market concentration index) respectively have positive and negative impact on Y1 at 10% significant level for public banks, while both of them signify a negative non significant effect on Y1 of private banks. The positive and statistically significant impact of real GDP growth rate provides support to the argument of the association between economic growth and the financial sector performance, consistent with the results of Kosmidou and Pasiouras (2005) and Hassan and Bashir (2003). Market concentration has, almost, no effect on Y1 estimation for private banks.

In a nutshell, in measuring Y1 four (A1, L1, R & H) out of eleven (including the intercept) variables are found to be statistically significant for public banks, while five (1/TA, A2, A3, L3& L4) out of eleven are statistically significant for private banks.

The second set of regressions was separately run for public ECBs and private ECBs based on net operating income (Y2) as dependent variables. Table 4.6 shows the regression results for public ECBs and private ECBs respectively.

Table 4.6 confirms the result on Y1 that the off-balance sheet return measurement $1/TA$ has insignificant negative impact on public Y2 while it shows a positive at 1% level significance for private banks. Since $1/TA$ reflects a net income variable, it indicates economies of scale (Kwast & Rose, 1982). Loans and advances (A1) have also been found to have positive coefficients for both classes of banks. But, it can be perceived from the table that only A1 on public banks is statistically significant at 1% level. A2 (deposits and placements with other banks) is both negative and insignificant for the two classes of banks. A3 is insignificant for both public and private banks but contradicts with the first regression being positive for public banks and insignificant for private banks. It was hypothesized that A3 is positively related with net income (Y2).

Furthermore, table 4.6 shows that surprisingly all liabilities have (L1, L2, L3&L4) a positive coefficient for public banks. This negates to the hypothesis that liabilities are negatively related to net income (Y2). However, only L1 (saving deposits) & L4 (other liabilities) are significant at 5% level. It may be argued that these banks pay only nominal interest on this two liabilities but charge high service fees. On the other side, for private banks the change on sign from what was seen on liabilities of the first regression (Y1) occurred just on saving deposit (L1), i.e. all of the liabilities have

a negative coefficient on Y2 unlike the first regression on Y1 which left L1 to be positive and significant at 10% level. Additionally, L3 and L4 are statistically significant at 1% level.

The coefficients of inflation rate (M) and market concentration (H) are found to be significant for both public and private banks. The signs of coefficient of variable M support the hypothesis that inflation is negatively related with operating income. Inflation matters in regression Y2 being significant at 10% level for both bank classes. Coefficients of H unveil a negative relationship, invalidating the hypothesis, between profitability measurement Y2 and market power. The coefficients (H) are significant at 10% & 5% level for public and private banks respectively. Coefficient of R confirms a positive impact of GDP growth rate on profitability at 1 percent significance level.

Finally, seven variables (including the intercept) for each bank set are detected to be statistically capable of explaining model three on dependent variable Y2.

Additional explanation is made only for significant variables as follows;

1/TA (coefficient of the intercept) The regression results for dependent variable Y1 show that private banks produced a higher return from off- balance sheet items. Off balance sheet items could be letter of credit and acceptances & guarantees and performance bonds. For each birr segregated to off balance sheet assets, private banks were on average able to generate 0.14 cents. 1/TA is significant at the biggest

hurdle (Brooks, 2006) which is one percent significance level. Thus, the model signals that non balance sheet items impact total income of private banks.

On dependent variables Y2 (net income) coefficient of $1/TA$ is negative and significant at five percent level for public ECBs while positive for private ECBs being significant at 1% level. These point out that public banks are experiencing decreasing returns to scale and that net operating income from off-balance sheet activities is negative (Muhammad and Mohammed, 2009). The positive coefficient of $1/TA$ which represents economies of scale suggests that private ECBs earn net positive income from off-balance sheet activities. That means that these banks enjoy increasing returns to scale in their operation.

Loans and Advances (A1) A1 is significant at 5% for the regression run on total income for public banks. Annual reports of public banks understudy provide types of loans and advances. They are divided on sectoral basis as agriculture, manufacturing, domestic trade and services foreign trade, building and construction and personal loans and advances. The positive coefficient of A1 in the model for Y2 is significant at 1% level. It evidences that a one birr investment on A1 would generate 0.203 cent marginal return. As it was expected A1 contributed positively for profitability of public banks.

Deposits and Placements with Other Banks (A2) A2 is found significant for Y1 on regression equation conducted for private banks at 5% percent significant level. It is found to be negatively related with total income. The coefficient is 0.054.

Sum of Investments (A3) Banks can invest on subsidiaries and associates. At a 1 percent significant negative contribution of A3 on Y1 of private banks reduced the total income of private banks' profitability by 0.0924 cent for each one birr added on it. It can be argued that what is paid for fund requirements for having investment exceeded the return from the investments. It was assumed to be positively related with profitability measures. In addition, A3 is insignificant in the second set of regressions.

Saving Deposits (L1) Saving deposits are opened with a primary aim of encouraging saving so that banks pay a higher interest rate compared to demand deposits. Banks, then, can invest the money on areas that take, somewhat, longer pay back period than demand deposits. For all the study periods saving deposits are next in size compared to demand deposits. A2s (demand deposits) are opened, often, by businesses that require immediate cash so that the amount involved is largest of all deposits.

It was hypothesized that all liabilities should have a positive return on Y1 (total income) considering the rationale behind that banks collect service charges from deposits and other non-deposit liabilities. Saving deposits is significant to the model for dependent variable Y1 at 10% level with positive effect.

Reversing to the second regression on Y2, L1 for public banks is significant at 5% level but contradicting the hypothesis that as liabilities there is a negative relationship between saving deposits and net income. This might happen due to a

higher charge by banks on services relatively to lower payment on interest expense on the deposits. Coefficient for private banks (- 0.0424) reconfirms the hypothesis at 1% significant level.

Fixed /Time Deposits (L3) The national bank of Ethiopia (NBE) report on 2010 portray classification of time deposits on the basis of time bound as up to 1 year, 1-2 years and over 2 years. The average deposit interest rate on L3 amongst other deposits is highest for all years of study ranging from 3.461 in 2002 to 6.307 in 2001. Even the amount of interest paid in each bucket of time for all years of scrutiny is greater than the averages of the other two deposits- saving and demand deposits. A higher interest payment on L3 is attributable to the arrangement that it is not payable on demand without the consent of the bank.

Fixed deposits have been observed to have insignificant- positive and significant - negative effect public and private banks respectively employing the first regression on Y1. The significance of L3 total income of private banks is achieved at 10 percent level. Still on net income (Y2) only private banks fixed deposits remain to be negatively-significant at 1% abiding by the hypothesis.

Other Liabilities (L4) Inter bank borrowing, dividend payable, accounts payable, other liabilities were summed together up so that in the model to many zero value biases can be eliminated. Inter-bank money market was first introduced in Aug 1998 (NBE, Annual Report for 2009/10). L4s are positive and significant at 1% level for private banks in both of the regressions (Y1 &Y2) corroborating the hypothesis. The

regression on Y2 for public banks holds a significant effect of L4s at 5% grade but positively related to net income which nullifies the presumed hypothesis. The negative effect of liabilities on net income is backed by the reality that operating costs are generally higher than fees received on them.

Inflation (M) As it can be seen from table 4.5 & 4.6 inflation appears to be significant (at 10% level for both banks) only for the second sets of regressions on Y2. Public banks' net income is on average increased by 0.0417 cents due to inflation. The reverse exhibits the effect of inflation on private banks which is actually alike what is expected.

An inflation rate that is fully anticipated raises profits as banks can appropriately adjust interest rates in order to increase revenues, while an unexpected change could raise costs due to imperfect interest rate adjustment.

GDP Growth Rate(R) GDP growth rate is significant for measuring the impact of asset liability management on profitability of public banks on the first function (Y1) at 10% level. Whereas, the regressions run on Y2 witness a positive effect of the real GDP growth rate at a 1% significance level on net income of banks under study. GDP has the expected positive effect since the banking sector is sensitive to the overall development of the economy. With the real sector growing, banks are beneficiaries from technological advancement and also can successfully collect their loans and extend new ones.

Market Concentration (H) Here the study heeds that increasing branch networks cannot be a grantee for positive return for banks operation. Both the levels profitability measurement invalidate the initial assumption that increased branches are expected to contribute positively towards profitability. For public banks the negative relationship is significant at 10% for regressions made on Y1 and Y2, while for private banks the negative touch on profitability on the second (Y2) regression significant at 1%.

This can be contended that though banks, for instance Commercial Banks of Ethiopia, Construction and Business bank of Ethiopia, Dashen Bank, are aggressively increasing their number of branches ,new branches(even the old ones) are running at loss. This, according to unstructured interview made with employees, might result from exaggerated start up or operating costs.

Summary of expected and actual relationship of variables with profitability measures and significant level of variables is depicted in the following table:

Table 4.8 Summary of Hypothesis and Actual Results

Variables	Expected relationship		Actual Results							
			Public banks				Private banks			
	(Y1)	(Y2)	Y1	@ %	Y2	@ %	Y1	@ %	Y2	@ %
1/TA	*	*	-		-	5	+	1	+	1
A1	+	+	+	5	+	1	-		+	
A2	+	+	+		-		-	5	-	
A3	+	+	-		+		-	1	-	
L1	+	-	+	10	+	5	+		-	10
L2	+	-	+		+		-		-	
L3	+	-	+		+		-	10	-	1
L4	+	-	+		+	5	-	10	-	1
M	-	-	+		+	10	-		-	10
R	+	+	+	10	+	1	-		+	1
H	+	+	-	10	-	10	-		-	1

*intercept

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSIONS

An assessment on the relationship between ALM and profitability on the commercial banks as whole without creating classes of ownership would help the researcher make conclusions on the banking industry. But, compressing banks which enjoy government backing (CBE & CBB) together with private banks may lead to a wrong understanding. Thus, the researcher opts to segregate banks on the basis of ownership.

The study is aimed at having an understanding which items of balance sheet do really affect the profitability of a bank and reckoning the possible effect of non balance sheet items on profitability of banks as well. Here, the study has no a motive to make comparison in profitability differences in between banks, thus measuring the relationship between ALM and profitability of banks is the sole object of the study.

Public banks significantly profit from loans and advances which are funded mainly from saving deposits. Placings to other banks (local or foreign) though it is insignificant it deemed to cause decline in net income of public banks. Sum of

investments, which are a set of investments by public banks are contributing zero or nominal return. Liabilities that arise from commitment like interbank deal, dividend payable, and on account purchases significantly increased profitability. Public banks borrow money to satisfy their need of cash (may be for lending) from inter-banks money market. They also make payments to a shareholder which is state dividend. This as to the regression result increases state backings. Other liabilities are inevitable with operations. Demands deposits are found to be insignificant to impact on profitability. Anticipated inflation alarmed the management of public banks to increase lending interest rates during the study years. Increased number of branches reduced profitability negatively. This may show ample expenses (both administrative and operating).

Private Banks higher return for the study periods resulted from non-balance sheet activities like LCs (letter of credits). All assets, even if insignificantly, lowered the profitability of private. This might be because money invested on the assets closed the opportunity from which the private banks could benefit had all the money been put for non-balance sheet related activities. Liabilities are negatively related to profitability of public banks

5.2. RECOMMNDATIONS

Public Banks are found to be both single asset (loans and advances) & single liability (saving deposits) managed banks. The reason for their profitability, according to the study, is interest from loans extended to customers funded from saving deposits. Non-balance sheet activities, investments in affiliations and subsidiaries are closing the opportunity that public banks would have been better off if large amount of loans are extended to customers. Private Banks are found being off-balance sheet activities oriented for their profitability. The researcher based on his undertaking is not able to identify whether private banks are asset or liability managed. This issue remains unanswered in this study and calls for further investigation.

Generally, one may concluded marking the banking sector in Ethiopia as infant, no matter how various measuring standards (for instance, number of banks, number of branches, asset mobilization, capital etc) are used. Thus, the researcher during his undertaking observed that the narrowness of the sector creates a problem in making econometrical analysis on the theme of this study and reaching at commendable remarks.

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APPENDICES

Appendix I

Table 4.1 Summary statistics of variables in regressions run for Public Banks

Variables	Mean	Med.	Min.	Max.	Std.dev
Y1	0.065	0.062	0.043	0.102	0.017
Y2	0.024	0.027	0.004	0.045	0.015
A1	0.447	0.439	0.202	0.783	0.187
A2	0.102	0.088	0.025	0.231	0.062
A3	0.251	0.253	0.058	0.481	0.159
L1	0.350	0.351	0.292	0.455	0.422
L2	0.272	0.298	0.047	0.448	0.170
L3	0.076	0.056	0.006	0.194	0.068
L4	0.155	0.147	0.039	0.324	0.072
M	0.104	0.089	-0.106	0.364	0.128
R	0.086	0.108	-0.021	0.126	0.048
H	0.272	0.271	-0.204	0.375	0.057

Source: Eviews 6 out put

Table 4.2 Summary statistics of variables in regressions run for Private Banks

Variables	Mean	Med.	Min.	Max.	Std.dev
Y1	0.078	0.078	0.058	0.108	0.011
Y2	0.031	0.033	0.005	0.052	0.010
A1	0.546	0.548	0.344	0.732	0.083
A2	0.166	0.142	0.073	0.432	0.049
A3	0.038	0.006	0.000	0.220	0.065
L1	0.436	0.423	0.246	0.581	0.051
L2	0.195	0.175	0.108	0.349	0.092
L3	0.091	0.081	0.013	0.238	0.051
L4	0.066	0.061	0.035	0.126	0.023
M	0.104	0.089	-0.106	0.364	0.126
R	0.086	0.108	-0.021	0.126	0.047
H	0.272	0.271	0.204	0.375	0.056

Source: Eviews 6 out put

Table 4.3 Correlation matrix of independent variables in regressions run for Public Banks

	A2	A3	L1	L2	L3	L4	M	R	H	
1.0000	0.7101	-0.9301	0.5311	-0.9351	0.9577	-0.2052	-0.2091	-0.2778	0.2957	A1
	1.0000	-0.6921	0.2513	-0.7607	0.7183	0.3394	-0.1851	-0.0670	0.2730	A2
		1.0000	-0.6960	0.9627	-0.9342	0.0480	0.0652	0.1229	-0.1185	A3
			1.0000	-0.5400	0.5221	-0.2466	-0.1171	-0.2814	0.0512	L1
				1.0000	-0.9688	-0.0130	0.0174	0.0708	-0.0729	L2
					1.0000	-0.1912	-0.1692	-0.2152	0.2631	L3
						1.0000	0.3992	0.5542	-0.5123	L4
							1.0000	0.3472	-0.7336	M
								1.0000	-0.4171	R
									1.0000	H

Source: Eviews 6 out put

Table 4.4 Correlation matrix of independent variables in regressions run for private banks

A1	A2	A3	L1	L2	L3	L4	M	R	H	
1.0000	-0.0576	-0.4121	-0.0652	0.0687	0.4549	0.0562	-0.0455	0.0710	0.2572	A1
	1.0000	-0.4626	-0.4443	0.4804	0.5351	-0.4612	-0.0183	0.0546	-0.1254	A2
		1.0000	0.4216	-0.3654	-0.5831	0.0615	-0.1771	-0.1741	0.1879	A3
			1.0000	-0.4591	-0.5314	-0.1852	-0.0398	0.0626	-0.0537	L1
				1.0000	0.3292	-0.1895	0.1540	0.1860	-0.2488	L2
					1.0000	-0.1042	0.0917	0.0298	0.0008	L3
						1.0000	-0.0386	-0.1420	0.0882	L4
							1.0000	0.3472	-0.7336	M
								1.0000	-0.4171	R
									1.0000	H

Source: Eviews 6 out put

Table 4.5 -Regression results for public and private ECBs, Dependent variable – Y1
(p- value in parentheses of column 2 and 3)

Variables	Public Banks	Private Banks
1/TA	-0.1887 (0.3094)	0.1453 (0.0000) ***
A1	0.1749 (0.0389)**	-0.0073 (0.6905)
A2	0.0937 (0.4702)	-0.0539 (0.0491) **
A3	-0.0373 (0.7002)	-0.0924 (0.0063) ***
L1	0.2673 (0.0810)*	0.0202 (0.5056)
L2	0.2558 (0.4084)	-0.0926 (0.1634)
L3	0.4096 (0.4112)	-0.0565 (0.1068) *
L4	0.1388 (0.2054)	-0.3513 (0.0001) ***
M	0.0273 (0.3437)	-0.0028 (0.8150)
R	0.1452 (0.0999) *	-0.0066 (0.7784)
H	-0.2059 (0.0996) *	-0.0411 (0.1823)
R-squared	0.921345	0.712118
Adjusted R-squared	0.813194	0.613977
F-statistic	8.519096	7.256031
Prob(F-statistic)	0.0000	0.0000
Durbin-Watson stat	1.76	1.30

*** Significant @ 1%

** Significant @ 5%

* Significant @ 10%

Source: Gretl out put

Table 4.6 Regression results for private and public ECBs, dependent variable - Y2 (p-value in parentheses of column 2 and 3)

Variables	Public Banks	Private Banks
1/TA	-0.3152 (0.0581)**	0.1050 (0.0000) ***
A1	0.2028 0.0082) ***	- 0.0227 (0.1452)
A2	-0.0568 (0.5905)	-0.0077 (0.7327)
A3	0.0356 (0.6548)	-0.0425 (0.1243)
L1	0.2451 (0.0561)**	-0.0424 (0.1014)*
L2	0.4118 (0.1252)	-0.0787 (0.1594)
L3	0.5694 (0.1799)	-0.0873 (0.0042) ***
L4	0.2016 (0.0405)**	-0.2446 (0.0019) ***
M	0.0417 (0.09823)*	-0.0198 (0.06182)*
R	0.2277 (0.0074) ***	0.0854 (0.0000) ***
H	-0.1865 (0.0737) *	-0.1114 (0.00008) ***
R-squared	0.932624	0.773086
Adjusted R-squared	0.839983	0.695729
F-statistic	10.06702	9.993719
Prob (F-statistic)	0.0000	0.0000
Durbin-Watson stat	2.39	1.36

*** Significant @ 1%

** Significant @ 5%

* Significant @ 10%

Source: Gretl out put

Table 4.7 Test for the Regressions

Dependent variables	Bank category	Distribution free wald test for Heteroskedasticity($\text{var}(u_i) = \sigma^2 < \infty$)		Normality test for residuals ($u_i \sim N(0, \sigma^2)$)	
		Null hypothesis: the units have a common error variance		Null hypothesis: error is normally distributed	
		Chi-square(Asymptotic test statistic)	p-value(@ Chi-square)	Chi-square	p-value(@ Chi-square)
(Y1)	Public banks	2.13627	0.343648	1.572	0.45556
	Private banks	13.5119	0.0355901	2.07329	0.354642
(Y2)	Public banks	0.117424	0.942978	1.36457	0.50546
	Private banks	11.3189	0.0790075	0.839047	0.65736

Source; Gretl out put

Appendix II
Ratio Data

Year	Banks	Y1	A1	A2	A3	L1	L2	L3	L4	M	R	H
2001	AIBSC	0.077482	0.487672	0.092058	0.100927	0.517641	0.126131	0.069541	0.060886	-0.003	0.074	0.375077
2002	AIBSC	0.072596	0.499003	0.083888	0.120247	0.560564	0.14126	0.042616	0.0655	-0.106	0.016	0.348256
2003	AIBSC	0.062741	0.44352	0.076343	0.220196	0.552842	0.1548	0.037598	0.074278	0.109	-0.021	0.282794
2004	AIBSC	0.059241	0.437417	0.08851	0.180546	0.547613	0.148961	0.039665	0.068531	0.073	0.117	0.307443
2005	AIBSC	0.058909	0.469752	0.085555	0.134318	0.543876	0.156434	0.034612	0.060817	0.061	0.126	0.285754
2006	AIBSC	0.069678	0.570724	0.080718	0.075957	0.546264	0.161422	0.031753	0.063136	0.106	0.115	0.260071
2007	AIBSC	0.078678	0.561954	0.080456	0.077701	0.525442	0.150721	0.049139	0.067171	0.158	0.118	0.242228
2008	AIBSC	0.080504	0.493989	0.073726	0.135744	0.446001	0.133389	0.038111	0.049512	0.253	0.112	0.211146
2009	AIBSC	0.091394	0.418543	0.104877	0.070173	0.399489	0.126701	0.020747	0.038722	0.364	0.099	0.204931
2010	AIBSC	0.086792	0.34424	0.129642	0.05013	0.465424	0.114234	0.013393	0.044707	0.028	0.104	0.205155
2001	DB	0.080271	0.558134	0.182216	0.01387	0.418264	0.194271	0.06637	0.049347	-0.003	0.074	0.375077
2002	DB	0.079129	0.548697	0.167369	0.057636	0.453855	0.207261	0.054572	0.054073	-0.106	0.016	0.348256
2003	DB	0.070014	0.580338	0.143963	0.085402	0.504578	0.227931	0.04481	0.066045	0.109	-0.021	0.282794
2004	DB	0.069801	0.609506	0.117814	0.102154	0.536423	0.233404	0.044017	0.072954	0.073	0.117	0.307443
2005	DB	0.058052	0.621345	0.125563	0.057803	0.548647	0.232309	0.040955	0.068508	0.061	0.126	0.285754
2006	DB	0.066347	0.657923	0.130837	0.00698	0.53231	0.229998	0.056767	0.062045	0.106	0.115	0.260071
2007	DB	0.080418	0.65829	0.114002	0.005307	0.489859	0.226696	0.091248	0.066081	0.158	0.118	0.242228
2008	DB	0.083179	0.589356	0.110518	0.00409	0.481587	0.214523	0.097224	0.081413	0.253	0.112	0.211146
2009	DB	0.081116	0.491734	0.08723	0.003231	0.505078	0.216621	0.07937	0.07667	0.364	0.099	0.204931
2010	DB	0.077873	0.420538	0.144876	0.065861	0.53264	0.222093	0.063422	0.061408	0.028	0.104	0.205155
2001	UBSC	0.090664	0.606019	0.149609	0	0.339571	0.113274	0.059087	0.056614	-0.003	0.074	0.375077
2002	UBSC	0.082626	0.529467	0.161396	0.090066	0.365778	0.127139	0.081406	0.07076	-0.106	0.016	0.348256
2003	UBSC	0.065364	0.526544	0.168961	0.059241	0.339258	0.120681	0.105037	0.11672	0.109	-0.021	0.282794
2004	UBSC	0.063686	0.548278	0.229917	0	0.376398	0.149934	0.163423	0.083307	0.073	0.117	0.307443
2005	UBSC	0.077631	0.537207	0.328716	0	0.384787	0.176908	0.238296	0.039457	0.061	0.126	0.285754
2006	UBSC	0.08117	0.578101	0.328179	0	0.404271	0.20495	0.200098	0.035206	0.106	0.115	0.260071
2007	UBSC	0.08412	0.619418	0.280166	0.000169	0.40664	0.198951	0.181893	0.036279	0.158	0.118	0.242228
2008	UBSC	0.086832	0.584902	0.2422	0.000118	0.408445	0.19685	0.153788	0.041903	0.253	0.112	0.211146
2009	UBSC	0.079035	0.49077	0.306841	0.000105	0.423764	0.225263	0.117683	0.041167	0.364	0.099	0.204931
2010	UBSC	0.081109	0.434822	0.432704	9.59E-05	0.458955	0.247263	0.08446	0.039591	0.028	0.104	0.205155
2001	BOA	0.087695	0.732306	0.114415	0.006193	0.494522	0.108421	0.099142	0.053446	-0.003	0.074	0.375077

2002	BOA	0.082808	0.637324	0.217035	0.004902	0.538905	0.111817	0.114613	0.047193	-0.106	0.016	0.348256
2003	BOA	0.062507	0.537365	0.281092	0.003898	0.526378	0.132802	0.114881	0.046778	0.109	-0.021	0.282794
2004	BOA	0.066372	0.53232	0.219952	0.05967	0.538562	0.13986	0.086414	0.048895	0.073	0.117	0.307443
2005	BOA	0.070818	0.531181	0.12927	0.091921	0.546016	0.143278	0.058363	0.052201	0.061	0.126	0.285754
2006	BOA	0.070941	0.586189	0.097439	0	0.520814	0.140426	0.06415	0.055549	0.106	0.115	0.260071
2007	BOA	0.073896	0.621783	0.105023	0.060649	0.522814	0.138696	0.081542	0.057916	0.158	0.118	0.242228
2008	BOA	0.075721	0.587382	0.139355	0.049295	0.531365	0.159833	0.073139	0.061261	0.253	0.112	0.211146
2009	BOA	0.075158	0.500477	0.112948	9.75E-05	0.545628	0.199474	0.051368	0.061628	0.364	0.099	0.204931
2010	BOA	0.074324	0.456139	0.146585	8.22E-05	0.581229	0.206757	0.031416	0.056033	0.028	0.104	0.205155
2001	NIB	0.060815	0.458122	0.171305	0.083631	0.27703	0.167566	0.043791	0.089861	-0.003	0.074	0.375077
2002	NIB	0.077612	0.537365	0.177651	0	0.329027	0.158528	0.073451	0.099591	-0.106	0.016	0.348256
2003	NIB	0.069328	0.528153	0.14186	0.037343	0.335797	0.153623	0.091494	0.115232	0.109	-0.021	0.282794
2004	NIB	0.066002	0.532744	0.091342	0.045714	0.343834	0.157989	0.087134	0.126695	0.073	0.117	0.307443
2005	NIB	0.073226	0.588932	0.10908	0.026419	0.384368	0.166768	0.10631	0.126524	0.061	0.126	0.285754
2006	NIB	0.07822	0.666084	0.12193	0.001286	0.411296	0.164866	0.13573	0.113342	0.106	0.115	0.260071
2007	NIB	0.078911	0.684968	0.107921	0.001098	0.414626	0.161917	0.142271	0.093723	0.158	0.118	0.242228
2008	NIB	0.083763	0.605689	0.086438	0.000848	0.402961	0.174842	0.11726	0.095324	0.253	0.112	0.211146
2009	NIB	0.087813	0.490958	0.079625	0.00076	0.405847	0.201346	0.07467	0.105058	0.364	0.099	0.204931
2010	NIB	0.091168	0.423576	0.1314	0.047042	0.418734	0.217184	0.052916	0.10541	0.028	0.104	0.205155
2001	WB	0.108455	0.532727	0.151349	0.029671	0.423746	0.290261	0.105149	0.061131	-0.003	0.074	0.375077
2002	WB	0.099258	0.580922	0.143715	0	0.35276	0.269253	0.158477	0.060756	-0.106	0.016	0.348256
2003	WB	0.084695	0.604372	0.152239	0	0.309773	0.275561	0.205806	0.062437	0.109	-0.021	0.282794
2004	WB	0.087344	0.609736	0.226602	0	0.307787	0.308252	0.161972	0.062584	0.073	0.117	0.307443
2005	WB	0.094223	0.59738	0.282059	0	0.311323	0.349806	0.102954	0.058479	0.061	0.126	0.285754
2006	WB	0.095622	0.636836	0.238507	0	0.317536	0.33908	0.119711	0.053464	0.106	0.115	0.260071
2007	WB	0.092582	0.628543	0.249125	0	0.261378	0.331092	0.178166	0.046596	0.158	0.118	0.242228
2008	WB	0.097348	0.566088	0.285238	0	0.246383	0.311458	0.180412	0.049649	0.253	0.112	0.211146
2009	WB	0.097637	0.453487	0.318448	0	0.282738	0.331184	0.110363	0.051988	0.364	0.099	0.204931
2010	WB	0.095539	0.401406	0.335218	0.03683	0.320291	0.335217	0.049005	0.053557	0.028	0.104	0.205155

Year	Banks	Y2	A1	A2	A3	L1	L2	L3	L4	M	R	H
2001	AIBSC	0.023184	0.487672	0.092058	0.100927	0.517641	0.126131	0.069541	0.060886	-0.003	0.074	0.375077
2002	AIBSC	0.011246	0.499003	0.083888	0.120247	0.560564	0.14126	0.042616	0.0655	-0.106	0.016	0.348256
2003	AIBSC	0.006876	0.44352	0.076343	0.220196	0.552842	0.1548	0.037598	0.074278	0.109	-0.021	0.282794
2004	AIBSC	0.0168	0.437417	0.08851	0.180546	0.547613	0.148961	0.039665	0.068531	0.073	0.117	0.307443
2005	AIBSC	0.020738	0.469752	0.085555	0.134318	0.543876	0.156434	0.034612	0.060817	0.061	0.126	0.285754
2006	AIBSC	0.02955	0.570724	0.080718	0.075957	0.546264	0.161422	0.031753	0.063136	0.106	0.115	0.260071
2007	AIBSC	0.037018	0.561954	0.080456	0.077701	0.525442	0.150721	0.049139	0.067171	0.158	0.118	0.242228
2008	AIBSC	0.035006	0.493989	0.073726	0.135744	0.446001	0.133389	0.038111	0.049512	0.253	0.112	0.211146
2009	AIBSC	0.041179	0.418543	0.104877	0.070173	0.399489	0.126701	0.020747	0.038722	0.364	0.099	0.204931
2010	AIBSC	0.042968	0.34424	0.129642	0.05013	0.465424	0.114234	0.013393	0.044707	0.028	0.104	0.205155
2001	DB	0.025392	0.558134	0.182216	0.01387	0.418264	0.194271	0.06637	0.049347	-0.003	0.074	0.375077
2002	DB	0.026861	0.548697	0.167369	0.057636	0.453855	0.207261	0.054572	0.054073	-0.106	0.016	0.348256
2003	DB	0.02118	0.580338	0.143963	0.085402	0.504578	0.227931	0.04481	0.066045	0.109	-0.021	0.282794
2004	DB	0.024723	0.609506	0.117814	0.102154	0.536423	0.233404	0.044017	0.072954	0.073	0.117	0.307443
2005	DB	0.028895	0.621345	0.125563	0.057803	0.548647	0.232309	0.040955	0.068508	0.061	0.126	0.285754
2006	DB	0.035523	0.657923	0.130837	0.00698	0.53231	0.229998	0.056767	0.062045	0.106	0.115	0.260071
2007	DB	0.041987	0.65829	0.114002	0.005307	0.489859	0.226696	0.091248	0.066081	0.158	0.118	0.242228
2008	DB	0.042629	0.589356	0.110518	0.00409	0.481587	0.214523	0.097224	0.081413	0.253	0.112	0.211146
2009	DB	0.038985	0.491734	0.08723	0.003231	0.505078	0.216621	0.07937	0.07667	0.364	0.099	0.204931
2010	DB	0.036708	0.420538	0.144876	0.065861	0.53264	0.222093	0.063422	0.061408	0.028	0.104	0.205155
2001	UBSC	0.033145	0.606019	0.149609	0	0.339571	0.113274	0.059087	0.056614	-0.003	0.074	0.375077
2002	UBSC	0.026591	0.529467	0.161396	0.090066	0.365778	0.127139	0.081406	0.07076	-0.106	0.016	0.348256
2003	UBSC	0.016532	0.526544	0.168961	0.059241	0.339258	0.120681	0.105037	0.11672	0.109	-0.021	0.282794
2004	UBSC	0.014182	0.548278	0.229917	0	0.376398	0.149934	0.163423	0.083307	0.073	0.117	0.307443
2005	UBSC	0.029942	0.537207	0.328716	0	0.384787	0.176908	0.238296	0.039457	0.061	0.126	0.285754
2006	UBSC	0.038366	0.578101	0.328179	0	0.404271	0.20495	0.200098	0.035206	0.106	0.115	0.260071
2007	UBSC	0.038734	0.619418	0.280166	0.000169	0.40664	0.198951	0.181893	0.036279	0.158	0.118	0.242228
2008	UBSC	0.039148	0.584902	0.2422	0.000118	0.408445	0.19685	0.153788	0.041903	0.253	0.112	0.211146
2009	UBSC	0.032821	0.49077	0.306841	0.000105	0.423764	0.225263	0.117683	0.041167	0.364	0.099	0.204931
2010	UBSC	0.036138	0.434822	0.432704	9.59E-05	0.458955	0.247263	0.08446	0.039591	0.028	0.104	0.205155
2001	BOA	0.035324	0.732306	0.114415	0.006193	0.494522	0.108421	0.099142	0.053446	-0.003	0.074	0.375077
2002	BOA	0.021139	0.637324	0.217035	0.004902	0.538905	0.111817	0.114613	0.047193	-0.106	0.016	0.348256
2003	BOA	0.005793	0.537365	0.281092	0.003898	0.526378	0.132802	0.114881	0.046778	0.109	-0.021	0.282794

2004	BOA	0.020195	0.53232	0.219952	0.05967	0.538562	0.13986	0.086414	0.048895	0.073	0.117	0.307443
2005	BOA	0.035153	0.531181	0.12927	0.091921	0.546016	0.143278	0.058363	0.052201	0.061	0.126	0.285754
2006	BOA	0.039079	0.586189	0.097439	0	0.520814	0.140426	0.06415	0.055549	0.106	0.115	0.260071
2007	BOA	0.033055	0.621783	0.105023	0.060649	0.522814	0.138696	0.081542	0.057916	0.158	0.118	0.242228
2008	BOA	0.014412	0.587382	0.139355	0.049295	0.531365	0.159833	0.073139	0.061261	0.253	0.112	0.211146
2009	BOA	0.016716	0.500477	0.112948	9.75E-05	0.545628	0.199474	0.051368	0.061628	0.364	0.099	0.204931
2010	BOA	0.029069	0.456139	0.146585	8.22E-05	0.581229	0.206757	0.031416	0.056033	0.028	0.104	0.205155
2001	NIB	0.032589	0.458122	0.171305	0.083631	0.27703	0.167566	0.043791	0.089861	-0.003	0.074	0.375077
2002	NIB	0.040409	0.537365	0.177651	0	0.329027	0.158528	0.073451	0.099591	-0.106	0.016	0.348256
2003	NIB	0.025651	0.528153	0.14186	0.037343	0.335797	0.153623	0.091494	0.115232	0.109	-0.021	0.282794
2004	NIB	0.028219	0.532744	0.091342	0.045714	0.343834	0.157989	0.087134	0.126695	0.073	0.117	0.307443
2005	NIB	0.036577	0.588932	0.10908	0.026419	0.384368	0.166768	0.10631	0.126524	0.061	0.126	0.285754
2006	NIB	0.03866	0.666084	0.12193	0.001286	0.411296	0.164866	0.13573	0.113342	0.106	0.115	0.260071
2007	NIB	0.039921	0.684968	0.107921	0.001098	0.414626	0.161917	0.142271	0.093723	0.158	0.118	0.242228
2008	NIB	0.042215	0.605689	0.086438	0.000848	0.402961	0.174842	0.11726	0.095324	0.253	0.112	0.211146
2009	NIB	0.044763	0.490958	0.079625	0.00076	0.405847	0.201346	0.07467	0.105058	0.364	0.099	0.204931
2010	NIB	0.04686	0.423576	0.1314	0.047042	0.418734	0.217184	0.052916	0.10541	0.028	0.104	0.205155
2001	WB	0.025889	0.532727	0.151349	0.029671	0.423746	0.290261	0.105149	0.061131	-0.003	0.074	0.375077
2002	WB	0.021786	0.580922	0.143715	0	0.35276	0.269253	0.158477	0.060756	-0.106	0.016	0.348256
2003	WB	0.018116	0.604372	0.152239	0	0.309773	0.275561	0.205806	0.062437	0.109	-0.021	0.282794
2004	WB	0.02946	0.609736	0.226602	0	0.307787	0.308252	0.161972	0.062584	0.073	0.117	0.307443
2005	WB	0.039148	0.59738	0.282059	0	0.311323	0.349806	0.102954	0.058479	0.061	0.126	0.285754
2006	WB	0.040649	0.636836	0.238507	0	0.317536	0.33908	0.119711	0.053464	0.106	0.115	0.260071
2007	WB	0.042197	0.628543	0.249125	0	0.261378	0.331092	0.178166	0.046596	0.158	0.118	0.242228
2008	WB	0.044409	0.566088	0.285238	0	0.246383	0.311458	0.180412	0.049649	0.253	0.112	0.211146
2009	WB	0.048262	0.453487	0.318448	0	0.282738	0.331184	0.110363	0.051988	0.364	0.099	0.204931
2010	WB	0.052819	0.401406	0.335218	0.03683	0.320291	0.335217	0.049005	0.053557	0.028	0.104	0.205155

year	banks	Y1	A1	A2	A3	L1	L2	L3	L4	M	R	H
2001	CBE	0.062505	0.404794	0.080021	0.322347	0.441126	0.348741	0.023458	0.116858	-0.003	0.074	0.375077
2002	CBE	0.053823	0.36795	0.088832	0.346816	0.444277	0.35825	0.022843	0.120693	-0.106	0.016	0.348256
2003	CBE	0.049317	0.287499	0.099688	0.390638	0.433204	0.360932	0.019503	0.137199	0.109	-0.021	0.282794
2004	CBE	0.04888	0.236167	0.087547	0.438601	0.439496	0.344612	0.015278	0.143997	0.073	0.117	0.307443
2005	CBE	0.043482	0.230016	0.048114	0.377797	0.442908	0.327649	0.013024	0.164575	0.061	0.126	0.285754
2006	CBE	0.04617	0.223059	0.032499	0.394657	0.438765	0.32643	0.010668	0.174148	0.106	0.115	0.260071
2007	CBE	0.051227	0.202396	0.038349	0.481294	0.448552	0.315368	0.007929	0.148038	0.158	0.118	0.242228
2008	CBE	0.0541	0.254829	0.032128	0.422605	0.424537	0.292528	0.006586	0.146019	0.253	0.112	0.211146
2009	CBE	0.060583	0.323992	0.025855	0.40026	0.414138	0.292192	0.007571	0.162723	0.364	0.099	0.204931
2010	CBE	0.062509	0.327961	0.035449	0.434994	0.432964	0.296539	0.011338	0.167298	0.028	0.104	0.205155
2001	CBB	0.069187	0.783829	0.141628	0.058113	0.047391	0.354397	0.188511	0.039527	-0.003	0.074	0.375077
2002	CBB	0.067431	0.755336	0.139463	0.068776	0.05848	0.369752	0.194312	0.046406	-0.106	0.016	0.348256
2003	CBB	0.064894	0.696212	0.135648	0.086592	0.075472	0.391329	0.174954	0.058016	0.109	-0.021	0.282794
2004	CBB	0.063611	0.623801	0.152145	0.089821	0.098068	0.385294	0.152631	0.099185	0.073	0.117	0.307443
2005	CBB	0.056865	0.474611	0.181249	0.17991	0.152133	0.315916	0.127043	0.227903	0.061	0.126	0.285754
2006	CBB	0.070446	0.533364	0.207485	0.183672	0.135299	0.31688	0.106928	0.3242	0.106	0.115	0.260071
2007	CBB	0.102295	0.632642	0.23179	0.099671	0.093425	0.365714	0.112991	0.290756	0.158	0.118	0.242228
2008	CBB	0.102527	0.548671	0.14927	0.079375	0.107483	0.379387	0.126012	0.222021	0.253	0.112	0.211146
2009	CBB	0.088673	0.521238	0.073517	0.081114	0.137857	0.414114	0.1143	0.184068	0.364	0.099	0.204931
2010	CBB	0.084816	0.512526	0.064269	0.085636	0.182482	0.455193	0.090177	0.134179	0.028	0.104	0.205155

Year	Banks	Y2	A1	A2	A3	L1	L2	L3	L4	M	R	H
2001	CBE	0.032635	0.404794	0.080021	0.322347	0.348741	0.441126	0.023458	0.116858	-0.003	0.074	0.375077
2002	CBE	0.004464	0.36795	0.088832	0.346816	0.35825	0.444277	0.022843	0.120693	-0.106	0.016	0.348256
2003	CBE	0.004455	0.287499	0.099688	0.390638	0.360932	0.433204	0.019503	0.137199	0.109	-0.021	0.282794
2004	CBE	0.023143	0.236167	0.087547	0.438601	0.344612	0.439496	0.015278	0.143997	0.073	0.117	0.307443
2005	CBE	0.021118	0.230016	0.048114	0.377797	0.327649	0.442908	0.013024	0.164575	0.061	0.126	0.285754
2006	CBE	0.027313	0.223059	0.032499	0.394657	0.32643	0.438765	0.010668	0.174148	0.106	0.115	0.260071
2007	CBE	0.02864	0.202396	0.038349	0.481294	0.315368	0.448552	0.007929	0.148038	0.158	0.118	0.242228
2008	CBE	0.031457	0.254829	0.032128	0.422605	0.292528	0.424537	0.006586	0.146019	0.253	0.112	0.211146
2009	CBE	0.040705	0.323992	0.025855	0.40026	0.292192	0.414138	0.007571	0.162723	0.364	0.099	0.204931
2010	CBE	0.041365	0.327961	0.035449	0.434994	0.296539	0.432964	0.011338	0.167298	0.028	0.104	0.205155
2001	CBB	0.004692	0.783829	0.141628	0.058113	0.354397	0.047391	0.188511	0.039527	-0.003	0.074	0.375077
2002	CBB	0.004324	0.755336	0.139463	0.068776	0.369752	0.05848	0.194312	0.046406	-0.106	0.016	0.348256
2003	CBB	0.005779	0.696212	0.135648	0.086592	0.391329	0.075472	0.174954	0.058016	0.109	-0.021	0.282794
2004	CBB	0.009312	0.623801	0.152145	0.089821	0.385294	0.098068	0.152631	0.099185	0.073	0.117	0.307443
2005	CBB	0.012946	0.474611	0.181249	0.17991	0.315916	0.152133	0.127043	0.227903	0.061	0.126	0.285754
2006	CBB	0.027151	0.533364	0.207485	0.183672	0.31688	0.135299	0.106928	0.3242	0.106	0.115	0.260071
2007	CBB	0.041609	0.632642	0.23179	0.099671	0.365714	0.093425	0.112991	0.290756	0.158	0.118	0.242228
2008	CBB	0.045802	0.548671	0.14927	0.079375	0.379387	0.107483	0.126012	0.222021	0.253	0.112	0.211146
2009	CBB	0.044424	0.521238	0.073517	0.081114	0.414114	0.137857	0.1143	0.184068	0.364	0.099	0.204931
2010	CBB	0.041203	0.512526	0.064269	0.085636	0.455193	0.182482	0.090177	0.134179	0.028	0.104	0.205155