



DETERMINANTS OF PROFITABILITY OF COMMERCIAL BANKS IN ETHIOPIA

BY: - Fesha Birhanu

ID: GSE/0176/07

**A THESIS SUBMITTED IN THE PARTIAL FULFILLMENT OF THE
REQUAIRMMENT FOR THEDEGREE OF MASTERS OF SCIENCE IN
ACCOUNTING AND FINANCE**

**ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS & ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE**

January, 2018

Addis Ababa, Ethiopia

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Advisor: Sewale Abate (PHD)

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Certificate of Declaration

This is to certify that the thesis prepared by Fesha Birhanu, entitled: Determinants of profitability of commercial banks in Ethiopia and submitted in partial fulfilment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Approved by:

Internal examiner: Dr. _____ Signature _____ Date _____

External examiner: Dr. _____ Signature _____ Date _____

Advisor: Dr. Sewale Abate Signature _____ Date _____

STATEMENT OF DECLARATION

I, **Fesha Birhanu** declare that this thesis entitled “**Determinants of profitability of commercial banks in Ethiopia**” submitted in partial fulfilment of the requirements for the Degree of Master of Science in Accounting and Finance, is outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently with only guidance and suggestion of the thesis Advisor. The study complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Name: Fesha Birhanu

Signature _____

Date _____

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ABSTRACT

The purpose of this study was to investigate determinants of commercial banks profitability in Ethiopia by using panel data of eight commercial banks from year 2005 to 2016. The study used quantitative research approach and secondary financial data were analyzed by using multiple linear regressions models. Fixed effect regression model was applied to investigate the impact of bank size, capital adequacy, liquidity risk, operating efficiency, management efficiency, employee efficiency, and funding cost, banking sector development, real GDP, inflation rate and foreign exchange rate on Return on Asset (ROA). The findings of the study show that bank size, capital adequacy and gross domestic product have statistically significant and positive relationship with bank's profitability. On the other hand, variables like liquidity risk, operational efficiency, funding cost and banking sector development have a negative and statistically significant relationship with banks' profitability. However, the relationship for management efficiency, employee efficiency, inflation and foreign exchange rate was found to be statistically insignificant. The study suggests that focusing and reengineering the banks alongside the key internal drivers should enhance the profitability of the commercial banks in Ethiopia.

Key words: *profitability, commercial banks*

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List of Acronyms

AIB	Awash International Bank
BOA	Bank of Abyssinia
BJ	Bera-Jarque
BLUE	Best Linear Unbiased Estimators
BSD	Banking Sector Development
CAP	Capital adequacy
CBE	Commercial Bank of Ethiopia
CAMEL	Capital adequacy, Asset quality, Management quality, Earning quality, Liquidity
CLRM	Classic Linear Regression Methods
DW	Durbin-Watson
EME	Employee Efficiency
EPRDF	Ethiopian People Revolutionary Democratic Front
FDC	Funding Cost
FEM	Fixed Effect Model
FER	Foreign Exchange Rate
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
HP	Hypotheses
INFL	Inflation
LIQ	Liquidity Risk
MGE	Management Efficiency
NBE	National Bank of Ethiopia
NIB	Nib International Bank
OLS	Ordinary Least Square
OPE	Operating Efficiency
REM	Random Effect Model
ROA	Return on Asset
ROE	Return on Equity
RQ	Research Question
SIZE	Bank Size
UB	United Bank
WB	Wegagen Bank

CHAPTER ONE

1. Introduction

1.1 Background of the Study

In Ethiopia, commercial banks play important primary role as financial intermediaries in the economic growth process, channeling funds from savers to borrowers for investment. The main role of the financial system is to channel the funds from savers to borrowers. If this process is done efficiently, then the profitability should improve, the flow of funds should increase too and there should be better quality services for customers

In recent years the banking sector all around the world has experienced major transformation in its environment due to improvement in the requirement of financial services and high tech facilities, resulting in significant impacts on its profitability. (Belayneh Hailegeorgis, 2011).

Both internal and external factors have been affecting the profitability of banks over time.

Short (1979) and Bourke (1989) indicated that the determinants of commercial bank Profitability can be divided into two main categories namely the internal determinants which are management controllable and the external determinants which are beyond the control of the management of the institutions. Following early work of Short (1979) and Bourke (1989), a number of more recent studies have attempted to identify some of the major determinants of bank profitability. On the other hand, researches on the determinants of bank profitability were focused on both the returns on bank assets and equity, and net interest rate margins as a profitability measures.

The determinants of profitability are empirically well explored although the definition of Profitability varies among studies. Disregarding the profitability measures, most of the banking Studies such as (Belayneh, 2011, Amdemikael, 2012, Birhanu, 2012, Habtamu, 2012, Samuel, 2015) have noticed that both the internal environment of the organization and external Environments are important drivers of high profitability. Therefore in this study, the drivers that would be considered are in two categories namely internal and external drivers or factors of Profitability.

When we come to previous studies on sub Saharan African countries, including Ethiopia, Valentina Flamini et al., (2009) have made a study on the determinants of commercial bank profitability in the region by using a sample of 389 banks from 41 Sub-Saharan Africa (SSA) countries. According to Valentina Flamini et al., (2009), bank profitability is high in

SubSaharan Africa (SSA) compared to other regions. In addition, the study finds that apart from credit risk, higher returns on assets are associated with larger bank size, activity diversification, and private ownership. Bank returns are affected by macroeconomic variables, suggesting that macroeconomic policies that promote low inflation and stable output growth does boost credit expansion. The results also indicate moderate persistence in profitability. On the other hand there was a study made on determinants of Ethiopian private banks profitability in 2008 but the researcher couldn't access and see the methodology employed by the researcher and final finding of the paper.

1.2 Background of the Study Area

History of Banking in Ethiopia

Modern banking in Ethiopia was introduced in 1905. At the time, an agreement was reached between Emperor Menelik II and a representative of the British owned National Bank of Egypt to open a new bank in Ethiopia. February 15, 1906 marked the beginning of banking in Ethiopia history when the first Bank of Abyssinia was inaugurated by Emperor Menelik II. It was a private bank whose shares were sold in Addis Ababa, New York, Paris, London, and Vienna. In 1931, Emperor Haile Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking services until the Italian invasion of 1936. During the Italian invasion, Bank of Italy was formed a legal tender in Ethiopia. In 1943, after Ethiopia regains its independence from fascist Italy, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed. In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution. State owned financial institutions includes;

- The Agricultural and Industrial Development Bank (Finance state owned enterprises)
- The Savings and Mortgage Corporation of Ethiopia
- The Imperial Savings and Home Ownership Public Association (Provided savings and loan services)

In addition, private financial institutions of the time include;

- The Addis Ababa Bank
- The Banco di Napoli

- The Banco di Roma

After 1974, the banking business could not move further because of the nationalization of private investments by the socialist regime that came into power leaving only three government banks; the National Bank of Ethiopia, the Commercial Bank of Ethiopia and agricultural and Industrial Development Bank (Mortgage Bank). This was reversed when the socialist regime was overthrown in 1991. Subsequently, the licensing and supervision of Banking Business Proclamation No. 84/1994 was issued in 1994 which led to the beginning of a new era for Ethiopia banking sector. Immediately after the enactment of the proclamation private banking companies began to flourish, leading to 16 private banks and one public owned commercial bank (excluding the non commercial public owned bank which is Development Bank of Ethiopia) operating in Ethiopia as of the current year 2017. Both public owned and private commercial banks which are currently operating throughout the country are listed in the following table:

Table 1.1 List of Public and Private Commercial Banks in Ethiopia

Banks	Branch Network in Number				Capital in Millions of birr
	2016/17				
	Reg	A.A	Total	% share	
1. Public Banks					
Commercial Bank of Ethiopia	1028	282	1310	30.8%	42,579.60
Development bank of Ethiopia	106	4	110	2.6%	7,595.10
Total Public Banks	1134	286	1420	33.4%	50,174.70
2.Private Banks					
Awash International Bank	186	153	339	8.0%	3,807.60
Dashen Bank	184	131	315	7.4%	3,420.90
Abyssinia Bank	140	113	253	5.9%	2,371.00
Wegagon Bank	139	84	223	5.2%	2,824.50
United Bank	111	93	204	4.8%	2,221.00
Nib International Bank	92	111	203	4.8%	2,570.20
Cooperative Bank of Oromia	232	55	287	6.7%	1,281.70
Lion International Bank	110	48	158	3.7%	1,163.50
Oromia International Bank	164	73	237	5.6%	1,378.30
Zemen Bank	15	7	22	0.5%	1,050.70
Buna International Bank	74	69	143	3.4%	1,152.30
Berhan International Bank	114	63	177	4.2%	1,536.30
Abay Bank	112	40	152	3.6%	1,139.30
Addis International Bank	21	32	53	1.2%	688.40
Debub Global Bank	19	19	38	0.9%	373.10
Enat Bank	10	23	33	0.8%	809.30
Total Private Banks	1723	1114	2837	66.6%	27,788.10
Grand Total	2857	1400	4257	100.0%	77,962.80

Source; National Bank of Ethiopia Quarterly Bulletin; September 2017

Generally, the following five principal events have been occurred in Ethiopian banking history related to Ethiopia political instability since 1905.

- The first event was establishment of the Bank of Abyssinia in 1906, marking the advent of banking into the country.
- The second event was fascist Italian invasion in 1936, when, following liquidation of the Bank of Ethiopia, a broad colonial banking network, extended to encompass all Italian possessions in the Horn of Africa (Eritrea, Ethiopia and Somalia) and closely linked with the metropolitan financial system, was set up in the country.
- The third event was, in 1943, establishment of the State Bank of Ethiopia, marking the rebirth of the Ethiopian independent banking. This occurred during World War II after liberation of the country from fascist Italy.
- The fourth event was the revolution of 1974, which wiped out the monarchy, nationalized companies and shaped a “socialist banking” two-tier model “suited” to Ethiopia, the whole credit system being based on the central bank and three state owned financial institutions, each of them enjoying monopoly in its respective market.
- The fifth event was the collapse of socialist regime followed by a financial sector reform and liberalization according to Monetary and Banking Proclamation number 84/1994.

1.3 Statement of the problems

There are plenty of studies conducted on commercial bank profitability and its determinant considering the importance of this area at international level.

The determinants of profitability have been debated for many years and still unsolved issues in the corporate finance literature. What makes the profit determinant debate very interesting is the determinant of profit is dynamic through time to time and differ with the nature of operating of the firm from place to place (Flamini et al, 2009).

And there is no universally accepted finding to the determinant of profitability of the banking sector, because country varies each other by their economic systems, financial systems and operating environment. Thus this studies would examine bank specific , industry specific and macroeconomic determinant of commercial banks profitability and a variety of variables such as (bank size, capital adequacy, liquidity risk, management efficiency, employee efficiency, funding cost, banking sector development, gross domestic product (GDP), inflation rate and foreign exchange rate) that are potentially responsible for determining

profitability of banks have been selected based on the selected theoretical literature and previous empirical works.

At present private commercial banks are dominant in respect of numbers and efficiency in the banking sector of Ethiopia. Commercial banks in Ethiopia have gone into significant changes after the liberalization of the banking system. The reforms removed barriers to entry of commercial banks and supported the improvement of institutional framework and more efficiently the performance of commercial banks, with this it has affected the profitability of commercial banks and increased banking competition even it's infant stage when we compare the industry even to other developing countries. Profitability of commercial banks is pro foundation for product innovation, diversification and efficiency of the commercial banks (Hempell 2002).

Thus the stability of commercial banks as whole in the economy depends on profitability level. More profitability level has tendency to absorb risks and shocks that commercial banks can face. Moreover profitability is the perquisite condition for the efficiency of commercial banks. Empirical evidence from Chijoriga (1997) has showed that the soundness of commercial banks performance depends on profitability. Francis (2007) has indicated that markets reforms in the Sub-Saharan Africa has worsen the profitability of commercial banks due to high level of nonperforming loans. Profitability of commercial banks is important for the efficiency of commercial banks. However, there is improvement in profitability from time to time.

As noted in Amdemikael (2012) Ethiopian banking industry is characterized by a quite high liquidity, which is well above the statutory requirement of 20 percent, high level of nonperforming loans, and failure to adopt new technologies to improve the efficiency of their services; among others which are the direct indicators of low performance when measured in terms of profitability as far as all of the above mentioned factors affect profitability negatively. Moreover, fear of risky investments by Ethiopian banks which may result in greater amount of profit for them and lack of active secondary stock market in the country which may reduce their investment options and their profitability as well are also clear indicators as Ethiopian banks are still not operating at their full capacity. Moreover, as noted in NBE (2009/10) annual report low contribution of the sector to Gross Domestic Product (GDP) despite the increasing contribution of the service sector to GDP is also another indicator of low performance of the sector. In general, even if Ethiopian banks looks like profitable, lack of competition, limited number of branches, poor asset quality, low

efficiency, higher levels of liquidity and others clearly indicate as they are still not performing well and attaining the maximum profit that they can achieve.

All the above discussed problems in the banking industry of Ethiopia in relation to performance in general and profitability in particular along with the gap in the literature (to be established in the next chapter) with respect to profitability and the link between profitability and internal and external determinant factors call for detailed investigation. Therefore, this study seeks to fill the gap by providing full information about the internal and external factors that affects profitability by examining the untouched one, and replicating the existing in the Ethiopian context by using all commercial banks operated in the country that had 12 years data.

Therefore, this study would examine and fill the gap by providing information about the internal and external factors that affects profitability by examining by including and testing four new variables (Employee efficiency, funding cost, banking sector development and Foreign exchange rate) that are not well tested by prior Ethiopian researchers.

1.4 Objectives of the study

Objective of the study designed as general and specific objectives of the study.

1.4.1 General objective of the study

The main objective of this study is to examine determinant of profitability on Ethiopian commercial banking industry over the period 2005- 2016.

1.4.2 Specific Objective

To provide answers to the broad research objectives that are described above and:

- To determine the determinants/factors of commercial banks profitability, in the case of Ethiopian Banks.
- To identify the major internal determinants/factors of commercial banks profitability, in the case of Ethiopian Banks.
- To identify the major external determinants/factors of commercial banks profitability, in the case of Ethiopian Banks.

1.5 Hypotheses of the Study (HP)

Hypotheses of the study are based on theories of bank profitability and empirical studies developed over the years by researchers on banking area. Marcoulides (1998) defined deductive approach as testing of theories. Researchers proceed with set of theories and

percepts of knowledge in mind to set study's hypotheses. More formal way of stating research question is by developing hypotheses between independent and dependent variables (Creswell, 2009). It may be stated in null form indicating no relationship between dependent and controlling variables. Developed hypotheses are as follow: Null Hypotheses (Ho) developed as follow:

HO1: Bank size has positive/negative and significant influence on commercial banks' profitability.

HO2: Capital adequacy has positive/negative and significant influence on commercial banks' profitability.

HO3: Liquidity Risk has negative and significant influence on commercial banks' profitability.

HO4: Operating efficiency has negative and significant influence on commercial banks' profitability

HO5: Management efficiency has positive and significant influence on commercial banks' profitability

HO6: Employee efficiency has negative and significant influence on commercial banks' profitability

HO7: Funding cost has negative and significant influence on commercial banks' profitability.

HO8: Banking sector development has negative and significant influence on commercial banks' profitability.

HO9: Real gross domestic product has positive and significant influence on commercial banks' profitability.

HO10: Inflation Rate has positive/negative significant influence on commercial banks' profitability.

HO11: Foreign exchange rate has positive and significant influence on commercial banks' profitability.

1.6 Scope of the Study

The scope of the study is limited to the assessment of the internal and external factors affecting bank profitability of all commercial banks that are found in Ethiopia and that have at least twelve years data (2005-2016). As a result, it includes the one large governments owned commercial banks namely, CBE, The scope of the study will also include the other seven private commercial banks (Awash International Bank, Dashen Bank, Abyssinia Bank, Wegagen Bank, United Bank, Nib International Bank, Cooperative Bank of Oromia).

1.7 Limitation of the Study

The limitation of the study originate from that even if there are many variables that affect commercial banks profitability the study will only concentrated on eleven variables (Bank size, capital adequacy, liquidity risk, management efficiency, employee efficiency, funding cost, banking sector development, real gross domestic product, inflation rate , banking regulations and foreign exchange rate).

Because of lack of 12 years data that is required for the analysis purpose in most of the newly established private banks are exclude from the study so, the number of sample banks are reduced to eight.

1.8 Significant of the Study

This study has vital significance to show the degree of the bank-specific, industry - specific and macroeconomic determinants in what extent they affected the profitability of the commercial banks, by identifying and showing the main determinants of profitability and to suggest policy implications after critical examination of the profitability determinants of the commercial banking industry of Ethiopia. To this end, mainly this study has importance for the following body.

- ✓ Moreover, it will help investors to measure the performance of their portfolios and proceed with readjustments as required.
- ✓ It will help research beginners who are interested to conduct their research in this area.
- ✓ The study may support as reference coming researcher(s) who study on the areas.
- ✓ IT will help customers deposit based on the indicators of success of the companies.
- ✓ It will help the management to hedge against adverse factors, like uncertainty, and capitalize on other, like strong demand and cost complementarities that improve performance.
- ✓ It will provide a road map for managers and the shareholders to evaluate their bank performance in term of profitability with respect to the internal and external determinants.

1.9 organization of the paper

The paper was organized as follow. The first chapter presented introduction followed by second chapter which presented literature review. The third chapter presented methodology and design as blue print of the study. Chapter four presented data analysis and discussion of the paper. Finally, chapter five of this study concluded the findings and presented recommendation based on the findings.

CHAPTER TWO

2. Literature Review

2.1 Theoretical literature reviews

Subsequent sections will build on concepts and definitions described here. In light of the above, the purpose of this chapter is to review the literatures related to bank profitability and its determinants. The review has **four sections**. Section 2.1 theoretical literatures of bank profitability and its indicators. Section 2.2 presents empirical studies on banks profitability section 2.3 presents the knowledge gap and the final section 2.4 present the conceptual frame work of the literatures.

2.1.1 Theories on profitability of commercial banks

The study of profits is important not only because of the information it provides about the health of the bank in any given year, but also because profits are a key determinant of growth and employment in the medium-term. Changes in profitability are an important contributor to economic progress via the influence profits have on the investment and savings decisions of companies. This is because a rise in profits improves the cash flow position of companies and offers greater flexibility in the source of finance for corporate investment (i.e. through retained earnings). Easier access to finance facilitates greater investment which boosts productivity, productive capacity, competitiveness and employment.

The existence, growth and survival of a business organization mostly depend upon the profit which an organization is able to earn. It is true that when Profitability increases the value of shareholders may increase to considerable extent. The term profitability refers to the ability of the business organization to maintain its profit year after year. The profitability of the organization will definitely contribute to the economic development of the nation by way of providing additional employment and tax revenue to government exchequer (the fund of a government). Moreover, it will contribute the income of the investors by having a higher dividend and there by improve the standard of living of the people.

In order for a business entity (whether public or privately owned) to continue to prosper, there is need for its earnings to be relatively stable for its expansion and growth over time. In addition to its level of earnings, its external environment must also be carefully understood and reliably anticipated. The business organization must ensure that right technology is pursued so as to achieve organizational objectives, Burns and Mitchell, (1946) and Aremu, Mejabi, and Gbadeyan, (2011).

Profitability connotes a situation where the income generated during a given period exceeds the expenses incurred over the same length of time for the sole purpose of generating income Banwo (1997), Sanni (2006). The fundamental requirements here are that the income and the expenses must occur during the same period of time (Matching Concept) and the income must be a direct consequence of the expenses. The period of time may be one week, three months, one year etc. Sabo (2007).

It is not immaterial whether or not the income has been received in cash nor is it compulsory that the expenses must have been paid in cash.

The term profit can take either its economic meaning or accounting concept which shows the excess of income over expenditure viewed during a specified period of time. On one hand, profit is one of the main reasons for the continued existence of every business organization. On the other hand, profit is expected so as to meet the required return by owners and other outsiders. John J. Hampton (2009) clarified profitability ratio as a class of financial metrics that are used to assess a business ability to generate earnings as compared to its expenses and other relevant costs incurred during a specific period of time. Accordingly, the term profitability is a relative measure where profit is expressed as a ratio, generally as a percentage. Profitability depicts the relationship of the absolute amount of profit with various other factors. Similarly, Michael Koller (2011) argued that profitability is the most important and reliable indicator as it gives a broad indicator of the ability of company to raise its income level. In practice, executives define profits as the difference between total earnings from all earning assets and total expenditure on managing entire asset-liabilities portfolio Kaur and Kapoor, (2007).

For a profit-oriented organization, profit is the soul of business. The importance of profitability, therefore, stems from its being the *raison* (purpose) of business. A company remains in operation because it expects to make profits. Once that expectation is confirmed unattainable, the most rational decision is to close shop or exit the business. Three indicators, namely: Return on Assets (ROA) Return on Equity (ROE) and Net Interest Margin (NIM), were identified by Ahmed (2003) to be mostly employed in the literature to measure profitability.

However, there are divergent views among scholars on the superiority of one indicator over the others as a good measure of profitability. For instance, Goudreau and Whitehead (1989) and Uchendu (1995) believed that the three indicators are all good. Hancock (1989) used

only ROE to measure profitability in his study. Also, Odufulu (1994) used only the gross profit margin in measuring profitability.

Ogunleye (1995) did not believe that gross profit margin could constitute a good Measure of profitability and therefore used ROA and ROE. Profitability measures, according to Akinola (2008) include Profit before Tax (PBT), Profit After Tax (PAT), Return on Equity (ROE), Rate of Return on Capital (ROC) and Return on Assets (ROA). Sanni (2009) used Earnings Per-Share (EPS). For this study, the researcher limited profitability to the one widely used profitability measure namely Return on Asset (ROA).

2.1.2 Determinants of banks profitability

The literature divides the determinants of conventional bank profitability into two categories, namely internal and external. Internal determinants of profitability, which are within the control of bank management, can be broadly classified into two categories, i.e. financial statement variables and non-financial statement variables. While financial statement variables relate to the decisions which directly involve items in the balance sheet and income statement; non-financial statement variables involve factors that have no direct relation to the financial statements. The examples of non-financial variables within the this category are number of branches, status of the branch (e.g. limited or full service branch, unit branch or multiple branches), location and size of the bank. Number of branches, status of branches and location are considered controllable variables since decision on those matters are within the discretion of management. In the case of a decision to establish new branches or services available where the locality is restricted by regulations, these variables are considered external to the bank. Similarly, the size of the bank is considered an internal determinant on the assumption that management of the bank is responsible for expanding their organization by acquiring additional assets and liabilities. Some researchers (Short, 1979 and Bourke, 1989) considered size as an external variable.

External variables are those factors that are considered to be beyond the control of the management of a bank. Among the widely discussed external variables are competition, regulation, concentration, market share, ownership, scarcity of capital, money supply, inflation and size.

A number of explanatory variables have been proposed for both categories, according to the nature and purpose of each study the research undertaken has focused on profitability analysis of either cross country or individual countries' banking systems.

The first group of studies includes Haslem (1968), Short (1979), Bourke (1989), Molyneux and Thornton (1992) and Demirguc-Kunt and Huizinga (2000). A more recent study in this group is Bikker and Hu (2002), though it is different in scope; its emphasis is on the bank profitability business cycle relationship. Studies in the second group mainly concern the banking system in the US (e.g. Berger *et al.*, 1987 and neely and Wheelock, 1997) or the emerging market economies (e.g. Barajas *et al.*, 1999). All of the above studies examine combinations of internal and external determinants of bank profitability.

The empirical results vary significantly, since both data sets and environments differ.

There exist, however, some common elements that allow a further categorization of the determinants.

Studies dealing with internal determinants employ variables such as size, capital, risk management and expenses management. Size is introduced to account for existing economies or diseconomies of scale in the market. Akhaveinet *al.* (1997) and Smirlock (1985) find a positive and significant relationship between size and bank profitability. Demirguc-Kunt and Maksimovic (1998) suggest that the extent to which various financial, legal and other factors (e.g. corruption) affect bank profitability is closely linked to firm size. In addition, as Short (1979) argues, size is closely related to the capital adequacy of a bank since relatively large banks tend to raise less expensive capital and, hence, appear more profitable. Using similar arguments, Haslem (1968), Short (1979), Bourke (1989), Molyneux and Thornton (1992) Bikker and Hu (2002) and Goddard *et al.* (2004), all link bank size to capital ratios,³ which they claim to be positively related to size, meaning that as size increases – especially in the case of small to medium-sized banks – profitability rises. However, many other researchers suggest that little cost saving can be achieved by increasing the size of a banking firm (Berger *et al.*, 1987), which suggests that eventually very large banks could face scale inefficiencies.

The need for risk management in the banking sector is inherent in the nature of the banking business. Poor asset quality and low levels of liquidity are the two major causes of bank failures. During periods of increased uncertainty, financial institutions may decide to diversify their portfolios and/or raise their liquid holdings in order to reduce their risk. In this respect, risk can be divided into credit and liquidity risk. Molyneux and Thornton (1992), among others, find a negative and significant relationship between the level of liquidity and profitability. In contrast, Bourke (1989) reports an opposite result; while the effect of credit risk on profitability appears clearly negative (Miller and Noulas, 1997).

This result may be explained by taking into account the fact that the more financial institutions are exposed to high-risk loans, the higher is the accumulation of unpaid loans, implying that these loan losses have produced lower returns to many commercial banks.

Bank expenses are also a very important determinant of profitability, closely related to the notion of efficient management. There has been an extensive literature based on the idea that an expenses-related variable should be included in the cost part of a standard microeconomic profit function. For example, Bourke (1989) and Molyneux and Thornton (1992) find a positive relationship between better-quality management and profitability. Turning to the external determinants of bank profitability, it should be noted that we can further distinguish between control variables that describe the macroeconomic environment, such as inflation, interest rates and cyclical output, and variables that represent market characteristics.

The latter refer to market concentration, industry size and ownership status.

A whole new trend about structural effects on bank profitability started with the application of the Market-Power (MP) and the Efficient-Structure (ES) hypotheses. The MP hypothesis, which is sometimes also referred to as the Structure- Conduct-Performance (SCP) hypothesis, asserts that increased market power yields monopoly profits. A special case of the MP hypothesis is the Relative-Market-Power (RMP) hypothesis, which suggests that only firms with large market shares and well differentiated products are able to exercise market power and earn non-competitive profits (see Berger, 1995a). Likewise, the X-efficiency version of the ES (ESX) Hypothesis suggests that increased managerial and scale efficiency leads to higher concentration and, hence, higher profits. Studies, such as those by Smirlock (1985), Berger and Hannan (1989) and Berger (1995a), investigated the profit-structure relationship in banking, providing tests of the aforementioned two hypotheses. To some extent the RMP hypothesis is verified, since there is evidence that superior management and increased market share (especially in the case of small-to medium-sized banks) raise profits. In contrast, weak evidence is found for the ESX hypothesis. According to Berger (1995a), managerial efficiency not only raises profits, but may lead to market share gains and, hence, increased concentration, so that the finding of a positive relationship between concentration and profits may be a spurious result due to correlations with other variables.

Thus, controlling for the other factors, the role of concentration should be negligible.

Other researchers argue instead that increased concentration is not the result of managerial efficiency, but rather reflects increasing deviations from competitive market structures,

which lead to monopolistic profits. Consequently, concentration should be positively (and significantly) related to bank profitability.

Bourke (1989), and Molyneux and Thornton (1992), among others, support this view.

A rather interesting issue is whether the ownership status of a bank is related to its profitability. However, little evidence is found to support the theory that privately-owned institutions will return relatively higher economic profits. Short(1979) is one of the few studies offering cross-country evidence of a strong negative relationship between government ownership and bank profitability.

In their recent work, Barth *et al.* (2004) claim that government ownership of banks is indeed negatively correlated with bank efficiency. In contrast, Bourke (1989) and Molyneux and Thornton (1992) report that ownership status is irrelevant for explaining profitability.

The last group of profitability determinants deals with macroeconomic control variables.

The variables normally used are the inflation rate, the long-term interest rate and/or the growth rate of money supply. Revell (1979) introduces the issue of the relationship between bank profitability and inflation. He notes that the effect of inflation on bank profitability depends on whether banks' wages and other operating expenses increase at a faster rate than inflation.

The question is how mature an economy is so that future inflation can be accurately forecasted and thus banks can accordingly manage their operating costs. In this vein, Perry (1992) states that the extent to which inflation affects bank profitability depends on whether inflation expectations are fully anticipated. An inflation rate fully anticipated by the bank's management implies that banks can appropriately adjust interest rates in order to increase their revenues faster than their costs and thus acquire higher economic profits. Most studies (including those by Bourke (1989) and Molyneux and Thornton (1992)) have shown a positive relationship between either inflation or long-term interest rate and profitability.

Recently, Demirguc-Kunt and Huizinga (2000) and Bikker and Hu (2002) attempted to identify possible cyclical movements in bank profitability - the extent to which bank profits are correlated with the business cycle. Their findings suggest that such correlation exists, although the variables used were not direct measures of the business cycle. Demirguc-Kunt and Huizinga (2000) used the annual growth rate of GDP and GNP per capita to identify such a relationship, while Bikker and Hu (2002) used a number of macroeconomic variables (such as GDP, unemployment rate and interest rate differential).

A. Bank-specific determinants

The impact on banks' performance has been measured by bank-specific factors such as capital adequacy, credit risk, liquidity risk, market power and regulatory costs. More recently, research seems to have focused on the impact of macroeconomic factors on banks' performance. In all these studies, however, the literature reveals that Sub-Saharan Africa is less studied and therefore would require more information on banking sector for better planning for the sector. This study therefore, was an attempt to address the gap of information on SSA commercial banking sector.

In investigating bank profitability, Short (1979), Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (2000) and Goddard *et al* (2004), among others, applied linear models to explain performance. Linear models have however been criticized for employing inconsistent variables and generating inefficient results. All this evidence points to the fact that more data would be required to understand banks' performance in the developing countries.

Cornett and Tehania (1992), Mercia, *et al.* (2002), Toddard, *et al.* (2004), Guru *et al.* (2001) and Panayiotis *et al.* (2006) show that bank profitability is a function of internal and external factors. Internal factors include bank-specific; while external factors include both industry-specific and macroeconomic factors. According to this literature, there are six standard key bank-specific indicators that are widely used to study banks: profitability; capital risk; asset quality; operational efficiency; and growth in bank assets. Industry-specific factors include: ownership, bank size, bank concentration index; while macroeconomic factors include interest rate, interest rate spread, inflation and per-capita income and growth in GDP. Most of these factors are included in this study to estimate bank profitability for SSA banks.

Applying the General Method of Moments (GMM) technique to a panel of Greek banks for the period 1985 to 2001 period, Panayiotis *et al.* (2006) discovered that bank profitability persist to a moderate extent. Persistence suggests that departures from perfectly competitive market structures may not be large. The study further shows that all bank-specific determinants, with the exception of size, influence bank performance in the anticipated way. The study on Malaysian banks by Guru *et al.* (2001) also show that efficient management is among the most important factors that explain high bank profitability. Extending a similar study to SSA, therefore, generates comparative results. Al-Haschimi (2007) investigates the determinants of bank net interest margin in 10 SSA countries, and applies an accounting decomposition model as well as panel regressions. Further found out that credit risk and

operational inefficiencies explain most of the variation in net interest margins across the region, with macroeconomic factors, having less influence on performance Smirlock (1985) found a positive and significant relationship between size and bank profitability. Short (1979) discovered that size is closely related to capital adequacy of a bank since relatively large banks tend to raise less expensive capital and, hence, appear more profitable. Using similar arguments, Bikker and Hu (2002) and Goddard *et al.* (2004), among others; linked bank size for small to medium size banks to capital and profitability. Molyneux and Thornton (1992), among others; found a negative and significant relationship between the level of liquidity and profitability. In contrast, Bourke (1989) reported an opposite result; while the effects of credit risk on profitability could be negative (Miller and Noulas, 1997).

There is also an extensive literature based on the idea that an expense-related variable should be included in a profit function. For example, Bourke (1989) and Molyneux and Thornton (1992) found a positive relationship between better-quality management and profitability. Athanasoglou, *et al.* (2006) study on the South Eastern European banking industry over the period 1998 to 2002, suggested a new approach in understanding bank profitability.

The performance of the banking sector is a subject that has received a lot of attention in recent years. There is now a large literature which has examined the role played by management of resources in determining bank performance.

It is generally agreed that better quality management of resources is the main factor contributing to bank performance, as evidenced by numerous studies that have focused on the U.S. banking system (DeYoung and Rice 2004; Stiroh and Rumble 2006; Bhuyan and Williams 2006; Hirtle and Stiroh 2007) and the banking systems in the western and developed countries (Ho and Tripe 2002; Williams 2003; Pasiouras and Kosmidou 2007; Kosmidou *et al.* 2007; Kosmidou and Zopounidis 2008; Athanasoglou *et al.* 2007; Albertazzi and Gambacorta 2008).

By contrast, fewer studies have looked at bank performance in developing economies. Guru *et al.* (2002) investigate the determinants of bank profitability in Malaysia. They used a sample of 17 commercial banks during the 1986 to 1995 period. The profitability determinants were divided into two main categories, namely the internal determinants (liquidity, capital adequacy, and expenses management) and the external determinants (ownership, firm size, and economic conditions).

The findings revealed that efficient expenses management was one of the most significant in explaining high In a comprehensive study, DermigucKunt and Huizinga (1999) examine the

determinants of bank interest margins and profitability using bank level data for 80 countries from 1988 to 1995. They find that a larger ratio of bank assets to GDP and a lower market concentration ratio lead to lower margins and profits. The findings also suggest that foreign banks have higher margins and profits than domestic banks in developing countries, while the opposite prevails in developed countries.

B. Industry-specific determinants

Another strand of literature emphasizes the importance of market structure and bank specific variables in explaining performance heterogeneities across banks. This literature is based on the structure-conduct-performance (SCP) paradigm and is also applicable to contestable markets, firm-level efficiency, and the roles of ownership and governance in explaining banks' performance (Berger, 1995; Berger and Humphrey, 1997; Bikker and Haaf, 2002; Goddard *et al.*, 2001; Goddard *et al.*, 2004; and Molyneux *et al.*, 1996). It was explained that, the extensive empirical evidence does not provide conclusive proof that bank performance is influenced either by concentrated market structures and collusive price setting behavior or superior management and production techniques. Bank efficiency levels were found to vary widely across banking sectors (Altunbaş *et al.*, 2001; Schure *et al.*, 2004).

Smirlock (1985) and Berger (1995) investigated the profit structure relationship in banking, providing tests of the aforementioned hypotheses. To some extent, the relative market power hypothesis was verified; since there was evidence that superior management and increased market share (especially in the case of small to medium sized banks) raise profits. In contrast, weak evidence was found for the efficient structure hypothesis. Explained that efficiency not only raises profits, but may lead to market share gains and, hence, increased concentration, so that the finding of a positive relationship between concentration and profits could be a spurious result due to correlations with other variables. Bourke (1989), Molyneux and Thornton (1992) argued, instead that increased concentration is not the result of managerial efficiency, but rather reflects increasing deviations from competitive market structures, which leads to monopolistic profits. Consequently, concentration should be related to bank profitability.

These studies further questioned whether the ownership status of a bank is related to its profitability or not. However, little evidence is found to support the theory that privately-owned institutions will return relatively higher economic profits (Short, 1979). In contrast, Bourke (1989) and Molyneux and Thornton (1992) revealed that ownership status could be irrelevant for explaining profitability. Eichengreen and Gibson (2001) analyzed bank-specific

and market-specific profitability determinants of Greek banks for the period 1993 to 1998; using a panel not restricted to commercial banks. The results revealed that industry-specific variables such as concentration ratio and market share have positive and significant influence on bank profitability. Recent literature also emphasizes the importance of changes in macroeconomic conditions on bank profitability. All this evidence provides sufficient information that bank concentration may not be a larger factor in explaining banks' profitability behavior.

C. Macroeconomic determinants

The last group of profitability determinants deals with macroeconomic control variables. The common variables include inflation rate, the long-term interest rate and rate of economic growth (Panayiotis *et al.*, 2005). More recently, a number of studies emphasize the relationship between macroeconomic variables and bank risk. Allen and Saunders (2004) provided evidence of the importance of macroeconomic factors in determining the profitability of banks in the sampled.

Rovell (1979) introduced the issue of the relationship between bank profitability and inflation. Noted that the effect of inflation on bank profitability depends on whether bank wages and other operating expenses increase at a faster rate than inflation. The question is how mature an economy is so that future inflation is accurately forecasted to enable banks manage their operating costs. Perry (1992) observed that the extent to which inflation affects bank profitability depends on whether inflation expectations are fully anticipated. An inflation rate fully anticipated by the bank management implies that banks can appropriately adjust interest rates in order to increase their revenues faster than their costs and thus acquire higher economic profits. Bourke (1989) and Molyneux and Thornton (1992) found a positive relationship between inflation and bank profitability.

Saunders and Schumacher (2000) apply a model of Ho and Saunders (1981) to study the determinants of interest margin in six European Union and US banks during the period 1988 to 1995. They further established that macroeconomic volatility and regulations have a significant impact on bank interest margin. The result pointed out an important tradeoff between ensuring bank solvency, as defined by high capital to asset ratio, and lowering cost of financial services to consumers, as measured by lower interest rate margin.

Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (2000) and Bikker and Hu (2002) identified possible cyclical movements in bank profitability. Bikker and Hu. (2002) established that bank profits are positively correlated with movements in the

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business cycle. Afanasieff *et al.* (2002), Guru *et al.* (2002) and Naceur and Goaied (2001; 2003), and Barajas *et al.* (1999) study on emerging countries (Brazil, Colombia, Malaysia and Tunisia) documented significant effects of financial liberalization on banks' performance.

Afanasieff *et al.* (2002) also made use of panel data techniques to uncover the main determinants of bank performance in Brazil and found out that macroeconomic variables such as GDP growth rate, inflation expectations are important in determining bank profitability over time. Neeley and Wheelock (1997) also explored the profitability of sampled US commercial banks and found a positive impact of per-capita income on profitability.

Overall, empirical review for this research provides back ground information of bank profitability. There is ample evidence of comprehensive account of developed countries and a few of developing ones, but less of SSA, signifying the requirement for further research on the sub-region. Empirical findings provide support that bank profitability is influenced by both internal, sector specific as well as macroeconomic factors. This study utilized some of the identified key variable indicators that were identified in earlier studies to have an influence on commercial banks' profitability. Further, there is proof that in these studies, more of static models than dynamic have been applied to study banks' profitability. Dynamic panel models therefore deem to be considered as important specifications for providing more rigorous and efficient results on banks' performance in the context of SSA, which is an extension of these studies. This study on SSA commercial banks; becomes an important step in providing more empirical information on the sub-region's commercial banking sector; using dynamic panel models. These methods are expected to generate more efficient results.

2.2 Empirical studies

2.2.1 Studies in panel Countries

These sections present same of the panel country studies reviewed by the researcher chronologically.

Wilson and Williams (2000) investigate the relationship between size and growth for a sample of banks in France, Germany, Italy and the UK over the period 1990 to 1996. Using several measures of bank size (total assets, equity and value of off-balance sheet business) they test for size effects on growth, using models which incorporate the influences of previous growth, bank type and country of origin. The results of the analysis suggest that for

Italy, small banks tend to grow faster than larger banks. No relationship is found between bank size and growth for France, Germany and the UK. This suggests a process of increasing concentration in these banking systems, even in the absence of bank-specific strategic advantages. Hassan and Bashir (2003) intended to characterize some financial and policy indicators that impact the overall performance of Islamic banks. Specifically, the purpose of study is to closely examine the relationship between profitability and the banking characteristics, after controlling for economic and financial structure indicators. Utilizing bank level data, this study examined the performance indicators of Islamic banks in 21 countries worldwide during 1994 to 2001.

The main data source is Bank scope database. A variety of internal and external banking characteristics were used to predict profitability and efficiency. Four measures of performance used in this study: the net non-interest margin (NIM), profit margin, returns on assets (ROA), and returns on equity (ROE). To assess the relationship between performance and internal bank characteristics, their analysis utilizes several bank ratios. The set of ratios used comprises, fund source management, funds use management, leverage and liquidity ratios. The paper used regression analysis to determine the underlying determinants of Islamic banks performance.

They concluded that Islamic banks profitability measures respond positively to the increases in capital and negatively to loan ratios. The results also indicated the importance of consumer and short-term funding, non-interest earning assets, and overhead in promoting bank profits.

They suggested that the regulatory tax factors are important in the determination of bank performance.

Favorable macroeconomic environment seems to stimulate higher profits. Finally, the size of the banking system has negative impact on the profitability except net non-interest margin. Demirguc Kunt, A Laven, L and Levine, R (2004) examine the impact of bank regulations, market structure, and national institutions on bank net interest margins and overhead costs using data on over 1,400 banks across 72 countries while controlling for bank-specific characteristics.

The data indicate that tighter regulations on bank entry and bank activities boost the cost of financial intermediation. Inflation also exerts a robust, positive impact on bank margins and Overhead costs. While concentration is positively associated with net interest margins, this Relationship breaks down when controlling for regulatory impediments to competition and Inflation. Furthermore, bank regulations become insignificant when controlling for national

indicators of economic freedom or property rights protection, while these institutional indicators robustly explain cross-bank net interest margins and overhead expenditures. Thus, bank regulations cannot be viewed in isolation; they reflect broad, national approaches to private property and competition.

Using bank-level data, Claessens and Laeven (2004) estimate the extent to which changes in input prices are reflected in revenues earned by specific banks in 50 countries banking systems.

They then relate this competitiveness measure to indicators of countries banking system structures and regulatory regimes. The authors find systems with greater foreign bank entry and fewer entry and activity restrictions to be more competitive. They find no evidence that the competitiveness measure negatively relates to banking system concentration. Their findings confirm that contestability determines effective competition, especially by allowing (foreign) bank entry and reducing activity restrictions on banks.

Peters, D. Raad, E. and Sinkey F. Joseph (2004) analyzed the performance and balance-sheet characteristics of banks in post-war Lebanon for the years 1993 to 2000 and for a control group of banks from five other countries in the Middle East for the years 1995 through 1999. The number of Lebanese banks included in their sample varies by year and ranges from 66 to 54 banks per year. They compared their sample banks with a control group of 52 banks from five countries, including United Arab Emirates (18 banks), Saudi-Arabia (10), Kuwait (8), Bahrain (9), and Oman (7). They employed the accounting return-on-equity (ROE) model to investigate profitability and leverage. The components of bank profitability are analyzed by focusing on net interest margin (NIM). This study employed regression models that relate bank profitability ratios to various explanatory variables. This study tests the relationships between bank profitability and size, asset portfolio composition, off-balance sheet items, ownership by a foreign bank, and the ratio of employment to assets. The results suggest that cross-sectional variation among banks play a major role in explaining ROA. Their models show a strong association between economic growth and bank profitability, whether measured by ROE or ROA. They found that Lebanese banks are profitable, but not as profitable as a control group of banks from five other countries located in the Middle East.

Athanasoglou, P. Delis, M. and Staikouras, (2006) examined the profitability behavior of bank specific,

Industry-related and macroeconomic determinants, using an unbalanced panel dataset of South Eastern European (SEE) credit institutions over the period 1998-2002. This paper used

annual bank level and macroeconomic data from seven SEE countries. The bank variables are obtained from the Bank Scope database, the macroeconomic variables from the IMFs International Financial Statistics (IFS) and the banking reform index from the European Bank for Reconstruction and Development (EBRD). Return on assets and return on equity are chosen as proxies for bank profitability. Among the independent variables analyzed were liquidity, credit risk, capital adequacy, operating expense, management quality, size, concentration, inflation and economic activity. The least squares methods of fixed effects and random effects models were applied in the analysis. The estimation results indicate that, with the exception of liquidity, all bank-specific determinants significantly affect bank profitability in the anticipated way. A key result is that the effect of concentration is positive, which provides evidence in support of the Structure-conduct performance hypothesis. In contrast, a positive relationship between banking reform and profitability was not identified, whilst the picture regarding the macroeconomic determinants is mixed. The paper was concluding that some remarks on the practicality and implement ability of the findings.

Pasiouras and Kosmidou (2007) examined how banks specific characteristics and the overall banking environment affect the profitability of commercial domestic and foreign banks operating in the 15 European Union countries over the period 1995-2001. This study used return on average assets (ROAA) to evaluate banks performance. Four bank characteristics are used as internal determinants of performance. These are the banks total assets, the cost to income ratio, the ratio of equity to assets, the ratio of bank loans divided by customers and short term funding and bank size. In addition, six external determinants are used to examine the impact of environment on banks performance. Two sets of variables have been considered in this study, indicating macroeconomic conditions and financial structure characteristics. The two macroeconomic variables used are gross domestic product growth and inflation. In order to examine this study used the ratios stock market capitalization to GDP, stock market capitalization to total assets of deposit money banks, total assets of deposit money banks to GDP and banking industry concentration. Their sample is a balanced panel data set of 584 commercial banks operating in the 15 EU countries over the period 1995-2001 consisting of 4088 observations. Banks were split according to their ownership resulting in two sub-samples of 332 domestic and 218 foreign banks. All financial and ownership data of individual banks as well as information concerning market concentration were drawn from Bank Scope database. Country and market specific data were obtained from Euro Monitor International Database (EMID) which collects data from sources such as International

Monetary Fund's (IMF), International Financial Statistics (IFS), World Economic Outlook (WEO)/National Statistics (UNS) and World Bank (WB). The results indicated that profitability of both domestic and foreign banks is affected not only by banks specific characteristics but also by financial market structure and macroeconomic conditions. Capital strength and efficiency in expenses management were found to be the main determinants of ROAA in all cases as the relatively high significant coefficients of the equity to assets and cost to income ratios showed. Equity to assets was positively related to ROAA and appeared to be the most significant determinant of profitability. The impact of the indicators of Macroeconomic conditions on ROAA is significant in all cases.

Olson and Zoubi (2008) in their paper, tried to determine whether Islamic and conventional banks in the Gulf Cooperation Council (GCC) region are distinguishable from one another on the basis of financial characteristics alone. They collected 237 observations, or bank-years of data, for 141 conventional and 96 Islamic banks operating in the Gulf Cooperation Council (GCC) during the period 2000-2005. They input 26 financial ratios in to log it, neural network, and k means nearest neighbor classification models to determine whether researchers or regulators could use these ratios to correctly categorize a bank as Islamic or conventional. These 26 financial ratios fall into five general categories: profitability, efficiency, asset quality, liquidity and risk. The empirical results of this study indicated that measures of bank characteristics are good discriminators between Islamic and conventional banks in the Gulf Cooperation Council (GCC) region. An initial glance at the data reveals that most accounting ratios are similar for Islamic and conventional banks. Nevertheless, some financial characteristics of Islamic banks are different from those of conventional banks. Results from their classification models implied that the operational characteristics of the two types of banks may be different. Islamic banks are more profitable than conventional banks, but probably not quite as efficient. They discovered that nonlinear classification techniques are able to correctly distinguish Islamic from conventional banks in out-of-sample tests at about a 92% success rate.

Heffernan and Fu (2008) identified the determinants of South Asian banks performance and assessed whether recent reforms had any effect. The sample covered 76 banks between 1999 and 2006. Most of the data used here come from Bank Scope. Ten bank-specific independent variables and three macroeconomic explanatory variables were analyzed in this study. While four dependent variables used in this study as the performance measures of banks. They were Economic Value Added (EVA), Return on Average Assets (ROAA), Return on Average

Equity (ROAE), and Net Interest Margin (NIM). This study employed the system Gaussian Mixture Model (GMM) model to assess the determinants of South Asian bank performance. A fixed effects panel data model is also estimated to allow comparison of results, and as robustness check. Among the results obtained are cost to income ratio is negatively signed and significant to Profitability. On the contrary, Loan Loss Reserve Ratio (LLR) produced a positive and significant coefficient. The results also reported that the macroeconomic variable that performed best in this study is the real GDP growth rate, followed by the unemployment rate. From the results it is confirmed that the system Gaussian Mixture Model (GMM) model is the preferred method of estimation. The study also looked at the question of which of four performance measures work best. Based on diagnostics and the significance of coefficients, the results suggested the best dependent variables are Economic Value Added (EVA) and the Net Interest Margin (NIM), as against Return on Average Assets (ROAA) or Return on Average Equity (ROAE).

2.2.2. Studies in single Countries

This sub section presents some of the single country studies reviewed by the researcher chronologically.

Guru et al. (2002) investigate the determinants of bank profitability in Malaysia. They used a sample of 17 commercial banks during the 1986 to 1995 period. The profitability determinants were divided into two main categories, namely the internal determinants (liquidity, capital adequacy, and expenses management) and the external determinants (ownership, firm size, and economic conditions). The findings revealed that efficient expenses management was one of the most significant in explaining high bank profitability. Among the macro indicators, high interest ratio was associated with low bank profitability and inflation was found to have a positive effect on bank performance.

Chantapong (2005) investigates the performance of domestic and foreign banks in Thailand during the period 1995 to 2000. All banks were found to have reduced their credit exposure during the crisis years and have gradually improved their profitability during the post-crisis years. The results indicate that foreign bank profitability is higher than the average profitability of the domestic banks although importantly, in the post-crisis period, the gap between foreign and domestic bank profitability has closed, suggesting that the financial restructuring program has yielded some positive results.

Kosmidou, Tanna and Pasiouras (2006) investigated the impact of bank-specific characteristics, macroeconomic conditions and financial market structure on UK owned

commercial banks profits, measured by Return on Average Assets (ROAA) and Net Interest Margins (NIM).

An unbalanced panel data set of 224 observations, covering the period 1995-2002, provided the basis for the econometric analysis. They relied on two commonly used measures of profit performance namely Return on Assets (ROA) and Net Interest Margin (NIM). The five measures used as internal determinants of performance are: cost to income ratio as an indicator of efficiency in expenses management, ratio of liquid assets to customer and short term ratio of loan loss reserves to gross loans as an indicator of banks asset quality, ratio of equity to total assets representing capital strength, and the total assets of a bank representing its size.

Turning to external determinants, four measures were considered, two of which represent the influence of Macroeconomic conditions and the other two of financial market structure. The results showed that capital strength, represented by the equity to assets ratio, is the main determinant of UK banks profits. The other significant determinants are cost-to-income ratio and bank size, both of which impact negatively on bank profits.

Athanasoglou *et al.* (2008) examined the effect of bank-specific, industry-specific and macroeconomic determinants of bank profitability of Greek commercial banks and covers the period 1985-2001. They employed an empirical framework that incorporates the traditional Structure-Conduct-Performance (SCP) hypothesis. The profitability variable is presented by two alternative measures: the ratio of profits to assets, i.e. the Return on Assets (ROA) and the profits to equity ratio, i.e. the Return on Equity (ROE). Five bank-specific factors used to test the correlation with bank profitability. Capital variable which is proxied by equity to assets ratio, and productivity growth variable produced a positive and significant relationship with profitability.

Next, credit risk and operating expenses management were found to be negatively significant. Lastly, the effect of bank size on profitability was found to be not important. Two industry-specific profitability determinants utilized namely ownership and concentration was found to be insignificant in affecting the profitability. Macroeconomic control variables, such as inflation and cyclical output, clearly affect the performance of the banking sector. In conclusion, their findings indicated that all bank-specific determinants, with the exception of size, affect bank profitability significantly in the anticipated way.

Ben Naceur and Goaied (2008) examine the impact of bank characteristics, financial structure, and macroeconomic conditions on Tunisian banks net-interest margin and profitability during

the period of 1980 to 2000. They suggest that banks that hold a relatively high amount of capital and higher overhead expenses tend to exhibit higher net-interest margin and profitability levels, while size is negatively related to bank profitability. During the period under study, they find that stock market development has positive impact on banks profitability. The empirical findings suggest that private banks are relatively more profitable than their state owned counterparts.

The results suggest that macroeconomic conditions have no significant impact on Tunisian banks profitability.

A study on bank profitability is also been achieved by Dietrich and Wanzenried (2009) focusing on 453 Swiss Commercial Banks over the period of 1999 to 2006, it has 1919 observations. The research includes the recurrent determinants such as bank-specific, industry-specific and macroeconomic factors. Most interestingly, their results demonstrate the existence of significant differences in profitability between the Swiss Commercial Banks and the determinants listed above are the main influences behind this positive impact on profitability. Some controversy matters are also listed, Banks in Lake Geneva region are slightly profitable than Banks in the Zurich region. Furthermore results also show that foreign banks are clearly less profitable compared to public banks. And also, some of macroeconomic variable such as effective tax rate and market concentration rate have negative effect on profitability.

2.2.3 Earlier studies on Ethiopian banking industry

The determinants of profitability are empirically well explored although the definition of Profitability varies among studies. Disregarding the profitability measures, most of the banking Studies such as (Belayneh, 2011, Amdemikael, 2012, Birhanu, 2012, Habtamu, 2012, Samuel, 2015) have noticed that both the internal environment of the organization and external Environments are important drivers of high profitability. Belayeneh in his study he classified the factors which affect profitability of commercial banks in two categories namely internal and external drivers or factors of Profitability.

Belayneh (2011), examine the impact of bank-specific, industry specific and macroeconomic determinants of Ethiopian commercial banks profitability. The study applied the balanced panel data of seven Ethiopian commercial banks that covers the period 2001- 2010.the estimation result shows that all bank-specific determinants, with the exception of saving deposit, significantly affect commercial banks profitability in Ethiopia. Market concentration is also a significant determining factor of profitability. Generally, the study find that all bank

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specific factors (with the exception of saving deposit), market concentration, as well as economic (GDP) growth significantly affect Ethiopian commercial banks profitability for the last 10 years.

Damena (2011) in his study examined the determinants of Ethiopian commercial banks profitability. The study applied the balanced panel data of seven Ethiopian commercial banks that covers the period 2001- 2010. The paper used Ordinary Least Square (OLS) technique to investigate the impact of some internal as well as external variables on major profitability indicator i.e., ROA. The estimation results showed that all bank-specific determinants, with the exception of saving deposit, significantly affect commercial banks profitability in Ethiopia.

Market concentration was also a significant determining factor of profitability. Habtamu (2012), study to investigate determinants of private commercial banks profitability in Ethiopia by using panel data of seven private commercial banks from year 2002 to 2011. The study used quantitative research approach and secondary financial data are analyzed by using multiple linear regressions models for the three bank profitability measures; Return on Asset (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). Fixed effect regression model was applied to investigate the impact of capital adequacy, asset quality, managerial efficiency, liquidity, bank size, and real GDP growth rate on major bank profitability measures i.e., (ROA), (ROE), and (NIM) separately. Beside this the study used primary data analysis to solicit managers perception towards the determinants of private commercial banks profitability. The empirical results shows that bank specific factors; capital adequacy, managerial efficiency, bank size and macro-economic factors; level of GDP, and regulation have a strong influence on the profitability of private commercial banks in Ethiopia. Thus, management bodies of private commercial bank should strive to strengthen the identified significant factors and government bodies should also see the adverse effect of tight policies imposed on the existing private banks as well as for the new entrants.

Birhanu (2012) examine the effect of bank-specific, industry-specific and macroeconomic determinants of Ethiopian commercial banking industry profitability from the period 2000 – 2011. By using OLS estimation method to measure the effect of internal and external determinants on profitability in terms of average returns on asset and net interest margin. The estimation results show that profitability persists in some extent, implies that the indicator of the existence of relatively fairly competitive market in Ethiopian commercial banking environment, especially competition between private banks. Regarding the explanatory

variables, all bank-specific determinants, with the exception of bank size, expense management and credit risk, affect bank profitability significantly and positively in the anticipated way. However, bank size, expense management and credit risk affect the commercial banks profitability significantly and negatively. In addition to this, no evidence is found in support of the presence of market concentration. Finally, from macroeconomic determinants GDP has positive and significant effect on both asset return and interest margin of the bank. But interest rate policy has significant and positive effect only on interest margin.

The commercial banks of Ethiopia policy makers and managers should give high concern to the credit risk management, expense management and large bank size management in order to reduce the hindrance of the profitability of the banks.

Amdemikael (2012) examined the determinants of Ethiopian commercial banks profitability. The study applied the balanced panel data of eight Ethiopian commercial banks that covers the period 2001- 2011. The study adopts a mixed methods research approach by combining documentary analysis and in-depth interviews to investigate the impact of some internal as well as external variables on major profitability indicator i.e., ROA. The findings of the study show that capital strength, income diversification, bank size and gross domestic product have statistically significant and positive relationship with banks profitability. On the other hand, variables like operational efficiency and asset quality have a negative and statistically significant relationship with banks profitability. However, the relationship for liquidity risk, concentration and inflation is found to be statistically insignificant.

Abebaw and Depaack (2011) was also investigate the impact of bank-specific characteristics, macroeconomic conditions and financial market structure on Ethiopian commercial banks' profits, measured by return on average assets (ROA). A balanced panel data set of 62 observations, covering the period 2001-2008, provided the basis for the econometric analysis. The results under this study show that capital strength, represented by the equity to assets ratio, bank intermediation ratio represented by banks loans to total assets and bank size represented by assets, are the main determinants of Ethiopian banks profits.

With regard to Size measures, Abebaw and Depaack (2011) size of bank has a positive effect on profitability supporting the economies of scale argument. The impact of overhead to net interest income and nonperforming loan ratios are negative and significant. When he assesses the external factors, they have a relatively small impact on the profitability of Ethiopian banks. He concluded that none of these measures was significant. Thus, overhead, capital

strength and bank intermediation and size measures are important determinants of bank profits in Ethiopia. This shows that the key for success in profit for banks rely on individual bank characteristics implying proper management of activities by individual banks is indispensable to be profitable.

Samuel (2015) examines the main bank-specific, industry-specific and macro-economic factors that can affect Ethiopian banks profitability and to what extent these determinants exert impact on Ethiopian banks profitability and he conclude that almost all the banks had excess liquidity ratio which is above the liquidity requirement set by the NBE. This shows as the Ethiopian banks are still underutilized their capacity as far as they prefer to maintain higher liquidity position rather than putting it on different investments or providing it to customers in the form of loan which in turn results in an increase in their profitability. This was more specifically exaggerated in the large government owned bank, CBE. In doing so, previous studies on bank profitability have been reviewed and it is summarized that the profitability of bank was usually expressed as a function of internal and external determinants. The internal determinants refers to the factors originate from bank accounts (balance sheets and income statement accounts) and therefore could be termed micro or bank-specific determinants of profitability.

The external determinants are variables that are not related to bank management but reflect the economic and legal environment that affects the operation and performance of financial institutions.

Empirical results from previous studies conclude that internal factors explain a large proportion of banks profitability; nevertheless external factors have also an impact on the performance.

A number of explanatory variables have been proposed for both categories, according to the nature and purpose of each study. Studies dealing with internal determinants employ variables such as size, capital adequacy, liquidity risk, operating efficiency, employee efficiency, funding cost etc. while for external determinants, several factors have been suggested as impacting on profitability and these factors can further distinguish between control variables that describe the macroeconomic environment, such as inflation, interest rates and economic growth, and variables that represent industry characteristics. The latter refer to, banking sector development, market concentration, industry size and ownership status.

2.3 Summary and Knowledge gap

In line with the above theoretical as well as empirical review, profitability is important to all business specially for banking industry since the stability of commercial banks depends on their profitability and the whole economy stability of the nation highly related to the stability of commercial banks. It also revealed that banks profitability can be affected by different factors such as bank specific, industry specific and macroeconomic. While this study focused on some of the bank specific, industry specific and macro-economic factors.

Due to the variation of the environment and data included in the analysis the results of various studies differ significantly. However, several researchers identified that there are some common factors which influence profitability of a bank. Summarizing the results from numerous studies, larger bank size, good asset quality, higher proportion of equity capital to asset, greater GDP growth have generally been associated with greater profitability. Various measures of costs are usually negatively correlated with profits. Greater provisions for loan losses, higher liquidity, and more reliance on debt have been lower indicative of lower bank profit.

The review of the literature reveals the existence of many gaps of knowledge in respect of the factors affecting bank profitability, particularly in the context of Ethiopia. As per the review of the literature most of the empirical studies that have been conducted with the aim of identifying factors affecting bank profitability belong to European Union and some emerging markets such as Philippines, Malaysia and Tunisia. Moreover, the literature review also reveals the existence of controversial conclusions that results from different studies made so far. Furthermore, so far as the review of the literature discloses, very scanty work has been done with the objective of identifying the determinants of profitability of banks in Sub Sahara Africa in general and Ethiopia in particular.

The study of Damena (2011) examined the determinants of commercial banks profitability in Ethiopia. The study of Damena (2011) fails to disclose the knowledge gap that exists in the area as far as it limits its scope only in case of seven commercial banks of the country and also overlooked some important variables that are untouched in Ethiopian context and significant from the point of view of the theories and previous empirical studies reviewed above, the study of Demena (2011) also surprisingly fails to include in its sample one of the governments owned commercial bank namely, CBB which have around 106 branches operated throughout the country currently (NBE 2013/14) at that time before merging with Commercial Bank of Ethiopia in 2016. In addition to this, the study fails to disclose the impact of some very

important variables on Ethiopian banks profitability such as efficiency, nonperforming loans and liquidity risk among others.

The study of Belayneh (2011) examined the determinants of commercial banks profitability in Ethiopia. The study of Belayneh (2011) also fails to disclose the knowledge gap that exists in the area.

In addition to this, the study fails to disclose the impact of some very important variables on that untouched in Ethiopian context such as labor efficiency, funding cost and among others.

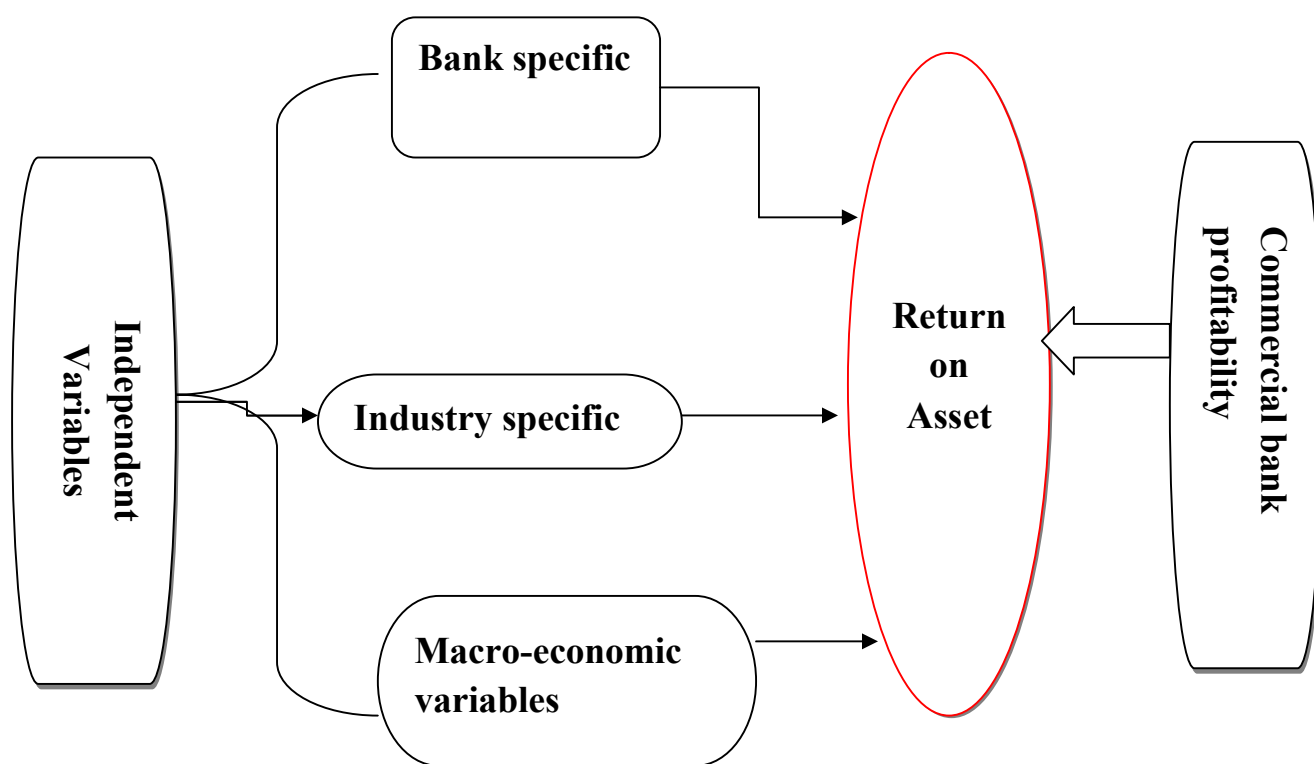
The study of Birhanu (2012) and Amdemikael (2012) was good in many aspects when we compare to prior studies that are conducted on the same area but both Birhanu (2012) and Amdemikael (2012) also fails to include some important variables that are not tested and never touched in Ethiopian context like labor efficiency, funding cost, financial sector development, foreign exchange rate among others.

To summarize in the context of Ethiopia, the related study conducted by Demena (2011), Belayneh (2011), Birhanu (2012) and Amdemikael (2012) examined the determinants of commercial banks profitability in Ethiopia, even if they tries to identify the impact of some bank specific, industry specific and macro-economic variables accordingly, their study clearly failed to identify most of the factors that affect bank profitability significantly and variables that are not tested and new for Ethiopian banking industry. In general, the lack of sufficient research (based on the researcher best knowledge) on the determinants of bank profitability in the context of Ethiopia and the existence of variables that are not tested in Ethiopian banking industry initiate this study. Therefore, the objective of this study is to examine the factors that affect bank profitability in Ethiopia and to fill the knowledge gap that exists in the area by including and testing four new variables (labor efficiency, funding cost, banking sector development and Foreign exchange rate) that are not tested by prior Ethiopian researchers.

2.4 Conceptual Framework for the Study

Different empirical evidences suggested that profitability of commercial banks influenced by internal, industrial and macro-economic factors. This study used both internal, industrial and macro-economic determinants of commercial bank profitability includes bank size, capital adequacy, Liquidity Risk, operating efficiency, management efficiency, employee efficiency, funding cost, banking sector development, real GDP, Inflation Rate and foreign exchange rate.

Figure 2.1 Relations between profitability and its determinants



CHAPTER THREE

3. Research Design and Methods

3.1. Research Design

The main aim of the study is to investigate the determinants of commercial banks profitability in Ethiopia and this study adopted an explanatory design by using balanced panel research technique to realize a stated objective.

As cited from (Baltagi 2005) the advantage of using panel data is that it controls for individual heterogeneity, less co linearity variables and tracks trends in the data something which simple time-series and cross-sectional data cannot provide.

The study employed quantitative research approach by secondary data gathered from financial statement of commercial banks respectively.

3.2. Population and Sample Design

This study examines both internal and external factors that affect the profitability of Ethiopian commercial banks. Thus for the study the target population is all commercial Banks registered by NBE and under operation in the country. Currently, in Ethiopia there is one Public-owned and sixteen private commercial banks which are operating throughout the country NBE (2015/2016). But because of lack of 12 years data that is required for the analysis purpose in most of the lately established private banks are exclude from the study so, the number of sample banks are reduced to eight.

3.3. Data Source and Collection Method

This study used secondary data sources to attain the objective of the study. Audited financial statements of each bank (2005-2016) for consecutive 12 years were utilized. To study the relationship between profitability and macroeconomic factors, the same year data was collected. Accordingly, macroeconomic data was collected from report and Publication of National Bank of Ethiopia and ministry of Finance and Economic Development

3.4. Data analysis and Model Specification

To attain the broad research objective, the paper is primarily based on panel data, which is collected through structured document review. Thus, the collected panel data is analyzed using descriptive statistics, correlations and multiple linear regression analysis. Mean values and standard deviations were used to analyze the general trends of the data from 2005-2016

based on the sector sample of 8 banks and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables.

A multiple linear regression model and t-static is used to determine the relative importance of each independent variable in influencing profitability.

For this study, the regression analysis known as OLS is used to estimate the relationship between profitability and its determinants.

The multiple linear 58 regressions model is run, and thus OLS is conducted using E-views 7 econometric software package, to test the casual relationship between the firm's profitability and their potential determinants and to determine the most significant and influential explanatory variables affecting the profitability of Ethiopian banks.

3.5. Data Collection

In order to analyze the effect of bank specific factors on profitability of banks audited financial Statements of eight banks (CBE, Awash International Bank, Dashen Bank, Abyssinia Bank, Wegagen Bank, United Bank, Nib International Bank, Cooperative Bank of Oromia) for 12 consecutive Years .i.e, from 2005-2016 is collected. The secondary data is also collected through structured document reviews are mainly from the records held by NBE and the banks themselves. Moreover, in order to analyze the relationship that exists between profitability and Macroeconomic variables, macroeconomic data were also collected for the same years. Those Macroeconomic data were mainly gathered from the records held by NBE through structured Document review.

3.6. Operational Definition

Dependent variables

Bank profitability is measured by the ratio of the Return on Average Assets (ROA), Return on Average Equity (ROE), and Net Interest Margin (NIM). (Alexandru et al, 2008).

The **ROA** reflects the ability of a bank's management to generate profits from the bank's assets.

ROE shows the return to the shareholders on their equity. **NIM** shows the difference between interest income and interest expenses as a percentage of total loans and advances which includes deposits with foreign banks, treasury bills and other investments.

ROA shows the profits earned per birr of assets and indicates how effectively the bank's assets are managed to generate revenues. Average assets were used in this study, in order to capture any differences that occurred in assets during the fiscal year. ROA can be calculated as:

Return on Asset (ROA)=Net Profit AfterTax/Average Total Assets

As highlighted by Athanasoglou et al (2008) and Sufian (2011), many scholars suggest that ROA is the key ratio for the evaluation of bank profitability given that ROA is not distorted by high equity multipliers, while ROE disregards the risks associated with high leverage and financial leverage.

Plenty of studies use ROA as profitability measure, (Pasiouras&Kosmidou, 2007, Athanasoglou et al. 2008,Belayneh ,2011,Amdemikael ,2012,Birhanu,2012,Habtamu,2012 , Samuel,2015).

This study is also trying to measure profitability by using ROA similar to most of the above mentioned researchers. ROA is measured as net profit after tax divided by total assets similar to Olweny& Shipho (2011).

Independent variables

This part describes the independent variables that are used in the econometric model to Estimate the dependent variables.

Bank-Specific variables

Bank Size:

The total asset is used a measure for bank size. Bank size is usually used to account for potential economies or diseconomies of scale in the banking sector.

Capital adequacy:

The ratio of Equity to total Asset is employed as a measure for bank Capital Adequacy.

This measures the percentage of the total asset that is financed with equity capital.

Capital adequacy therefore describes the sufficiency of the amount of equity that can absorb shocks that banks may experience.

Liquidity risk:

Liquidity is a prime concern for banks and the shortage of liquidity can trigger bank failure.

Banking regulators also view liquidity as a major concern. This is because banks without sufficient liquidity to meet demands of their depositors risk experiencing bank run.

Loan/deposit

Operating Efficiency

Operating ratio is viewed as a measure of operational efficiency.

Management efficiency: _

The ratio of operating expense to operating income was use and the higher the ratio the lower the managerial efficiency.

$$\text{Managerial efficiency} = \text{Operating Expense} / \text{Operating Income}$$

Employee Efficiency: The people in a bank are the most valuable resources and the major driving force for successes and failures. The quality of human resources employed by a bank greatly affects its profitability.

Staff Salary/Total asset

Funding cost: the interest rate paid by commercial banks for the funds that they deploy in their business, the cost of funds is one of the most important input costs for a financial institution, since a lower cost will generate better returns when the funds are deployed in the form of short term and long-term loans to borrowers.

Industry-specific variables

Banking sector development

Total asset of the industry/GDP

Macroeconomic variables

Gross Domestic Product: The real gross domestic product is the measure of total economic activity within the economy and it is commonly used economic indicator.

Inflation rate: Another important macroeconomic condition which may affect both the costs and revenues of banks is the inflation rate (INFL).

Foreign exchange Rate: Foreign Exchange risk arises when a bank holds assets or liabilities in foreign currencies and impacts the earnings and capital of bank due to the fluctuations in the exchange rates.

Banking regulations

The banking industry is among one of the most heavily regulated industries in the world and Ethiopian banking industry also one the most heavily regulated industry. As quoted from Sudin Haron (1996), the main reason for regulation is to provide a sound, stable and healthy financial system.

3.7 Model adequacy test

Test for Heteroskedasticity

It has been assumed thus far that the variance of the errors is constant, σ^2 - this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroskedastic.

To test for the presence of Heteroskedasticity, the popular white test employed in this study.

Test for Autocorrelation

Assumption that is made of the CLRM's disturbance terms is that the covariance between the error terms over time (or cross-sectional, for that type of data) is zero. In other words, it is assumed that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it would be stated that they are "auto correlated" or that they are "serially correlated". A test of this assumption is therefore required. To test the presence of autocorrelation, the popular Durbin-Watson Test is employed.

Test for normality

As noted in Brooks (2008) a normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. One of the most commonly applied tests for normality; the Bera-Jarque formalizes these ideas by testing whether the coefficient of skewness and the coefficient of excess kurtosis are zero and three respectively. Brooks (2008) also states that, if the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant at 5% significant level.

Test for Multicollinearity

An implicit assumption that is made when using the OLS estimation method is that the explanatory variables are not correlated with one another. If there is no relationship between the explanatory variables, they would be said to be *orthogonal* to one another. If the explanatory variables were orthogonal to one another, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change. Usually, as noted by Hair et al. (2006) correlation coefficient below 0.9 may not cause serious multicollinearity problem. In contrary to this, Kennedy (2008) argued that as any correlation coefficient above 0.7 could cause a serious multicollinearity problem leading to inefficient estimation and less reliable results.

CHAPTER FOUR

4. Data presentation and Analysis

The previous chapter present the research method adopted in the study. The purpose of this study is to present the result of the different methods used. This chapter analysis the determinant of commercial bank profitability using the annual balanced panel data , where all the variables are observed for each cross section and each time period. The study has a time period segment spanning from 2005-2016 and a cross section segment which consider eight commercial bank Such as: CBE, Awash International Bank, Dashen Bank ,Abyssinia Bank, Wegagen Bank, United Bank, Nib International Bank, Cooperative Bank of Oromia.

4.1 CLRM Assumption and Diagnostic Test

Before going advance in to panel data econometric procedures, the first issue is test the assumption of Classical Linear Regression Model (CLRM). Most Prior academic literature, as mentioned in the literature review, examines determinants of banks profitability using different panel data modeling techniques. Among others, Pasiouras and Kosmidou (2007) and Ommeren(2011) use ordinary least squares (OLS) technique in which differences between the observations and estimations are minimized in terms of sum of squares. The characteristics of the model and proposed variables in equation (3) of this research are not violating the classical assumptions underlying the OLS model. These are checked by testing each assumption.

Test for average value of the error term is zero ($E(u_t) = 0$)

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

Test for Heteroskedastic

To test for the presence of heteroscedasticity, the popular white test would be employed in this study. This test involves testing the null hypothesis that the variance of the errors is constant (homoscedacticity) or no heteroscedasticity versus the alternative that the errors do not have constant variance.

In this study as shown in table 4.1, both the F-statistic and Chi-Square versions of the test statistic gave the same conclusion that there is no evidence for the presence of

Heteroskedasticity, since the p-values were in excess of 0.05. The third version of the test statistic, “Scaled explained SS”, which as the name suggests is based on a normalized version of the explained sum of squares from the auxiliary regression, also gave the same conclusion that there is no evidence for the presence of Heteroskedasticity problem, since the p-value was considerably in excess of 0.05.

Table 4.1 Heteroskedasticity Test: White

F-statistic	9.668707	Prob. F (74,21)	0.2393
Obs*R-squared	93.26267	Prob. Chi-Square (74)	0.2713
Scaled explained SS	130.9754	Prob. Chi-Square (74)	0.2183

Source: computed from E-views 7 result

Test for Autocorrelation

According to Chris Brooks (2008), assumption they said that the CLRM’s disturbance terms are the covariance between the error terms over time (or cross-sectional, for that type of data) is zero. In other words, it is assumed that the errors are uncorrelated with one another. In addition he said that if the errors are not uncorrelated with one another, it would be stated that they are “auto correlated” or that they are “serially correlated”. To test this assumption the DurbinWatson (DW) statistical test was applied.

The test for autocorrelation was made by using Durbin and Watson. Durbin Watson (DW) test was for first order autocorrelation, i.e. it tests only for a relationship between an error and its immediately previous value. DW is approximately equals to $2(1 - \hat{\rho})$, where $\hat{\rho}$ is the estimated correlation coefficient between the error term and its first order lag (Brooks 2008). The null hypothesis for the DW test is no autocorrelation between the error term and its lag. According to Brooks (2008), DW has 2 critical values: an upper critical value (dU) and a lower critical value (dL), and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The rejection, non-rejection, and inconclusive regions are shown on the number line in figure 4.1 bellow.

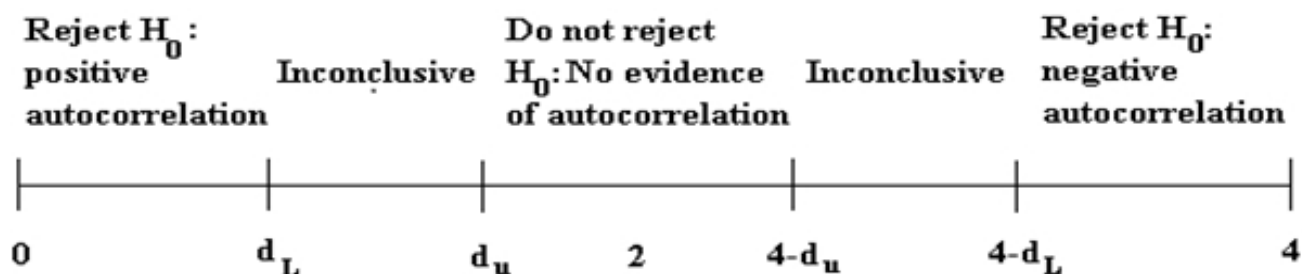


Figure 4.1 Rejection and Non-Rejection Regions for DW Test

The study used the d_L and d_U values for 95 observations as approximation of 96 observations. As per the DW table for 95 observations with 12 explanatory variables at 1% level of Significance, the d_L and d_U values are 1.290 and 1.793 respectively. The Durbin-Watson test statistic value in table 4.2 was 1.576. The DW value of ROA lies in the inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected.

Table 4.2 Autocorrelation Test: Durbin Watson

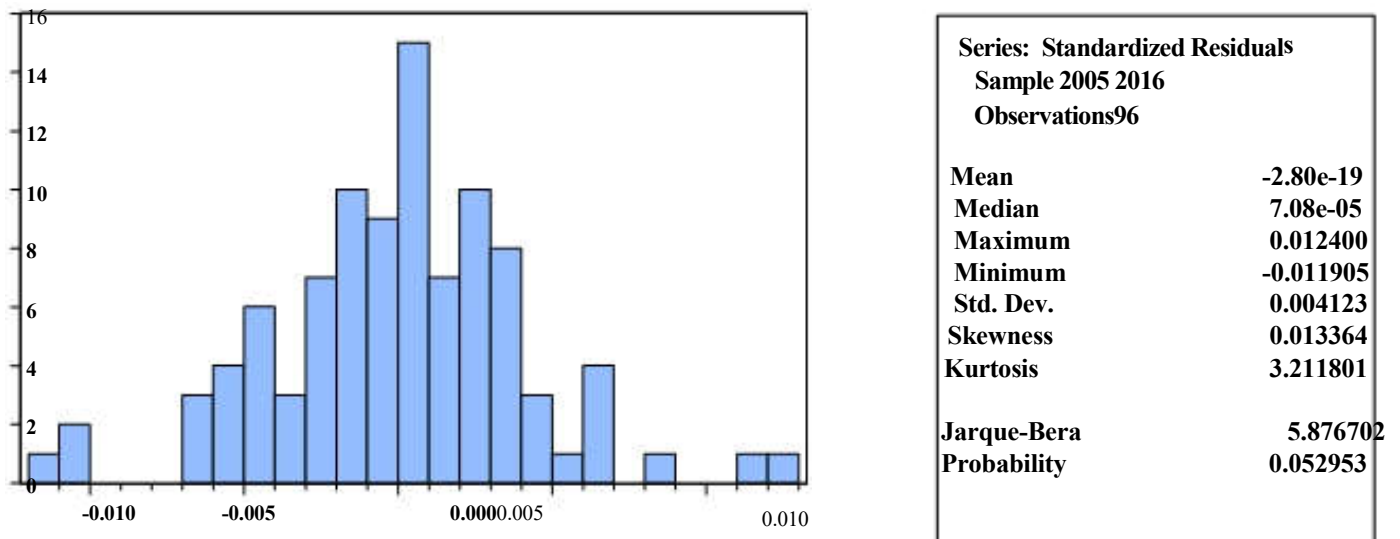
Variables	DW test static result
All bank specific, industry specific and macro-economic variables	1.58

Source: computed from E-views 7 result

Test for Normality

Another third important diagnostic test conducted in this paper is the normality assumption (i.e. the normally distributed errors). Brooks (2008) stated that the normality assumption ($u_t \sim N(0, \sigma^2)$) is required in order to conduct single or joint hypothesis tests about the model parameters. One of the most commonly applied tests for normality is the Bera-Jarque (BJ) test. BJ uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments – the mean and the variance Brooks (2008). In case of this study, the researcher used BJ normality test to test the null hypothesis of normally distributed errors assumptions. As shown in figure 4.2 since, the histogram is bell-shaped and the Bera-Jarque statistic is not significant. This means that the p-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null hypothesis of normality at the 5% level so, the residuals are normally distributed in this study, concluded that there was no problem of normality on ROA model.

Figure 4.2 Normality test for residuals



Source: computed from E-views 7 result

Test for Multicollinearity

The final test which is conducted in this study is the multicollinearity test, this help to identify the correlation between explanatory variables and to avoid double effect of independent variable from the model. The next table described correlation among explanatory variable.

According to Gujarati (2004), the standard statistical method for testing data for multicollinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in this study correlation matrix for eleven of the independent variables shown below in table 4.3 had been estimated. The results in the following correlation matrix show that the highest correlation was 0.676 which is between foreign exchange rate and banking sector development. Since there is no correlation above 0.7, 0.75 and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, we can conclude in this study that there is no problem of multicollinearity.

Table 4.3 Correlation matrixes of independent

	SIZE	CAP	LIQ	OPE	MGE	EME	FDC	BSD	GDP	INF	FER
SIZE	1										
CAP	-0.37682	1									
LIQ	-0.01257	-0.02941	1								
OPE	-0.49521	0.020666	-0.084463	1							
MGE	0.329447	-0.10036	0.42325	-0.41819	1						
EME	-0.18814	0.480547	-0.05725	0.089074	0.091954	1					
FDC	-0.40424	0.214354	-0.08384	0.650289	-0.38326	0.484704	1				
BSD	0.581774	0.114086	-0.13686	-0.34481	0.226093	0.482339	0.132205	1			
GDP	0.316992	-0.05925	0.071982	-0.50882	0.298028	0.057042	-0.31619	0.263393	1		
INF	0.390397	0.044125	0.083288	-0.44446	0.178627	0.162385	-0.1009	0.472468	0.306383	1	
FER	0.546216	0.118981	-0.11197	-0.27104	0.24655	0.47988	0.173279	0.675884	0.167192	0.356	1

Source: computed from E-views 7 result

Test for Choosing Random effect (RE) versus fixed effect (FE) models

To test the relationship between these commercial banks profitability (ROA) and identified profitability determinants, the theoretical model is developed based on the finance theory from the methodological part of this study. The important issue from the equation (1) panel model is, it is not specified whether it is fixed effects or random effects model. So the focal point the researcher concern here is, to examine whether individual effects are fixed or random. Because, there are broadly two classes of panel data estimator approaches that can be employed in empirical research: fixed effects models and random effects models. This also requires the high concern when the researcher employed the panel data approaches.

According to Gujarati (2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model (FEM) and random effect model (REM). Hence the choice here is based on computational convenience. On this score, FEM may be preferable. Since the number of time series (i.e. 12 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks), FEM is preferable in this case.

According to Brooks (2008); Verbeek (2004) and Wooldridge (2006), it is often said that the REM is more appropriate when the entities in the sample can be thought of as having randomly selected from the population, but a FEM is more plausible when the entities in the sample effectively constitute the entire population/sample frame. Hence, the sample for this study was not selected randomly and equals to the sample frame FEM is appropriate.

4.2 Descriptive Statistics of the data

Table 4.5 presents the outcomes of the descriptive statistics for main variables involved in the regression model. The dependent variable is ROA. The remaining are the independent variables such as: SIZE, CAP, LIQ, OPE, MGE, EME, FDC, BSD, GDP, INFL, FER , Key figures, including mean, median, standard deviation, minimum and maximum value were reported. This was generated to give overall description about data used in the model and served as data screening tool to spot unreasonable figure.

Table 4.4 Descriptive Statistics

Variables	Observation	Mean	Median	Max	Min	Sta. Dev
ROA	96	0.024589	0.027001	0.040283	0.003413	0.009281
SIZE	96	22.26681	22.20619	26.007	19.5649	1.295091
CAP	96	0.112544	0.109688	0.280255	0.011223	0.041291
LIQ	96	0.494831	0.47995	0.782	0.2153	0.142753
OPE	96	0.714355	0.664573	2	0.50078	0.17949
MGE	96	0.403941	0.401007	0.613608	0.181818	0.090699
EME	96	0.010401	0.010427	0.017686	0.004915	0.003069
FDC	96	0.023709	0.023769	0.059701	0.010677	0.006962
BSD	96	0.264682	0.223627	0.499683	0.140592	0.112186
GDP	96	0.090769	0.108772	0.126442	-0.02	0.043449
INFL	96	0.14202	0.122121	0.364	-0.10572	0.126824
FER	96	11.33265	9.0192	18.19471	8.5425	3.624989

Source: computed from E-views 7 result

According to table 4.4, all variables comprised 96 observations and the profitability measure used in this study namely; ROA indicates that the Ethiopian banks attained, on average, a positive after tax profit over the last twelve years. For the total sample, the mean of ROA was 2.45% with a minimum of 0.3% and a maximum of 4%. That means the most profitable bank among the sampled banks earned 4% of profit after tax for a single birr invested in the assets of the firm. On the other hand, the least profitable bank of the sampled banks earned 0.3 cents of profit after tax for each birr invested in the assets of the firm. The standard deviation statistics for ROA was (0.009) which indicates that the profitability variation between the selected banks was very small. The result implies that these banks need to optimize the use of their assets to increase the return on their assets.

Regarding the explanatory variables of the model there are some interesting statistics that have to be mentioned. Despite the small dispersion in the minimum and maximum observation of ROA there could be seen relatively high variation in the equity to asset ratio. On average, the equity-to-asset ratio equals 11.25% with a maximum of 28.02%, which was considerably above the statutory requirement of NBE, even if it's minimum value was 1.12%. The standard deviation Statistics for capital adequacy was (0.041) which shows the existence of relatively higher variation of equity to asset ratio between the selected banks compared to the variation in ROA. On the other hand, the outputs of the descriptive statistics indicate that, the ratio of liquid assets to total assets was 49.5%, on average, with a minimum of 2.15% and a maximum of 78.2%. This means despite the inverse relationship that exists between liquidity and profitability, the liquidity measure indicates that the Ethiopian commercial banks have, on average, a higher liquidity position which was somewhat higher than the statutory requirement of 15% for the last twelve years.

Furthermore, another interesting observation is that there was somewhat a higher variation in the cost-to-income ratio indicated by the range between 200% and 50%. The mean of the cost-to-income ratio equals 71.4%. The relatively higher range between the minimum and maximum value implies that the most efficient bank has a quite substantial cost advantage compared to the least efficient bank. It is especially important to notice that the mean of banking sector development was 26.4%, meaning that the banking sector development of the Ethiopian banking sector during the analyzed period 2005-2016 was high. On the other hand bank size which is measured by natural log of total asset had the highest standard deviation next to foreign Exchange rate (1.295), which means it is the most deviated variable from its mean next to foreign exchange rate (3.625) compared to other variables. The smallest standard deviation was reported in employee efficiency which was (0.003) and shows the existence of less variation among the Ethiopian banks in diversifying their source of revenue.

Table 4.4 also shows that the mean real GDP growth in Ethiopia for the last twelve years was 9.07%, with a maximum of 12.64% and a minimum of -2%. Table 4.4 also presents for GDP a small standard deviation of (0.043); this implies that economic growth in Ethiopia during the period of 2005 to 2016 remains reasonable stable and the result of this stable economic growth contribute positively to the commercial banks profitability. The other macro-economic variable employed in this study INFL, had somewhat a higher standard deviation (0.126) compared to

GDP; this implies that inflation rate in Ethiopia during the study period remains somewhat unstable. The last but not the least macroeconomic variable employed in this study FER, had the higher standard deviation (3.625) compared to other remaining variables employed in the study; this implies that the foreign exchange rate in Ethiopia during the study period remains highly unstable.

4.3 Correlation analysis

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

As a sample size approaches to 100, the correlation coefficient of about or above 0.20 is significant at 5% level of significance (Meyers et al. 2006). The sample size of the study was 8*12 matrixes of 96 observations which was around 100 hence the study used the above justification for significance of the correlation coefficient. Table 4.5 bellow shows the correlation coefficient between the dependent variables and independent variables.

Table 4.5 Correlation matrix of dependent and independent variables

	ROA	SIZE	CAP	LIQ	OPE	MGE	LAE	FDC	BSD	GDP	INFL	FER
ROA	1											
SIZE	0.376366	1										
CAP	0.27143	-0.37682	1									
LIQ	-0.1083	-0.01257	-0.02941	1								
OPE	-0.68975	-0.49521	0.020666	-0.08463	1							
MGE	0.345804	0.329447	-0.10036	0.42325	-0.41819	1						
EME	0.286383	-0.18814	0.480547	-0.05725	0.089074	0.091954	1					
FDC	-0.2212	-0.40424	0.214354	-0.08384	0.650289	-0.38326	0.484704	1				
BSD	0.499926	0.581774	0.114086	-0.13686	-0.34481	0.226093	0.482339	0.132205	1			
GDP	0.542392	0.316992	-0.05925	0.071982	-0.50882	0.298028	0.057042	-0.31619	0.263393	1		
INFL	0.455654	0.390397	0.044125	0.083288	-0.44446	0.178627	0.162385	-0.1009	0.472468	0.306383	1	
FER	0.438103	0.546216	0.118981	-0.11197	-0.27104	0.24655	0.47988	0.173279	0.675884	0.167192	0.355989	1

Source: computed from E-views 7 result

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

As could be seen in the above table 4.5, the real GDP growth rate was the most positively correlated variable with ROA. This correlation clearly shows that, as the real GDP growth rate increases, profitability also moves to the same direction. On the other hand, the cost to income ratio and the ratio of interest expense to total deposit seems to be negatively correlated with the profitability measure, indicating that, when the cost and interest expense increase, profitability moves to the opposite direction. The liquidity of banks was negatively correlated with ROA, indicated by the correlation of (-0.1083) between liquid assets to total asset ratio and ROA. But the linear relationship between LIQ and ROA was statistically not different from zero. In contrary to the liquidity, the SIZE, CAP, MGE and EME were positive and significant correlated with profitability with a correlation of (0.376366), (0.27143), (0.345804) and (0.286383) respectively. Continuing to the correlations of the industry level variable total asset of the industry to real GDP ratio had positively correlated with ROA. The correlation for this variable was (0.499926). Similarly, all the macro economic variables used in this study, real GDP growth rate, inflation rate and foreign exchange rate had positive and significant correlation with ROA with a correlation of (0.542392), (0.455654) and (0.438103) respectively.

4.5 Results of regression analysis

Under the following regression outputs the beta coefficient may be negative or positive; beta indicates that each variable's level of influence on the dependent variable. P-value indicates at what percentage or precession level of each variable is significant. R2 values indicate the explanatory power of the model and in this study adjusted R2 value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models.

Empirical model: As presented in the third chapter the empirical model used in the study in order to identify the factors that can affect Ethiopian banks profitability was provided as follows:

$$ROA_{it} = \alpha + \beta_1(SIZE)_{it} + \beta_2(CAP)_{it} + \beta_3(LIQ)_{it} + \beta_4(OPE)_{it} + \beta_5(MGE)_{it} + \beta_6(EME)_{it} + \beta_7(FDC)_{it} + \beta_8(BSD)_{it} + \beta_9(GDP)_{it} + \beta_{10}(INFL)_{it} + \beta_{11}(FER)_{it} + \varepsilon_{it}$$

The estimation result of the operational panel regression model used in this study is presented in table 4.6. From table 4.6 the R-squared statistics and the adjusted-R squared statistics of the model was 80.26% and 75.65% respectively. The result indicates that the changes in the independent variables explain 75.65% of the changes in the dependent variable. That is Size, equity to total asset ratio, liquidity risk, operational efficiency, management efficiency, employee efficiency, funding cost, banking sector development, gross domestic product, inflation rate and foreign exchange rate collectively explain 75.65% of the changes in ROA. The remaining 24.35% of changes was explained by other factors which are not included in the model. Thus these variables collectively, are good explanatory variables of the profitability of commercial banks in Ethiopia. The null hypothesis of F-statistic (the overall test of significance) that the R² is equal to zero was rejected at 1% as the p-value was sufficiently low. F value of 0.000 indicates strong statistical significance, which enhanced the reliability and validity of the model based on the results shown in table 4.6, all bank-specific independent variables except management efficiency, employee efficiency had statistically significant impact on profitability.

Banking sector development, the only industry specific independent variable has also significant impact on profitability. On the other hand, among the three macro-economic independent variables used in this study the only significant variable was GDP.

Among the significant variables, Size, capital, liquidity and operating efficiency were significant at 1% significance level since the p-value for the above variables were almost 0.000. Whereas banking sector development were significant at 5% significance level. Finally, funding cost and real GDP growth rate was significant at 10% significance level (p-value=0.0587 and 0.0744) respectively.

Table 4.6 Regression Result for factors affection Ethiopian banks profitability

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.125878	0.037031	-3.399223	0.0011
SIZE	0.007594	0.001848	4.108453	0.0001***
CAP	0.084914	0.019906	4.265685	0.0001***
LIQ	-0.016453	0.005165	-3.185599	0.0021***
OPE	-0.029998	0.004909	-6.111082	0.0000***
MGE	0.007474	0.010293	0.726076	0.4700
EME	-0.49898	0.372788	-1.338530	0.1847
FDC	-0.281908	0.146907	-1.918950	0.0587*
BSD	-0.062690	0.031415	-1.995535	0.0495**
GDP	0.030420	0.016817	1.808921	0.0744*
INFL	0.000555	0.005745	0.096620	0.9233
FER	0.000938	0.000851	1.101756	0.2740
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.802631	Mean dependent var	0.024589	
Adjusted R-squared	0.756492	S.D. dependent var	0.009281	
S.E. of regression	0.004580	Akaike info criterion	-7.759096	
Sum squared resid	0.001615	Schwarz criterion	-7.251569	
Log likelihood	391.4366	Hannan-Quinn criter.	-7.553945	
F-statistic	17.39620	Durbin-Watson stat	1.576061	
Prob (F-statistic)	0.000000			

***, **, and * denote significance at 1%, 5%, and 10% levels respectively.

Source: computed from E-views 7 result

Besides, table 4.6 also shows that the coefficient of liquidity risk, operational efficiency, employee efficiency, funding cost and banking sector development against ROA were negative as far as the coefficients for those variables are negative (-0.016453), (-0.029998), (-0.49898), (-0.281908) and (-0.062690) respectively. This indicates that there was an inverse relationship between the aforementioned five independent variables and ROA. Thus the increase of those variables will lead to a decrease in ROA

On the other hand, variables like size, capital adequacy, management efficiency, gross domestic product, inflation rate and foreign exchange rate had a positive relationship with profitability as far as their respective coefficients were (0.007594), (0.084914), (0.007474), (0.030420), (0.000555)

and (0.000938). This revealed that there was a direct relationship between the above six independent variables and ROA. In general as per the regression results provided in table 4.6 among the 11 repressors used in this study seven of them were significant.

In general, so far, the results of the documentary analysis which includes tests for the classical linear regression model, descriptive statistics, correlation matrix and regression analysis have been presented. The results of the tests for the classical linear regression model showed as the data fit the basic assumptions of CLRMs. On the other hand, the remaining results of the documentary analysis and primary data were used to assess the link that exists between bank-specific, industry-specific and macro-economic determinants of bank profitability (ROA).

4.6. Analysis and discussions

The preceding chapter presented mainly the outputs of the documentary result. Accordingly, based on the outputs presented in the previous chapter, this chapter presents the analysis. The chapter is organized in two sections, the first section, presents the research hypotheses presented in chapter three and the second section discusses the results and attempts to test hypotheses.

4.6.1 Research hypotheses

Hypothesis may be defined a tentative proposition suggested as a solution to problems or as an explanation of some phenomena. Hypothesis can also be defined as a testable, tentative, probable explanation of the relationship between two or more variables that create a state of affair or phenomena.

A hypothesis is an expectation of what the researcher beliefs that he /she might find in the data. It provides a directly testable relational statement facilitates extension of knowledge. Hypothesis should always be in declarative sentence form, and should relate either generally or specifically variables to variables. Hypothesis are formulated either a research problem statement or an existing theory or the finding of previous studies.

As stated in chapter one the broad objective of this study was to identify the factors that affect bank profitability in Ethiopia. Further, as noted in the previous chapters (chapter one and three), in order to achieve this broad objective the study developed the following eleven hypotheses.

Research hypotheses (Ho):

HO1: There is positive/negative relationship between bank size and bank's profitability.

HO2: There is positive/negative relationship between capital adequacy and bank's profitability.

HO3: There is negative relationship between Liquidity Risk and bank's profitability.

HO4: There is negative relationship between operating efficiency and bank's profitability.

HO5: There is positive relationship between management efficiency and bank's profitability

HO6: There is negative relationship between employee efficiency and bank' profitability.

HO7: There is negative relationship between funding cost and bank's profitability.

HO8: There is a negative relationship between banking sector development and bank profitability.

HO9: There is positive relationship between real gross domestic product and bank's profitability.

HO10: There is positive/negative relationship between Inflation Rate and bank's profitability

HO11: There is positive relationship between foreign exchange rate and bank's profitability.

4.7 Analysis of results

This section of the chapter discusses the analysis of the results. The analysis is based on the theoretical framework and the data collected through the data collection instruments. Hence, the analysis focuses mainly on the results of the regression analysis and use open-ended questionnaires to support result obtained from document review for the selected bank-specific, industry-specific and macro-economic factors that have an impact on bank profitability. These selected factors are bank size, capital adequacy, liquidity risk, operational efficiency, management efficiency, employee efficiency, funding cost, banking sector development, real growth domestic product, inflation and exchange rate.

Bank Size

The natural logarithm of total asset (SIZE) was used as proxy for size in the regression model according to the studies of Boyd et al., (1993). The result indicates that size is positive and statistically significant to bank profitability. This implies that bank size induces economies of scale there by making larger banks more profitable. Economies of scale will reduce the cost of gathering and processing information. The larger the bank size, the more profitable the bank. It could also mean that bank size is associated with diversification which may impact favorably on risk and product portfolio. The data of this study shows the size of all Ethiopian commercial banks which is measured by log of total asset is increased for the last 12 years. Consequently, this improvement leads to the profitability of banks in Ethiopia. The result implies that larger banks enjoy the higher profit than smaller banks in Ethiopia banking sector because they are exploiting the benefit of economies of scale. The finding of this study was in consistent with the findings of Akhaveinet al. (1997) and Smirlock (1985) and Damena (2011).

Capital Adequacy

The coefficient of capital adequacy which is measured by the equity to asset ratio was positive and statistically significant at 1% significance level ($p\text{-value}=0.0001$). The positive coefficient for capital adequacy was in favor of the signaling or bankruptcy costs hypotheses and in opposite to the risk-return trade-off hypothesis. Moreover, the coefficient of the ratio of equity to asset which was relatively higher as compared to other variables shows that an increase in capital adequacy will result in increased profitability. This is in line with the expectation as a bank with a sound capital position is able to pursue business opportunities more effectively and has more time and flexibility to deal with problems arising from unexpected losses, thus achieving an increase in profitability. So from the findings we can conclude as capital adequacy was one of the main determinants of profitability of banks in Ethiopia. Further, the finding was also consistent with previous studies of Kosmidou(2008),Pasiouras&Kosmidou(2007),Athanas,(2008), Damena (2011), Amdemikael (2012)and Habtamu(2012)and it also indicates that well capitalized Ethiopian banks face lower costs of going bankrupt, which reduces their cost of funding or that they have lower needs for external funding which results in higher profitability.

Moreover the result was also consistent with the existed reality in the Ethiopian banking industry, which shows the existence of a direct relationship between capital adequacy and bank profitability i.e., the most profitable bank CBE was also the most capitalized bank of the country.

Liquidity risk

Concerning the liquidity risk, the regression results of this study implies that the relation between liquidity risk and ROA is negative and significant at 1% significance level ($p\text{-value}=0.0021$). The variable, liquid assets to total assets ratio was used as a proxy for liquidity in the model. The result indicates that the liquidity variable has a significantly negative influence on bank profitability. This implies that high figures for this variable mean low profitability. Since high figures for this variable denotes low liquidity, higher liquidity is associated with lower profitability. The result is inconsistent with the assertion that holding assets in a highly liquid form tends to reduce income. The result is however in line with the findings of Molyneux et al., (1992) and Guru et al. (1999) who concluded in their study that liquidity negatively correlates with profitability.

Operational efficiency

The coefficient of the ratio of cost to income, which provides information on the efficiency of the company regarding expenses relative to income, was negative and statistically significant at

1% significance level ($p\text{-value}=0.0000$) which is in line with a prior expectation and makes the variable an important determinant of Ethiopian banks profitability. This showed that minimizing commercial banks costs in Ethiopia would certainly improve the banks performance in general and profitability in particular. This finding was consistent with many previous studies, e.g. Sufian & Chong (2008) and Pasiouras & Kosmidou (2007), Trujillo-Ponce (2012). For instance, Sufian & Chong (2008) in their work on the Philippines banks realized as cost to income ratio exhibits a negative and significant impact on Philippines banks profitability. The results imply that an increase/decrease in these expenses reduces/increases the profits of financial institutions operated in Philippines. Coming back to this particular study, the result revealed that in the context of the Ethiopian banking industry like that of Sufian & Chong (2008) result, the ratio of cost to income exhibits a negative and significant impact on the ROA. Thus, the ratio of cost to income was statistically significant in explaining the variability in ROA of commercial banks in Ethiopia. The result generated through primary data also supports the above fact. Therefore, operational efficiency exists as one of the major determinant factor that can influence Ethiopian banks profitability in an unfavorable way. Moreover, this result was also consistent with the existed reality in the Ethiopian banking industry where the efficiency was definitely lower.

Management efficiency

One would expect that the impact of management efficiency on profitability is positive and significant. However, even if the coefficient of management efficiency was positive as expected, it was not statistically significant even at 10% significance level ($p\text{-value}= 0.4700$), insinuating that its influence is negligible. Moreover, the insignificant parameter indicates that the structure does not affect Ethiopian banks profitability. Thus the hypothesis that states there is a significant relationship between management efficiency and profitability may be rejected or data did not support the hypothesis. Referring to previous studies, the results concerning management efficiency are mixed. Vincent (2013) found that the relationship was positive but insignificant relationship between management efficiency and bank profits but, Indranarain (2009), Bourke (1989) and Molyneux & Thornton (1992). Found a significant positive relationship between management efficiency and bank profits.

Funding costs

One would expect that the impact of funding cost on profitability is negative and significant. That means the coefficient of funding cost was negative as expected, at 10% significance level ($p\text{-value}= 0.0587$), funding cost had an important impact on the commercial banks profitability.

in Ethiopia. The result also shows in the recent period, Ethiopian banks have improved their funding structures by replacing volatile wholesale and parental funding with stable customer Deposits. Ethiopian banks took some measures in order to reduce costs because initially wholesale funding came at a higher cost compared to retail but after the expenses were incorporated in a broad deposit-gathering branch network, the net cost of wholesale was actually lower. The wholesale funding approach reduces the asset-liability duration mismatch risk, which is one of the major concerns of Ethiopian banks and this is one of the reasons why these banks were oriented to the wholesale area. So, due to the changes that the Ethiopian banks had passed through we can say that these mutations were the reason why we registered a negative relationship between funding costs and profitability, although the economic theory says otherwise. This confirms and justifies our introduction of these variables in our models as has never been done in any previous literatures in the context of the Ethiopian banking industry like Dietrich and Wanzenried (2009) and Lindblom et al. (2010) that of result, the ratio of cost to income exhibits a negative and significant impact on the ROA.

Banking sector development Concerning the banking sector development, the regression results of this study implies relation between banking sector development and ROA is negative and significant at 5% significance level ($p\text{-value}=0.0495$). The variable, total asset of the industry over real GDP (BSD) was used as a proxy for banking sector development in the model. The result indicates that the banking sector development variable has a significantly negative influence on bank profitability. This implies that high figures for this variable mean low profitability. Since the richer the country, the more active are all financial intermediaries. The greater the development of a country's banks, the tougher is the competition, the greater is the efficiency, and the lower are the bank margins and profits. The result is consistent with DemircucKunt and Huizinga (1998) they using bank-level data for a large number of industrial and developing countries, present evidence about the impact of financial development and structure on bank performance. They measure the relative importance of bank or market finance by the relative size of stock aggregates, by relative trading or transaction volumes, and by indicators of relative efficiency.

Real GDP

Turning to the macroeconomic variables, the researcher observe that real GDP has highly statistical significant and positive impact on ROA at 10% significance level ($P\text{-value}=0.0744$). These results about GDP support the argument of the positive association between economic

growth and the financial sector performance. This shows as the stimulated Ethiopian economy over the study period creates a new and potential demand for financial services. The results for positive coefficients are similar to the parameters that are observed and revealed by the numbers of researchers (e.g. Demirguc-Kunt et al., (1998), Bikker et al., (2002) and Athanasoglou et al., (2008)) concluded that positive and strong correlation existed between economic growth (GDP) and bank profitability. This is because the default risk is lower in upturn than in downturn economy and another important point is higher economic growth may lead to a greater demand for both interest bearing and non-interest bearing financial services.

Inflation

The coefficient of inflation was positive as anticipated, but it was not statistically significant, thus, the effect of inflation on Ethiopian banks profitability is not significant. The findings also suggested that as inflation is not a determinant of bank's profitability in Ethiopia as far as the parameter for this variable is insignificant as illustrated by the large p-values of 0.9233. In terms of inflation impact on ROA, previous studies of Demirguc-Kunt & Huizinga (1999) showed a positive result and this implies that during the period of the study, inflation was anticipated. Which gave banks the opportunity to adjust the interest rates accordingly, resulting in revenues that increased faster than costs, with a positive impact on profitability? Referring to previous studies, the results concerning inflation are mixed. Demirguc-Kunt & Huizinga, (1999) find a positive relationship between inflation rate and bank profitability. However, Pasiouras & Kosmidou (2007) found a negative relationship between inflation rate and bank profits.

Foreign Exchange Rate

The proxy for foreign exchange rate was the official exchange rate it refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).

The coefficient of foreign exchange rate was positive as estimated, but it was not statistically significant, thus, the effect of foreign exchange rate on Ethiopian banks profitability is not significant. The findings also suggested that as foreign exchange rate is not a determinant of bank's profitability in Ethiopia as far as the parameter for this variable is insignificant as illustrated by the large p-values of 0.2740. In relation to previous literature the results for positive coefficients are similar to the parameters that are observed and revealed by the numbers of researchers Evans. O, (2014) and Songul Kakilli (2013). Regardless of the findings of the regression analysis, the result of

the primary data reveals that the foreign exchange rate is one of the major determinants of Ethiopian banks profitability. But, the output of the regression analysis and the questionnaires are in agreement in relation to the direction of the effect of management efficiency as far as both of them proves the existence of positive or direct relationship between foreign exchange rate and profitability of Ethiopian banks.

CHAPTER FIVE

5. Summary of main findings and Conclusions and Recommendations

The prior chapter presents the analysis of the findings, while this chapter deals with the main findings of the study and conclusions and recommendations provided based on the findings of the study. The following sections discussed about the final conclusion remarks of the study and applicable recommendations. Accordingly this chapter is organized into two sections. The first section, section presents the conclusions whereas the second section, presents the recommendations.

5.1. Summary of main findings and Conclusions and Recommendations

The following table 5.1 presents the summary of hypothesized expected sign and actual sign for the relationship between the explanatory variables (independent variables) and banks Profitability (dependent variables).

Table 5.1 Summary of actual and expected signs of explanatory variables on the dependent variables

Explanatory variables	Expected impact on profitability	Actual impacts Profitability (ROA)
SIZE	Positive/negative & Significant	Positive & Significant
CAP	Positive/negative & Significant	Positive & Significant
LIQ	Negative & Significant	Negative & significant
OPE	Negative & Significant	Negative & significant
MEG	Positive & Significant	Positive & insignificant
LAE	Negative & Significant	Negative & insignificant
FDC	Negative & Significant	Negative & significant
BSD	Negative & Significant	Negative & significant
GDP	Positive & Significant	Positive & Significant
INFL	Positive/negative & Significant	Positive & insignificant
FER	Positive & Significant	Positive & insignificant

Source: own computation

This part discussed the analysis of the results of multiple linear regressions model. To summarize the above data analysis Ethiopian banks profitability are highly affected by bank-specific (internal) factors than that of external one that means except management efficiency and employee efficiency all the bank-specific factors included in this study are proved as they were the major determinants of Ethiopian banks profitability. On the other hand, among the external

variables included in this study the only factor that can affect Ethiopian banks profitability was banking sector development and real GDP. Thus, next chapter will discuss the conclusions and recommendations of the study.

5.2. Conclusions

The main purpose of the study was to identify the main bank-specific, industry-specific and macro-economic factors that can affect Ethiopian banks profitability and to what extent these determinants exert impact on Ethiopian banks profitability. In doing so, previous studies on bank profitability have been reviewed and it is summarized that the profitability of bank is usually expressed as a function of internal and external determinants. The internal determinants refers to the factors originate from bank accounts (balance sheets and income statement accounts) and therefore could be termed micro or bank-specific determinants of profitability. The external determinants are variables that are not related to bank management but reflect the economic and legal environment that affects the operation and performance of financial institutions. Empirical results from previous studies conclude that internal factors explain a large proportion of banks profitability; nevertheless external factors have also an impact on the performance.

A number of explanatory variables have been proposed for both categories, according to the nature and purpose of each study. Studies dealing with internal determinants employ variables such as size, capital adequacy, liquidity risk, operating efficiency, employee efficiency, funding cost etc. while for external determinants, several factors have been suggested as impacting on profitability and these factors can further distinguish between control variables that describe the macroeconomic environment, such as inflation, interest rates and economic growth, and variables that represent industry characteristics. The latter refer to, banking sector development, market concentration, industry size and ownership status.

Based on the review on previous studies and banking area theories, the present study investigated the impact of some selected bank-specific, industry-specific and macro-economic factors on the profitability of the Ethiopian banking industry over the period of 2005 to 2016. The bank-specific factors that were used in this study include variables such as size, capital adequacy, liquidity risk, operating efficiency, management efficiency, employee efficiency, and funding cost. On the other hand in this study only one industry-specific variable and three macroeconomic conditions indicator variables were employed (banking sector development, real GDP growth, inflation rate and foreign exchange rate). To comply with the objective of this

research, the study also used an appropriate econometric methodology for the estimation of variables coefficient under fixed effect regression models. The quantitative data were mainly obtained from NBE through documentary analysis in order to identify and measure the determinants of banks profitability. In specific, multiple regression analysis is adopted to measure the effect of determinants on banks profitability quantitatively and primary data also used to supplement the documentary analysis.

For testing the research hypotheses, a sample size of eight Ethiopian commercial banks were selected and the necessary financial data were collected for the time period of 2005 to 2016. The empirical findings and the primary data results on the impact of bank profitability in Ethiopia for the sample suggest the following conclusions.

First, the natural logarithm of total assets has a positive impact on ROA with strong significance coefficient. This indicates that as larger banks of the country experience more significant increases in profitability through economies of scale.

Second, as expected, the result showed a positive relationship between capital adequacy and profitability with strong statistical significance, showing that an increase in capital adequacy will result in increased profitability. This is in line with the expectation as a bank with a sound capital position is able to pursue business opportunities more effectively and has more time and flexibility to deal with problems arising from unexpected losses, thus achieving increased profitability.

Third, as expected the liquidity risk has a negative impact on ROA with strong significance coefficient. This indicates that as banks that hold more liquid asset experience less significant increase in profitability.

Fourth, again as expected, the result showed a negative relationship between operational efficiency and profitability with strong statistical significance. This shows that as minimizing commercial banks operating costs in Ethiopia would certainly improve the banks performance.

Fifth, again as expected, the result showed a negative relationship between funding cost and profitability with statistical significance. This shows that as minimizing commercial banks interest expense in Ethiopia would certainly improve the banks performance.

Sixth, as expected, the result showed a negative relationship between banking sector development and profitability with statistical significance, showing that an increase in banking sector development will result in decrease in profitability. This is in line with the expectation as a greater the development of a country's banks, the tougher is the competition, the greater is the efficiency, and the lower are the bank margins and profits. The more underdeveloped the stock market, the greater are the bank profits.

Lastly, the GDP growth also has statistically significant and positive relationship with profitability. On the other hand, management efficiency, labor efficiency, inflation and foreign exchange rate are factors that have little or no impact on the profitability of Ethiopian banks in this model as far all those variables were not significant even at 10% significance level.

In the Ethiopian banking industry, as per the result of descriptive statistics there was excess liquidity ratio. Almost all the banks had excess liquidity ratio which is above the liquidity requirement set by the NBE. This shows as the Ethiopian banks are still underutilized their capacity as far as they prefer to maintain higher liquidity position rather than putting it on different investments or providing it to customers in the form of loan which in turn results in an increase in their profitability. This was more specifically exaggerated in the large government owned bank, CBE.

5.3 Recommendations

In order to hold up risky surprises and maintaining financial stability, it is vital to identify the determinants that mostly influence the overall performance of Ethiopian commercial banks. Therefore, based on the findings of the study the following possible recommendations were forwarded:

Bank size, capital adequacy, liquidity risk, operational efficiency, funding cost are significant key internal drivers of profitability of commercial banks in Ethiopia. Indeed focusing and reengineering the institutions alongside these indicators could enhance the profitability as well as the performance of the commercial banks in Ethiopia.

The explanatory powers of bank-specific variables are far more important in explaining the variability in ROA for commercial banks in Ethiopia than external variables. But among the

external factors included in this study banking sector development and GDP growth rate exists as significant key drivers of profitability of Ethiopian banks. This is a clear signal to all commercial banks in Ethiopia that they cannot ignore the industry structure and macroeconomic indicators when strategizing to improve on their profits or performance. Thus, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the internal environment and the macroeconomic environment together in fashioning out strategies to improve their performance or profits.

As far as lack of innovative products and fear of risky investments by banks themselves are also factors that can affect Ethiopian banks profitability negatively, Ethiopian banks should try their best in order to provide new banking services and to participate in risky investment areas which may in turn increases their profitability significantly.

In general, as many literatures supports financial intermediation in Ethiopia is still in its early stages even by the standards of other low-income countries: more than 80 percent of the population is unbanked (versus an average of 60-70 percent elsewhere in Africa); and many other metrics such as the total number of banks, banks contribution to GDP, bank accounts per person, branches per person, and bank credit per person are lower in Ethiopia compared to other African countries. Thus, Ethiopian commercial banks should focus to reach this unmet demand of finance by adjusting their strategy with the government regulation.

Finally, the study sought to investigate the factors that influence profitability of commercial banks in Ethiopia. However, the variables used in the statistical analysis did not include all factors that can affect Ethiopian banks profitability. Thus, future research could incorporate factors such as, number of branches, government regulation and broad money supply.

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Appendices

Appendix -I: Tests for the Heteroskedasticity Test: White Heteroskedasticity Test: White

F-statistic	9.668707	Prob. F(74,21)	0.2393
Obs*R-squared	93.26267	Prob. Chi-Square(74)	0.2713
Scaled explained SS	130.9754	Prob. Chi-Square(74)	0.2183

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/19/17 Time: 06:55
Sample: 1 96
Included observations: 96
Collinear test repressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000997	0.010114	-0.098590	0.9224
SIZE	0.000464	0.000796	0.582332	0.5665
SIZE^2	-1.25E-05	1.61E-05	-0.771359	0.4491
SIZE*CAP	-0.000607	0.000319	-1.906505	0.0704
SIZE*LIQ	-6.80E-05	8.67E-05	-0.783983	0.4418
SIZE*OPE	1.46E-05	0.000114	0.128519	0.8990
SIZE*MGE	0.000215	0.000132	1.627118	0.1186
SIZE*EME	-0.009141	0.007928	-1.152951	0.2619
SIZE*FDC	-0.001625	0.001891	-0.859558	0.3997
SIZE*BSD	0.000123	0.000605	0.202998	0.8411
SIZE*GDP	0.000379	0.000400	0.948429	0.3537
SIZE*INFL	0.000144	0.000110	1.317546	0.2019
SIZE*FER	1.04E-05	1.73E-05	0.598754	0.5557
CAP	0.010455	0.006882	1.519192	0.1436
CAP^2	0.007810	0.002784	2.805452	0.0106
CAP*LIQ	0.005294	0.002222	2.382456	0.0267
CAP*OPE	-0.001428	0.001645	-0.868417	0.3950
CAP*MGE	-0.002977	0.003883	-0.766819	0.4517
CAP*EME	-0.084753	0.121191	-0.699333	0.4920
CAP*FDC	-0.186142	0.039344	-4.731155	0.0001
CAP*BSD	-0.006756	0.009702	-0.696340	0.4939
CAP*GDP	0.008351	0.005726	1.458590	0.1595
CAP*INFL	0.003355	0.001850	1.813073	0.0841
CAP*FER	0.000570	0.000289	1.972622	0.0618
LIQ	-0.000698	0.002267	-0.307933	0.7612
LIQ^2	-8.76E-05	0.000263	-0.333555	0.7420
LIQ*OPE	0.002364	0.001102	2.145155	0.0438
LIQ*MGE	0.000522	0.000631	0.827291	0.4174
LIQ*EME	-0.033989	0.019618	-1.732580	0.0978
LIQ*FDC	-0.004880	0.011547	-0.422625	0.6769
LIQ*BSD	0.000282	0.003190	0.088482	0.9303
LIQ*GDP	0.000305	0.002120	0.143706	0.8871
LIQ*INFL	-0.000678	0.000359	-1.887363	0.0730
LIQ*FER	4.37E-05	8.09E-05	0.540717	0.5944
OPE	-0.004758	0.002676	-1.778169	0.0899
OPE^2	0.001127	0.000463	2.436516	0.0238
OPE*MGE	-0.001152	0.001271	-0.906471	0.3750

OPE*LAE	0.061689	0.049036	1.258027	0.2222
OPE*FDC	-0.019396	0.017790	-1.090248	0.2880
OPE*BSD	-0.018550	0.006934	-2.675152	0.0142
OPE*GDP	0.006810	0.001551	4.389209	0.0003
OPE*INFL	0.002548	0.001018	2.503991	0.0206
OPE*FER	0.000535	0.000219	2.438315	0.0237
MGE	-0.003749	0.003459	-1.083831	0.2907
MGE^2	0.000382	0.000683	0.559781	0.5816
MGE*EME	0.030318	0.034857	0.869793	0.3942
MGE*FDC	-0.011821	0.020042	-0.589817	0.5616
MGE*BSD	-0.008924	0.005476	-1.629568	0.1181
MGE*GDP	-0.002029	0.002515	-0.806812	0.4288
MGE*INFL	0.001865	0.000764	2.442604	0.0235
MGE*FER	0.000162	0.000148	1.095902	0.2855
EME	0.175107	0.179394	0.976102	0.3401
EME^2	-1.428004	1.070935	-1.333418	0.1967
EME*FDC	1.289556	0.615878	2.093848	0.0486
EME*BSD	0.341327	0.180313	1.892975	0.0722
EME*GDP	0.084437	0.067717	1.246914	0.2262
EME*INFL	-0.015949	0.025426	-0.627273	0.5372
EME*FER	-0.008467	0.004992	-1.696245	0.1046
FDC	0.077524	0.039518	1.961721	0.0632
FDC^2	-0.373601	0.220544	-1.693995	0.1050
FDC*BSD	0.083806	0.081016	1.034433	0.3127
FDC*GDP	-0.008507	0.038709	-0.219767	0.8282
FDC*INFL	0.026885	0.016555	1.623960	0.1193
FDC*FER	-0.001582	0.002250	-0.703148	0.4897
BSD	-0.026193	0.009561	-2.739618	0.0123
BSD^2	0.025774	0.043820	0.588177	0.5627
BSD*GDP	0.306810	0.136260	2.251661	0.0352
BSD*INFL	0.007259	0.010493	0.691786	0.4966
BSD*FER	-0.000827	0.001536	-0.537999	0.5962
GDP	-0.008561	0.018762	-0.456319	0.6528
GDP^2	-0.105976	0.052569	-2.015937	0.0568
GDP*INFL	-0.060749	0.032383	-1.875953	0.0746
GDP*FER	-0.004527	0.002656	-1.704240	0.1031
INFL	-0.001844	0.001872	-0.984855	0.3359
INFL^2	-0.000789	0.002575	-0.306482	0.7623

R-squared	0.971486	Mean dependent var	2.09E-05
Adjusted R-squared	0.871009	S.D. dependent var	4.03E-05
S.E. of regression	1.45E-05	Akaike info criterion	-19.40405
Sum squared resid	4.41E-09	Schwarz criterion	-17.40065
Log likelihood	1006.394	Hannan-Quinn criter.	-18.59424
F-statistic	9.668707	Durbin-Watson stat	2.324680
Prob(F-statistic)	0.000000		

Appendix-II: Regression Results For Factors affecting Bank Profitability

Dependent Variable: ROA
Method: Panel Least Squares
Date: 10/19/17 Time: 06:03
Sample: 2005 2016
Periods included: 12
Cross-sections included: 8
Total panel (balanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.125878	0.037031	-3.399223	0.0011
SIZE	0.007594	0.001848	4.108453	0.0001
CAP	0.084914	0.019906	4.265685	0.0001
LIQ	-0.016453	0.005165	-3.185599	0.0021
OPE	-0.029998	0.004909	-6.111082	0.0000
MGE	0.007474	0.010293	0.726076	0.4700
EME	-0.498988	0.372788	-1.338530	0.1847
FDC	-0.281908	0.146907	-1.918950	0.0587
BSD	-0.062690	0.031415	-1.995535	0.0495
GDP	0.030420	0.016817	1.808921	0.0744
INFL	0.000555	0.005745	0.096620	0.9233
FER	0.000938	0.000851	1.101756	0.2740

Effects Specification Cross-section fixed (dummy variables)

R-squared	0.802631	Mean dependent var	0.024589
Adjusted R-squared	0.756492	S.D. dependent var	0.009281
S.E. of regression	0.004580	Akaike info criterion	-7.759096
Sum squared resid	0.001615	Schwarz criterion	-7.251569
Log likelihood	391.4366	Hannan-Quinn criter.	-7.553945
F-statistic	17.39620	Durbin-Watson stat	1.576061
Prob(F-statistic)	0.000000		

Appendix-III: Ratio Data

OBS	ROA	SIZE	CAP	LIQ	OPE	MGE	EME	FDC	BSD	GDP	INFL	FER
CBE - 05	0.02252	23.9096	0.0528	0.6909	0.5801	0.4838	0.0055	0.0127	0.1627	-0.02	0.10924	8.5809
CBE - 06	0.01194	24.0546	0.0535	0.7376	0.7366	0.4637	0.00579	0.0119	0.1729	0.1173	0.07347	8.6197
CBE - 07	0.01725	24.2249	0.0431	0.6887	0.5873	0.5334	0.00528	0.0115	0.1897	0.1264	0.06126	8.6518
CBE - 08	0.02237	24.3026	0.042	0.7497	0.5603	0.5323	0.00522	0.0117	0.1944	0.1154	0.10577	8.681
CBE - 09	0.01988	24.495	0.0971	0.7806	0.6165	0.5402	0.00502	0.0107	0.2127	0.1179	0.15823	8.7943
CBE - 10	0.027	24.6436	0.0905	0.474	0.5421	0.4815	0.00565	0.0142	0.2345	0.1119	0.253	9.2441
CBE - 11	0.03233	24.8078	0.0848	0.3591	0.5008	0.3872	0.00547	0.0141	0.2592	0.1004	0.364	10.4205
CBE - 12	0.02653	25.0299	0.0749	0.2855	0.5619	0.3897	0.00581	0.0136	0.2901	0.1057	0.028	12.8909
CBE - 13	0.02506	25.4618	0.0548	0.3569	0.5906	0.4164	0.00491	0.0132	0.3705	0.1128	0.181	16.1178
CBE - 14	0.03422	25.7909	0.0486	0.2153	0.5305	0.4208	0.0055	0.0144	0.449	0.0884	0.341	17.2536
CBE - 15	0.03098	26.007	0.0459	0.233	0.5626	0.3169	0.00677	0.0156	0.4997	0.0966	0.135	18.1947
CBE-16	0.03099	26.018	0.0423	0.241	0.5714	0.3158	0.00681	0.0159	0.5216	0.0871	0.154	18.2131
CBO - 05	0.01168	20.6635	0.0839	0.3593	0.8226	0.2581	0.01168	0.0374	0.1627	-0.02	0.10924	8.5809
CBO - 06	0.00378	20.7787	0.0785	0.4868	0.9467	0.4667	0.0123	0.0292	0.1729	0.1173	0.07347	8.6197
CBO - 07	0.00928	21.3287	0.0579	0.5862	0.8455	0.5727	0.00764	0.0208	0.1897	0.1264	0.06126	8.6518
CBO - 08	0.03116	21.3094	0.0874	0.5755	0.6456	0.4304	0.00835	0.0247	0.1944	0.1154	0.10577	8.681
CBO - 09	0.02965	21.3593	0.0112	0.5106	0.7431	0.445	0.01006	0.0238	0.2127	0.1179	0.15823	8.7943
CBO - 10	0.03518	21.5954	0.1083	0.6269	0.6182	0.3775	0.01142	0.0298	0.2345	0.1119	0.253	9.2441
CBO - 11	0.02837	21.6757	0.1038	0.5153	0.6784	0.4057	0.01041	0.0262	0.2592	0.1004	0.364	10.4205
CBO - 12	0.02898	21.8745	0.1013	0.5295	0.6541	0.3944	0.01174	0.026	0.2901	0.1057	0.028	12.8909
CBO - 13	0.0245	21.9775	0.1036	0.5557	0.7135	0.4294	0.01354	0.0316	0.3705	0.1128	0.181	16.1178
CBO - 14	0.01951	22.5062	0.0806	0.7818	0.7255	0.5454	0.01127	0.0304	0.449	0.0884	0.341	17.2536
CBO - 15	0.02076	22.6253	0.0993	0.7472	0.7124	0.5459	0.0143	0.0294	0.4997	0.0966	0.135	18.1947
CBo-16	0.02126	22.7113	0.0998	0.75324	0.7142	0.5506	0.0150	0.0285	0.4988	0.0976	0.140	18.2102
AIB - 05	0.00999	21.0605	0.0978	0.4768	0.9604	0.4257	0.00999	0.0223	0.1627	-0.02	0.10924	8.5809
AIB - 06	0.01469	21.2942	0.1024	0.5084	0.7903	0.4516	0.00904	0.0201	0.1729	0.1173	0.07347	8.6197
AIB - 07	0.01707	21.5235	0.0876	0.4464	0.745	0.3691	0.00988	0.0175	0.1897	0.1264	0.06126	8.6518
AIB - 08	0.0264	21.8064	0.1029	0.3619	0.6579	0.3991	0.01016	0.0187	0.1944	0.1154	0.10577	8.681
AIB - 09	0.03734	22.0661	0.1132	0.3625	0.5822	0.3746	0.00992	0.0199	0.2127	0.1179	0.15823	8.7943
AIB - 10	0.02963	22.296	0.1239	0.4766	0.6624	0.4066	0.00996	0.0274	0.2345	0.1119	0.253	9.2441
AIB - 11	0.02226	22.5832	0.1168	0.6422	0.7002	0.421	0.01045	0.0242	0.2592	0.1004	0.364	10.4205
AIB - 12	0.03116	22.7958	0.1184	0.6621	0.6399	0.5583	0.01178	0.0254	0.2901	0.1057	0.028	12.8909
AIB - 13	0.03565	23.0374	0.1293	0.5228	0.6111	0.5745	0.01198	0.0271	0.3705	0.1128	0.181	16.1178
AIB - 14	0.03304	23.2029	0.1349	0.3434	0.6447	0.398	0.01259	0.031	0.449	0.0884	0.341	17.2536
AIB - 15	0.03416	23.4219	0.1354	0.2847	0.6593	0.402	0.01675	0.0289	0.4997	0.0966	0.135	18.1947
AIB-16	0.03523	23.4809	0.1359	0.2154	0.6698	0.4104	0.02094	0.0393	0.5006	0.0972	0.102	18.2101
DB - 05	0.01356	21.4119	0.0648	0.4004	0.7985	0.3881	0.00954	0.0185	0.1627	-0.02	0.10924	8.5809
DB - 06	0.02092	21.708	0.0643	0.4004	0.7083	0.3906	0.00859	0.0188	0.1729	0.1173	0.07347	8.6197
DB - 07	0.02076	21.9529	0.0711	0.3604	0.6966	0.3077	0.00848	0.0184	0.1897	0.1264	0.06126	8.6518
DB - 08	0.02926	22.2375	0.0849	0.3112	0.6376	0.3406	0.00902	0.0182	0.1944	0.1154	0.10577	8.681
DB - 09	0.03096	22.5218	0.0901	0.3438	0.6144	0.3402	0.00877	0.0191	0.2127	0.1179	0.15823	8.7943
DB - 10	0.03054	22.7811	0.0933	0.4739	0.6433	0.3729	0.00936	0.0264	0.2345	0.1119	0.253	9.2441
DB - 11	0.02567	22.9988	0.0934	0.5934	0.6693	0.4246	0.01002	0.0252	0.2592	0.1004	0.364	10.4205
DB - 12	0.02623	23.2372	0.0909	0.518	0.6632	0.4995	0.00934	0.0245	0.2901	0.1057	0.028	12.8909

DB – 13	0.03074	23.4084	0.0953	0.5258	0.6477	0.5292	0.00987	0.0275	0.3705	0.1128	0.181	16.1178
DB – 14	0.03722	23.5866	0.1043	0.4105	0.622	0.4797	0.01084	0.0292	0.449	0.0884	0.341	17.2536
DB – 15	0.03073	23.7063	0.1036	0.3824	0.6659	0.4382	0.01293	0.0309	0.4997	0.0966	0.135	18.1947
DB – 16	0.03733	23.8359	0.1029	0.3619	0.6962	0.4006	0.01385	0.0321	0.4952	0.0985	0.206	18.2013
WB – 02	0.00929	20.2863	0.0991	0.4841	0.9032	0.3448	0.01548	0.0388	0.1406	0.0163	-0.1057	8.5425
WB – 05	0.01237	20.6056	0.1046	0.415	0.8358	0.3731	0.01237	0.0242	0.1627	-0.02	0.10924	8.5809
WB – 06	0.02807	20.8543	0.1132	0.3978	0.7091	0.4	0.01228	0.0206	0.1729	0.1173	0.07347	8.6197
WB – 07	0.0297	21.2032	0.1114	0.3794	0.68	0.4667	0.01238	0.0171	0.1897	0.1264	0.06126	8.6518
WB – 08	0.03143	21.5382	0.1129	0.2996	0.6773	0.4545	0.01372	0.0197	0.1944	0.1154	0.10577	8.681
WB – 02	0.00929	20.2863	0.0991	0.4841	0.9032	0.3448	0.01548	0.0388	0.1406	0.0163	-0.1057	8.5425
WB – 05	0.01237	20.6056	0.1046	0.415	0.8358	0.3731	0.01237	0.0242	0.1627	-0.02	0.10924	8.5809
WB – 06	0.02807	20.8543	0.1132	0.3978	0.7091	0.4	0.01228	0.0206	0.1729	0.1173	0.07347	8.6197
WB – 07	0.0297	21.2032	0.1114	0.3794	0.68	0.4667	0.01238	0.0171	0.1897	0.1264	0.06126	8.6518
WB – 08	0.03143	21.5382	0.1129	0.2996	0.6773	0.4545	0.01372	0.0197	0.1944	0.1154	0.10577	8.681
WB – 09	0.03218	21.9703	0.1158	0.3704	0.65	0.4219	0.01264	0.0202	0.2127	0.1179	0.15823	8.7943
WB – 10	0.03366	22.1403	0.1467	0.5396	0.6791	0.4465	0.01334	0.0302	0.2345	0.1119	0.253	9.2441
WB – 11	0.03529	22.356	0.1633	0.7082	0.6152	0.5053	0.01453	0.0224	0.2592	0.1004	0.3641	0.4205
WB – 12	0.0389	22.4711	0.1832	0.7434	0.6053	0.5628	0.01582	0.0193	0.2901	0.1057	0.028	12.8909
WB – 13	0.0401	22.8103	0.1659	0.7066	0.604	0.6136	0.01495	0.0168	0.3705	0.1128	0.181	16.1178
WB – 14	0.04028	22.8452	0.1922	0.5106	0.6048	0.4802	0.0173	0.0243	0.449	0.0884	0.341	17.2536
WB – 15	0.03303	23.0645	0.1761	0.3388	0.6393	0.3849	0.01769	0.0228	0.4997	0.0966	0.135	18.1947
WB- 16	0.03206	23.0120	0.1814	0.3397	0.6554	0.2821	0.01740	0.0235	0.5002	0.0989	0.121	18.2014
BOA – 05	0.0045	21.0107	0.1118	0.6028	0.9259	0.2346	0.006	0.0251	0.1627	-0.02	0.10924	8.5809
BoA – 06	0.02397	21.1839	0.1218	0.5451	0.6911	0.2114	0.00631	0.0228	0.1729	0.1173	0.07347	8.6197
BOA – 07	0.02965	21.4445	0.1235	0.5595	0.5987	0.3092	0.00632	0.0203	0.1897	0.1264	0.06126	8.6518
BOA – 08	0.02999	21.765	0.1418	0.4861	0.6136	0.25	0.01059	0.0188	0.1944	0.1154	0.10577	8.681
BOA – 09	0.01973	21.9459	0.1187	0.4919	0.7491	0.2434	0.01031	0.0221	0.2127	0.1179	0.15823	8.7943
BOA – 10	0.00341	22.1749	0.0983	0.5671	0.958	0.2735	0.0106	0.0269	0.2345	0.1119	0.253	9.2441
BOA – 11	0.01834	22.4238	0.0948	0.6874	0.7518	0.3185	0.01203	0.0249	0.2592	0.1004	0.364	10.4205
BOA – 12	0.02239	22.5606	0.0932	0.6931	0.7002	0.4416	0.01263	0.0248	0.2901	0.1057	0.028	12.8909
BOA – 13	0.02486	22.7081	0.0908	0.5868	0.7073	0.398	0.01248	0.027	0.3705	0.1128	0.181	16.1178
BOA – 14	0.02625	22.8323	0.11	0.4236	0.7008	0.312	0.0129	0.0308	0.449	0.0884	0.341	17.2536
BOA – 15	0.02701	23.0387	0.1094	0.2557	0.6836	0.3251	0.01326	0.0304	0.4997	0.0966	0.135	18.1947
BOA-16	0.02806	23.4785	0.1210	0.3154	0.6614	0.3341	0.01416	0.0300	0.5004	0.1024	0.104	18.2421
UB – 05	0.01066	19.9661	0.194	0.446	0.8387	0.3871	0.00853	0.0209	0.1627	-0.02	0.10924	8.5809
UB – 06	0.01039	20.3287	0.1424	0.4669	0.8478	0.413	0.01039	0.0207	0.1729	0.1173	0.07347	8.6197
UB – 07	0.02889	20.7937	0.1165	0.4814	0.6593	0.4945	0.00932	0.0197	0.1897	0.1264	0.06126	8.6518
UB – 08	0.02752	21.1895	0.1195	0.3718	0.6508	0.4365	0.00876	0.0238	0.1944	0.1154	0.10577	8.681
UB – 09	0.02932	21.504	0.1649	0.4847	0.6667	0.3646	0.01054	0.026	0.2127	0.1179	0.15823	8.7943
UB – 10	0.02801	21.9019	0.1439	0.608	0.675	0.3881	0.01057	0.0257	0.2345	0.1119	0.253	9.2441
UB – 11	0.02012	22.2606	0.1118	0.782	0.7304	0.391	0.01175	0.0242	0.2592	0.1004	0.364	10.4205
UB – 12	0.02959	22.4975	0.1081	0.7739	0.6575	0.5084	0.01149	0.0221	0.2901	0.1057	0.028	12.8909
UB – 13	0.03001	22.7679	0.1167	0.6951	0.6323	0.4626	0.01078	0.0239	0.3705	0.1128	0.181	16.1178
UB – 14	0.0339	22.8965	0.1254	0.4847	0.6418	0.3763	0.01342	0.0294	0.449	0.0884	0.341	17.2536
UB – 15	0.02142	23.0236	0.1204	0.3675	0.763	0.3361	0.01518	0.0307	0.4997	0.0966	0.135	18.1947
UB- 16	0.01263	24.0621	0.1201	0.2814	0.8421	0.3057	0.01709	0.0319	0.5041	0.0984	0.359	19.2014

NIB – 05	0.01469	20.6011	0.1412	0.4712	0.803	0.4394	0.00678	0.0187	0.1627	-0.02	0.10924	8.5809
NIB – 06	0.02807	20.944	0.1387	0.4925	0.6237	0.3978	0.00642	0.018	0.1729	0.1173	0.07347	8.6197
NIB – 07	0.02656	21.2725	0.1293	0.4665	0.6593	0.3852	0.00635	0.0196	0.1897	0.1264	0.06126	8.6518
NIB – 08	0.02861	21.4445	0.1406	0.3588	0.6398	0.3354	0.00839	0.0227	0.1944	0.1154	0.10577	8.681
NIB – 09	0.02915	21.6815	0.163	0.3756	0.6346	0.2933	0.00959	0.0224	0.2127	0.1179	0.15823	8.7943
NIB – 10	0.03096	22.018	0.1639	0.4148	0.6435	0.3367	0.00974	0.0251	0.2345	0.1119	0.253	9.2441
NIB – 11	0.03204	22.2933	0.1516	0.6	0.6409	0.4047	0.01112	0.0228	0.2592	0.1004	0.364	10.4205
NIB – 12	0.03366	22.5102	0.1535	0.5764	0.6403	0.5215	0.01292	0.0218	0.2901	0.1057	0.028	12.8909
NIB – 13	0.03459	22.685	0.1646	0.4767	0.6241	0.4931	0.01359	0.0231	0.3705	0.1128	0.181	16.1178
NIB – 14	0.03456	22.8366	0.1846	0.3726	0.6224	0.429	0.01399	0.026	0.449	0.0884	0.341	17.2536
NIB – 15	0.0255	22.9365	0.1822	0.232	0.7023	0.2736	0.01532	0.0278	0.4997	0.0966	0.1318	18.1947
NIB- 16	0.0198	22.9702	0.1809	0.186	0.7135	0.2411	0.011621	0.0270	0.4503	0.0971	0.1305	18.3101