INVESTMENT ON ACCOUNTING INFORMATION SYSTEM (IAIS) EFFECT ON BANK PERFORMANCE:
[A CASE OF PRIVATE COMMERCIAL BANKS IN ETHIOPIA]

A Thesis submitted in partial fulfillment of the requirement for the award of Master of Science Degree in Accounting & Finance

By:
Taddesse Kebede G/Mariyam

ADDIS ABABA UNIVERSITY
FACULTY OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE

Addis Ababa, Ethiopia
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Declaration

I the undersigned declare that this thesis "Investment on Accounting Information System effect on Bank performance: A case of Private Commercial Banks in Ethiopia" is my original work, that it had not been submitted or presented for the award of any other degree or other similar titles in this or other universities or institutions and that all sources of materials used for the thesis have been properly acknowledged.

Declared by

Name: Taddesse Kebede G/Mariyam

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Date _____

Confirmed by Advisor

Name: Asmare Emerie Kassahun (PhD)

Signature _____

Date _____

Statement certification

This is to certify that Taddesse Kebede G/Mariyam has carried out his research work on the topic entitled "Investment on Accounting Information System effect on Bank Performance: A case of Private Commercial Banks in Ethiopia". The work is original in nature and is suitable for submission for the reward of the MSc Degree in Accounting and Finance

Advisor: Asmare Emerie Kassahun (PhD) _____

Date: _____

Addis Ababa University

Faculty of Business and Economics

Department of Accounting and Finance

Investment on Accounting Information System effect on Bank Performance: A case of Private Commercial Banks in Ethiopia.

By: Taddesse Kebede G/Mariyam

Approved by the board of examiner:

_____	_____
Advisor	**Signature and date**
_____	_____
Name of internal examiner	**Signature and date**
_____	_____
Name of external examiner	**Signature and date**

Acknowledgments

First and foremost, thank you the Almighty God for compassionate the most Merciful and Source of Knowledge & Wisdom, who bestowed upon me the health, the power of communication and the audacity to accomplish this thesis.

I am incredibly much indebted to my thesis Advisor Asmare Emerie Kassahun (Phd), for his critical professional comment, constructive criticism, follow up, devotion, suggestion and useful advice have been invaluable inputs that have improved the quality of my work. Without him this study would have never reached its present stage. Hence, I remain grateful and thankful always.

Further, I would also like to gratitude all Managers and Staffs of Accounting & Finance Departments of private commercial banks in Ethiopia at head office level for their genuine and unlimited cooperation in the provision of information and publications needed for the study. Besides, I would like to say thank you to my colleagues at Addis Ababa University, department of Accounting and Finance especially Tesfaye Teffera and Tesfaye Alemayehu and to all my friends who were always happy to cooperate in everything I needed.

It is my great pleasure to give my deepest gratitude to my Parents Captain kebede G/Mariyam, and W/ro Wssene Mulugeta for giving birth to me at first place and their spiritual support, especially my thanks goes to my lovable family Members My wife Messelech Lemma, and My kids Kirubel Taddesse and Surafel Taddesse for their affection, understanding, and spiritual support throughout my life.

Last but not least I add a special note of deepest gratitude to Mr. Waktola Yadete for the passionate of parenthood, love and support you had during your life time in this world. Dear I wish if you stand beside of me especially at my graduation date. However, the sky cloud was not allowed to do this oh! Even to see each other again. A few words to say “God bless your sole rest in peace at heaven.”

Taddesse Kebede G/mariyam

Abstract

The main aim of this study is to assess the impact of Investment made on Accounting Information System and its effect on Banks performance in the case of private commercial Banks in Ethiopia. In order to fulfill the stated objective an exploratory research design with a quantitative panel data was used. To this end, the researcher relied on consecutive ten years Annual Audited Financial Report of selected seven Private Commercial Banks in Ethiopia using a purposive sampling method for the period 2005 – 2014.

The study employed a multivariate regression model using Return on Asset (ROA), Return on Equity (ROE) and Productivity (PROD) as a dependent variable for measuring the financial performance of the selected Banks and three independent explanatory variables used as a component of Accounting Information Systems; Infrastructure, software and Services.

The researcher also controlled for the effects of size (measured by log of total assets). Based on a balanced panel constructed ordinary least squares (OLS) and random effects, the study finds that Investment on AIS's services provided by IT personnel payroll, hiring, training, evaluating and related costs has a significant and positive impact followed by investment on AIS's software which was consistent with the researcher's expectation. While Investment on AIS's infrastructure was found to have a negative but insignificant impact. The remaining variable, SIZE had positive but insignificant effect on their performance. The overall results revealed that Investment on AIS have a significant impact on the financial performance of Private commercial Banks in Ethiopia.

Hence, based on the findings of the study the researcher conclude that, performance of infrastructure was not productive as expected and should have to consistent with the quality of AIS's service and appropriate implementation of AIS's software.

Finally, as was indicated in the scope and limitation section this study was only confined to the Private commercial Banks in Ethiopia. Hence, the study could be further enhanced by including the State owned banks. The study could also developed by including more independent and control variables to the regression model. Moreover, if further studies should supplemented with qualitative data, the findings would be more informative.

***Key words**: Investment on Accounting Information System, Private Bank Performance, Panel, Ethiopia*

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CHAPTER ONE

PROBLEMS AND ITS APPROACH

1.10 Background

Compared to most Sub-Saharan countries in Africa, Ethiopia has taken a cautious approach toward the liberalization of its banking industry. For all intents and purposes, its industry is closed and generally less developed than its regional peers. Allowing the expansion of private banks means allowing the increased entry of foreign capital investment in to Ethiopia. Private Banks play an important function in the Ethiopian economic development, particularly after the announcement of Proclamation No.84/1994. (Ethiopia N. B., 2015)

Currently, there are nineteen Commercial banks are operating in Ethiopia of which three of them are Government owned Banks. Such as; Commercial Bank of Ethiopia, Construction and Business Bank, and Development Bank of Ethiopia. The remaining sixteen banks are private owned Commercial banks. Namely: Abay Bank S.C, Addis International Bank S.C, Awash International Bank S.C, Bank of Abyssinia S.C, Berhan International Bank S.C, Bunna International Bank S.C, Cooperative Bank of Oromia S.C, Dashen Bank S.C, Debub Global Bank S.C, Enat Bank S.C, Lion International Bank S.C, Nib International Bank S.C, Oromia International Bank S.C, United Bank S.C, Wegagaen Bank S.C, and Zemen Bank S.C (Ethiopia N. B., 2015)

Objectively Commercial Banks are established to earning profits by providing banking services. They seeking to achieve their strategic objectives of profitability and growth in an effective and efficient manner in order to maximizing their market value and increase the wealth of the owners. This can be done in various ways by improve their performance and increase profits under the age characterized by competition through technological development and knowledge. They invest huge amount of financial resources on capacity building and Accounting information system which promote efficiency of their services and facilitate decision-making process using data and accurate information.

1.11 Introduction

Over the last decades the world has witnessed wide economic and technological changes that affected the world economy including accounting. Such changes resulted in the overlapping of various scientific fields, and knowledge and the interconnection of their objectives but Accounting was not in isolation from

these developments the broad use of accounting information technology in the profession of accounting has placed it before a challenge that required a search for sufficient means to effectively cope with the new changes and to find new methods to improve the quality of local accounting services and to keep its level competitive with the imported accounting services.

Computer tools have allowed the Banks to make a better use of their accounting systems in their relations with customers. In the same way the development of the electronic banking allows them to save a lot of time in their transactions; moreover AIS have fastened. Recently, there is a common understanding that using information technologies has been crucial to broaden market share and cost management. Accordingly, majority of Private commercial banks are invested in technology to promote information and communication in areas of their functions. Because they are very directly identified with gaining or losing market share. This in turn, has to be reflected in their performance.

“In today’s business environment, information systems are an absolute necessity in order for companies to attain strategic goals and improve operational performance (Jeong, 2010). **System** is the primary source of appropriate information to users in decision-making process. Information system is known as "a set of components interconnected with each other on a regular basis in order to produce useful information. They communicate this information to users appropriately and timely manner, in order to assist them in the performance of the functions assigned to them (AbdulRazzaq, 2003)

Accounting Information Systems (AIS) are a tool designed to help in the management and control of firms’ economic-financial area. The possibility of generating and using accounting information system should have to from a strategic viewpoint. Since this is important for all firms, it is more important to deal with a higher degree of uncertainty in the competitive market (El Louadi, 1996) Thus, firms should improve their systems and data processing capacity to match their information needs (Drazin, 1985).

Accounting information system is a back bone regarding facilitating the decision-making process through the provision of supervision, monitoring and evaluation of performance. The use of Accounting information system will help them in the provision of data and information fit the speed of occurrence of the variables in the markets of the world economic and physical, and will save time and effort for the financial analyst based on the accounting software of modern information in order to keep up the events and keep up with the changes and take the appropriate decisions in time manner.

Investing in Accounting Information System, improving the quality of information and leverage for achieving a stronger and more flexible corporate culture to face continual changes in the environment. Innovation is the incentive with which a virtuous circle will be put in place, leading to better firm performance and a reduction in the financial and organizational obstacles, while making it possible to access capital markets.

As information and communications technologies cover a wide range and include all the areas in which a banks acts, this research work has focused on a specific part of them, the accounting information systems (AIS) investment to show that use computerized accounting tools and software are directly related to financial performance in Private commercial Banks in Ethiopia. AIS are systems used to record the financial transactions of a business or organization. This system combines the methodologies, controls and **accounting techniques with the technology of the IT industry:** ***user interface, computers and sophisticated software***. The software used to track transactions provides internal reporting data, external reporting data, financial statements, and trend analysis capabilities.

During the last few decades, advances in technologies have allowed the banking sector to take advantage, showing a worldwide improvement in its profitability. Both intrinsic and exogenous determinants have affected the profitability and earnings in the banks (P.P. Athanasoglou, 2008); (Ramlall, 2009) and (Sufian, 2009)

Literature considers the determinants of bank performance, usually measured by ROA, ROE and in some cases, the net interest margin/ productivity. They include bank financial ratios, regulatory changes and in a few cases, macroeconomic variables. (Goddard, 2004) Accordingly, it is of researcher's great interest to analyze the impact of Investment on Accounting Information system (AIS) on financial profitability indicators (Return on Assets (ROA) and Return on Equity (ROE)) and the performance of Private commercial Banks in Ethiopia from year 2005-2014.

1.12 Statement of the Problem

This paper demonstrates investment on AIS against private commercial banks performance in Ethiopia. However, ***measuring the performance of investment on AIS of banks is no simple matter and that indicators differ strongly in quality***.

Bank Performance measures are not limited to specific rule of thumb calculation there are various performance measures can be used as proxy from external and internal organizational aspects. However, it is difficult to use all of them as a performance measures in this paper due to economics of scale and specific stated objectives.

Stockholders of banks had a view of performance in terms of the profits made on their behalf, whether or not adjusted for risks taken. The researcher wants to study the effects of Investment on AIS against performance of private commercial banks in Ethiopia using financial performance measurements known by the stockholders.

Some of financial performance indicators are **productivity, Return on Asset and Return on Equity**. ROA "Return on Assets" and calculated as the financial year result divided among total assets. ROE "Return on Equity" is calculated as the financial year result divided among own equity and productivity equals operating income after deductions for Marketing and working expenses, all of them divided by staff costs. Productivity is an average measure of the efficiency of Bank's service using asset investment. It can be expressed as the ratio of output or Income to inputs or investment on AIS used. It is a measure of efficiency of services process and as such the objective to be maximized in services process.

AIS has at least three categorized components, naming: Infrastructures, Software and Services. The researcher is desired to study which components of Investment on AIS affect performance of private commercial banks in Ethiopia based on selected financial performance measurements. ***The output of the study will aid the economic decision of Stockholders and Managers of private Banks have regarding the Investment on AIS and its return***.

Many researches have conducted research related to information technology or accounting information system impact on firm performance; ***however, there is no study was made regarding Investment on AIS and Bank performance in Ethiopian Context***.

1.13 The Objectives of the Study

1.13.1 Main Objective of the study

The aim of this study is to detect the Investment of Accounting information system and performance of Private commercial banks in Ethiopia in financial terms, so by testing the impact of the investment on AIS on some performance measures of financial common and traded such as return on assets (ROA), and return on equity (ROE) and productivity as a key proxy of financial metrics for the performance of private banks, which reflect these standards for Bank's ability to generate earnings ratio from its Investment make a profit as an indicator of the performance of the Banks' primary objective with which to maximize the wealth of shareholders.

1.13.2 Specific Objectives

A Bank financial performance can be measured in its profitability that evaluates the performance. Specifically to detect:

- Whether investment on AIS's ***Infrastructure***, Investment on AIS's ***Software*** and Investment on AIS's ***Service*** are positively and significantly affect performance of private commercial banks in Ethiopia Separately expressed by ***Return on Asset***

- Whether investment on AIS's ***Infrastructure,*** Investment on AIS's ***Software*** and Investment on AIS's ***Service*** positively and significantly affect performance of private commercial banks in Ethiopia Separately expressed by ***Return on Equity***

- Whether investment on AIS's ***Infrastructure***, Investment on AIS's ***Software*** and Investment on AIS's ***Service*** positively and significantly affect performance of private commercial banks in Ethiopia Separately expressed by ***Productivity***.

1.14 Hypothesis Tested:

In order to be more formal statement of research the researcher were employs hypotheses. These hypotheses are predictions about the outcome of the results, and they may be written as alternative hypotheses specifying the exact results to be expected. They also may be stated in the null form, indicating no expected difference or no relationship between groups on a dependent variable as stated by. (Creswell John, 2009). Accordingly, the followings are hypothesis to be tested based on selected variables. The researcher assumed that:

H1: Investment made on AIS's infrastructure has positive and significant impact on ***ROA, ROE and Productivity*** of Private commercial banks in Ethiopia!

H2: Investment made on AIS's Software has positive and significant impact on ***ROA, ROE and Productivity*** of Private commercial banks in Ethiopia!

H3: Investment made on AIS's Services has positive and significant impact on ***ROA, ROE and Productivity*** of Private commercial banks in Ethiopia!

1.15 Significance of the research

The research would have the following importance. Many researches have conducted research related to information technology or accounting information system impact on firm performance; however, ***there is no study was made regarding Investment on AIS and Bank performance in Ethiopian context***.

This would cover study of investment made on AIS as stated on title and present the fact. Hop that, the study will get interested ***stakeholders' attention who are willing to go further for study on similar but different business sectors*** pertaining Accounting information system investment decision. It will also have a great contribution ***for bank administrators to improve*** their awareness especially in the banking and related industries for their financial administration efficiency and effectiveness.

The study is also important ***for those concerned government regulatory authorities*** like national bank for decision they made pertaining Accounting Information System investment and also for other related government ***and foreign banks too***. Considering this research thesis as an initiative, any interested researcher can conduct further and detail research on the stated title.

1.16 Delimitation of the Research

The scope of the study would be limited to Private commercial Banks in Ethiopia pertaining Investment on Accounting Information System and banks performance. Even though, net income gives an idea of how well a bank is doing, it suffers from one major drawback: It does not adjust for the bank's size, thus making it hard to compare how well one bank is doing relative to another.

Selection of dependent variables which fit the study was also part of limitation. Because, there are many variables which determinants of performance but not relevant for this study but sited by many researchers and the researcher needs to choose the more appropriate variables so that it is suitable with the dependent variable. It is necessary to highlight that three indicators have been chosen to study the effects of the degree to which Investment on AIS have on performance of private commercial banks in Ethiopia performance. ROA, ROE and Productivity proxy of bank performance. Independent Variables are categorized in to three parts; namely AIS Infrastructures, Software and Services. However, all private banks under this study had a trained of categorizes the value of investment made on software under investment on infrastructure due to easy of computation of depreciation according to Ethiopian tax law. (Financial Statements of Private Banks in Ethiopia 2005-2014). And also only seven banks were considered for the study regarding establishment and operation and consistent. Sample period selected in the study covers only ten years data from 2005 to 2014 due to limitation of number of banks under study if the study was go further behind year 2005 while majority of banks were established onwards so the data was not consistent.

1.17 Operational definitions

Performance: Performance is deemed to be the fulfilment of an obligation. **Bank performance:** Is a combination of various aspects which cannot be observed directly but economically important. However, stockholders are view performance in terms of the profits made on their behalf, whether or not adjusted for risks taken. There is also contribution financial institutions make to the common wealth, on behalf of consumers and businesses. These results are reflected in the firm's return on asset, return on equity, and Productivity.

Return on asset: Is one of measure of Bank performance which measured by the ratio of the return on average assets (ROA), calculated as net profit after tax divided by total assets. It is the most common

profitability ratio of performance measure used by banks in order to evaluate performance comparing the efficiency of a number of different investments.

Return on equity: ROE is more concerned about how much the bank is earning on their equity investment, the net income per birr of equity capital. The amount of net income returned as a percentage of shareholders equity. It measures how efficiently a bank can use the money from shareholders to generate profits and grow. Unlike return on Assets ratios, ROE is a profitability ratio from the investor's point of view. This ratio calculates how much Investment is made based on the investors' investment in the bank, not the company's investment in assets or something else.

Productivity: Is an average measure of the efficiency of Bank's service using asset investment. It can be expressed as the ratio of output or Income to inputs or Assets. It is a measure of efficiency of services process and as such the objective to be maximized in services process. Productivity is an average measure of the efficiency of Bank's service using deployed invested assets. Productivity is a required tool in evaluating and monitoring the performance of bank. When directed at specific issues and problems, productivity measures can be very powerful. In essence, productivity measures are the yardsticks of effective resource use. Managers are concerned with productivity as it relates to making improvements in the bank. Proper use of service delivery measures can give the manager an indication of how to improve it: either increase the numerator of the measure, decrease the denominator, or both.

Accounting Information System (AIS): Are a tool designed to help in the management and control of firms' economic-financial area. The possibility of generating and using accounting information system should have to from a strategic viewpoint. Since this is important for all firms, it is more important to deal with a higher degree of uncertainty in the competitive market (El Louadi, 1996) Thus, firms should improve their systems and data processing capacity to match their information needs (Drazin, 1985).

1.18 Organization of the paper

Having the above all the rest of contents are organized as follows: Chapter two presents empirical and theoretical review of related literatures to the issue of Investment on AIS and bank performance: A case of private commercial banks in Ethiopia; Chapter three provides research design and methodology followed by chapter four contains of finding or results and discussion; and Chapter five gives summary, conclusion and recommendations. A "Reference" of related literature is referred while writing the paper and appendices are included after chapter five.

CHAPTER TWO

REVIEW RELATED LITERATURES

In this chapter the theoretical part and empirical parts of past literature was discussed in detail in relation to 'Investment on Accounting Information System and Bank performance: A case of private commercial banks in Ethiopia' since the introduction of banks in Ethiopia.

2.4 Theoretical concepts

The economic liberalization of the financial sector started in 1991 laid a foundation for the formation and expansion of private banks in Ethiopia. (Gote, 1995) This coupled with rapid technological advancement and improved communication systems, have contributed to the increasing integration and resemblance amongst banks in the financial sector. As a result, banks are now faced with very high and intense competition. (Harvey, 2010)

Banks operating in Ethiopia is consequently put into lot of pressures due towards increase in competition. Various strategies are formulated to retain the customer and the key of it is to increase the service quality level. Service quality is particularly essential in the banking services context because it provides high level of customer satisfaction, and hence it becomes a key to competitive advantage. (M, 2001) Service quality has a significant impact on a bank's success and performance. (Mouawad M, 1996)

Due to a pervasive and steadily growth of information and communication technology, the world banking industry is entering into new phenomena of unprecedented form of competition supported by modern information and communication infrastructure. Nowadays, service quality has received much attention because of its obvious relationship with costs, financial performance, customer satisfaction, and customer retention. In order to sustain service quality banks should develop and sustain accounting information system (AIS) as a tool. ***AIS is a collection of resources, such as people and equipment, designed to transform financial and other data into information. Accounting information systems perform this transformation whether they are essentially manual systems or thoroughly computerized.*** However, during this Era using computerized accounting Information system (or simply an accounting system) is not compared with the backward application of using manual system. This chapter reviews literatures that are relevant to the problem under investigation. The review covers theoretical framework and conceptual framework regarding the title "Investment on Accounting information system and Bank performance: the case of private banks in Ethiopia".

2.4.1 Accounting Information System

Investopedia Explains '**Accounting Information System (AIS)** is a Systems that combines traditional accounting practices such as the Generally Accepted Accounting Principles (GAAP) with modern information technology resources. Six elements compose the typical accounting information system: People - the system users, Procedure and Instructions - methods for retrieving and processing data, Data - information pertinent to the organization's business practices, Software - computer programs used to process data, Information Technology Infrastructure - hardware used to operate the system, and internal controls - security measures to protect sensitive data.

Accounting Information Systems (AIS): include transaction processing cycles, the use of information technology, and the development of financial information systems. Accounting Information system are useful for companies and businesses wanting to make the accounting process easier by utilizing a computer program or other system that will perform payroll and other functions. These systems, commonly including accounting software, make it easier to compile financial data for use in taxes, payroll, and other bookkeeping requirements. Accounting is a very important part of running and maintaining a business and the success of a company will often heavily rely on the practices and procedures that are used in the bookkeeping efforts of the company. Because, it is the issue of creating value that has its own cost vs. benefit and for competitive advantage. (Investopedia, 2015)

Accounting Information System is considered as a subsystem of Management Information System (MIS). Regarding accounting as information system is perhaps the latest definition of Accounting. For the first time in ((AICPA), 1966) stated that "Accounting actually is information system and if we be more precise accounting is the practice of general theories of information in the field of effective economic activity and consists of a major part of the information which is presented in the quantitative form".

Hence accounting information systems could be described as systems used to record the financial transactions of a business or organization. These system combine the methodologies, controls and accounting techniques with the technology of the Information industry to track transactions provide internal reporting data, external reporting data, financial statements, and trend analysis capabilities affect organizational performance. (Urquía Grande, 2010)

Accounting Information System, according to Nicoloau (2006), is a computer based system that increases the control and enhances the cooperation in the organization. Management is engaged with different

types of activities that are requires quality and reliable information. They require also non-financial information such as production statistics, quality of production and so on. However, quality of information generated from AIS is very important for management. Generally the quality of information depends on the reliability, form of reporting, timeliness and relevance to the decisions.

Research indicate that the effectiveness of Accounting Information Systems depend on the quality of output information that satisfy the users. Accounting Information Systems are considered important organizational mechanisms that are critical for effectiveness in decision management and control in organizations. (Galbraith, 1983; Zimmerman, 1995).

2.4.1.1 Important functions of AIS:

AIS has three important function in any Organization

- **It collects and stores data** concerning activities and transactions so that the organization can review what has happened.
- **It processes data** into information that is useful for making decision that enable management to plan, execute and control activities.
- **It provides adequate controls** to safeguard the organization's assets, including its data. These controls ensure that the data is available when needed and that it is accurate and reliable.

Banking is becoming highly Accounting Information system based and because of its inter-sectorial link, it appears to be reaping most of the benefits of revolution in technology, as can be seen by its application to almost all areas of its activities. A broad opening has been experienced around the world for banks and they are currently taking due advantage of these innovations to provide improved customer services in the face of competition and faster services that enhance productivity

Technological advancement facilities payments and creates convenient alternatives to cash and cheque for making transactions. Such new practices have led to the development of a truly global, seamless and internet enabled 24-hours business of banking. Technological advancement in payments is important due to the fact that it will be feasible to outsource quite a number of the banks' role in the payments system. Also banks regulation can be more technologically dependent and better focused rather than focusing on conceptual guidelines. (Akinuli, 1999; Ovia, 2005).

Various Bank issues on Accounting Information System (Milne, 2006) said due to the characteristic of banking business, bank's accounting information system (AIS) have specific important features related to their liquidity management and the management of their customers' account information. According to Milne, a bank has to manage its liquidity efficiently in order to maximize profit and to fulfill regulation (minimum reserve requirement).

(Tam, 1998) Opined that to perform such duties, the treasury manager need information of consolidated balance of customers' deposits, loan and other placements of bank funds. That information are needed on a daily basis so that the treasury manager can determine how mush reserve is needed and how much money should be placed in or borrowed from the money market to conform to the regulation and to maximize the usefulness of available funds. The use of computer network has made it possible for the treasury manager to get the information needed almost at any time if all of the bank's branches are online. Therefore the bank's liquidity management could be performed more timely and efficiently based on accurate information (Deakin, 1999).

Among reasons why people use a bank's services are to obtain convenient access to cash and to obtain interest payments and other return on investment. The banks serve the needs of the customers by providing a system that enables the customers to check their account balance, to deposit and to withdraw cash, and to make payment in a convenient way. The system must also provide up to date and accurate information of customers' account. The introduction of accounting information System had improved the quality of bank services to their customers.

According to (Rahman, 2008.), the following are the benefits of accounting information system in the banking industries:

- **Timely Information**: The accounting information system provide business and other users with timely financial information (financial Report). This information helps users and business with strategic planning, budgets and other valuable information for payroll, bank reconciliation and creation of spreadsheet.
- **Easy to Use**: Raw data are entered directly into computers; the system processes any calculation, manipulations, reports and reconciliation. The output shows the result as information in a meaningful manner.

- **Internal Control:** The accounting information system makes it easier for banks to establish internal control which help to detect fraud, theft and other mismanagement.
- **Decision Making:** Data recorded and processed enables computers to yield reports that aid interested parties in their decision making process. Most accounting information system can yield statistics that indicate performance of product or service.
- **External Financial Reporting:** One of the most important characteristics of accounting information system is its ability to produce information that helps organizations generate financial statement. From the accounting information system, one should be able to create companies balance sheet, income statement, shareholder or owners' equity and statement of cash flows.

To save you time and reduce operational risk, Investment Accounting Manager provides straightforward automation of daily, monthly or yearly administrative and accounting tasks such as amortization, accruals, mark-to-market and calculation of unrealized profit/loss. (simcorp.com, 2015)

Benefits of accounting information system can be evaluated by its impacts on improvement of decision-making process, quality of accounting information, performance evaluation, internal controls and facilitating company's transactions. AIS add value to organization by providing accurate and timely information also by improving the quality and reducing the cost, or services, improving efficiency, improving decision making capabilities, increasing the sharing of knowledge. Well-designed AIS can also an organization profit by improving the efficiency and effectiveness of its supply chain (Hall, 2010).

2.4.2 Investment on Accounting Information System

All Banks' managers seeking to achieve organizational goal in an effective and efficient manner to reach the targeted profitability, growth, and maximize the market value and wealth of their owners. There are various ways that can lead to improve banks performance and achieving performance under the age characterized by competition. Particularly, technological development in the event they are used however, they should sacrifices financial costs (large amount of investments) to establish systems (computerized information system). These includes acquire hardware, software and training personnel, these led to banks pay a lot of many from their resources *(in combination said to be Investment)* in order to use the systems *(Accounting Information system)* for good performance.

There are studies which obtain a positive relationship between investment on Accounting Information system and performances in terms of economic profitability, financial profitability and value added. Investing in staff training, improving the quality of products and internal processes and increasing AIS investment will be the leverage for achieving a stronger, more flexible corporate culture to face continual changes in the environment. Innovation is the incentive with which a virtuous circle will be put in place, leading to better firm performance and a reduction in the financial and organizational obstacles, while making it possible to access capital markets. (Research, 2011) (Menachemi, Burkhardt, Schewchuk, Burke, & Brooks, 2006)

Increasing investment on AIS will be the leverage for achieving a stronger, more flexible corporate culture to face persistent changes in the environment. Innovation is the incentive with which a virtuous circle will be put in place, leading to better firm performance and a reduction in the financial and organizational obstacles, while making it possible to access capital markets. (Urquía Grande, 2010). For facing continuous changes in the environment, achieving a stronger, more flexible corporate culture, this can be done by increasing AIS investment.

2.4.3 Bank performance

Performance is deemed to be the fulfilment of an obligation. Bank performance is a combination of various aspects which cannot be observed directly but economically important. However, stockholders are view performance in terms of the profits made on their behalf, whether or not adjusted for risks taken. There is also contribution financial institutions make to the common wealth, on behalf of consumers and businesses.

Investors are mainly interested in whether financial products are not too expensive and whether the quality is sufficient. This raises the issue of, on the one hand, the efficiency of financial institutions (i.e. whether unnecessary costs are made in bringing a product to market) and, on the other, the level of competition in the relevant markets (i.e. whether profit margins are not unnecessarily high). Since efficiency and competition cannot be observed directly, they have to be measured in an indirect way.

There is another kind of performance that works in the interest of consumers, but does so in the long run. It is the reliability of a financial institution in terms of solvency and of whether customers can be sure to get their money back. Now that the subprime mortgage and liquidity crisis has engulfed us all, the amount

of risk banks take in carrying on their business is a focal point of attention. Although this long- term performance is also affected by competition and efficiency.

Various theoretical relationships exist between the several types of performance. The classic structure-conduct-performance (SCP) theory holds that market structure determines competitive conduct and hence profits. For instance: high bank concentration leads to less competition and hence to higher profits. According to an alternative paradigm, the efficiency hypothesis, more efficient banks increase their market share by pushing less efficient competitors from the market.

More efficient banks will translate lower costs into either increased profits or price reductions – the latter in order to improve their competitiveness and increase their market share (Efficiency thus is not an effect but a determinant of market structure. It has been generally assumed that competitive pressure forces banks to become more efficient Hicks (1935). The strong intertwinement between variables explains why market structure, costs and profitability are often used as proxies for competition and efficiency.

St. Clair (2004) selects various indicators of banking-sector performance - including bank income, expenditure, profit, capital and liquidity - and regresses each indicator on a set of macroeconomic variables including nominal output growth, unemployment rate, consumer price inflation, property price inflation, nominal exchange rate and interest rate using the single equation regression model.

Brissimis et al. (2008) examine the relationship between banking sector reform and bank performance – measured in terms of **efficiency,** total factor **productivity** growth and net interest **margin** – accounting for the effects through competition and bank risk-taking. Bank efficiency is highly important in explaining and interpreting bank performance.

Important examples are given by (Berger, 2003.), who argue that the only way consumers can potentially benefit from large bank is through enhanced efficiency, resulting in lower prices and an increased service level.

(Molyneux, 1995) underscore the importance of efficiency of banking and point out that higher efficiency can be expected to 'lead to improved financial products and services, a higher volume of funds intermediated, greater and more appropriate innovations, a generally more responsive financial system, and improved risk-taking capabilities if efficiency profit gains are channeled into improved capital adequacy positions'. So that, bank performance – measured in terms of efficiency, productivity profit margin. However, Bank efficiency is highly important in explaining and interpreting bank performance.

2.4.3.1 Measure of Bank performance

There are various types of bank performance measures in order to understand them it is better to classify them in terms of internal and external factors. Internal factors described as efficiency, productivity and profitability of the bank concerning size optimizes and capital structures. Whereas the external factors consists of degree of liberalization of the banking industry (Athanasoglou P. B., 2008) and GDP of the country (Beck, 2003).

Since, stockholders are view performance in terms of the profits made on their behalf, whether or not adjusted for risks taken. Bank performance is measured in terms of Return on Assets, Return on Equity and Productivity/ Net Interest Margin (XLRI, 1918). In addition, in the eyes of the public, a bank is good if it gives good service they provide in draft or encashing a cheque, or infrequent downtime of its ATM, cash shortage in ATM etc. The time taken to redress a customer's complaint will also decide the efficiency of a bank and its performance.

2.4.3.1.1 Determinants of performance

A. The internal determinants

- **Size: number of branches**

The impact of size on bank performance is hotly debated among researchers. There are three groups: those who believe that size has a positive impact on performance, those who find a negative impact, and those for whom the impact is not significant. The first group includes the study of (Short, 1979), (Smirlock, 1985). They advance several arguments to justify their results: A large reduces costs due to economies of scale that this entails, large banks can also raise capital at a lower cost.

The second group in study of (Stiroh, 2006) show the negative effects of the size and emphasize that the more a bank is, the more difficult it is to manage. Additionally, the authors point out that the size may result from aggressive growth strategy, obtained at the expense of margins and performance. In the same (Kasman, 2010) finds a statistically significant and negative impact on the size of the net interest margin (net interest margin) watching a panel of 431 banks in 39 countries.

In study of (De Jonghe, 2010) concludes that small banks are better able to withstand difficult economic conditions, while (Barros, 2007.) Argue that small banks are more likely to get good performance and less chances of getting bad performance. Conversely, large banks are less likely to obtain good performance

and a greater chance of getting bad results. Many other authors such as (Berger A. (., 2007.) respond to the argument of economies of scale and argue that some costs can be reduced simply by increasing the size. Finally, the third groups are not statistically significant impact of size on the performance of banks in study of (Athanasoglou, 2008).

The study by (Berger A. a., 1997) allows the researcher to refine understanding of the impact and effectiveness. Performing a regression between efficiency and size, the authors find that large banks are more efficient than smaller ones

- **Capitalization (capital/ Total Assets)**

Capitalization is usually measured by the ratio of equity to assets ratio (capital to asset ratio (CAR)). Rapid approach to the question might suggest a **higher CAR ratio reduces the ROE** due to two mechanisms: A high ratio indicates a lower risk, and the theory of markets to balance advocating a strong relationship at risk and profitability would lead us to infer a lower profitability, An increase in this ratio may indicate that the share of the debt decreases and thus implies a lower earnings from the tax exemption of the debt burden.

However, all the authors who have studied the issue (Berger A. , 2003.) Try to summarize here the main explanations given by the authors to justify their results: A high level of capital reduces the risk (bankruptcy) incurred by banks. They can therefore afford to maintain the same level of risk of investing in riskier assets whose expected return is of course higher. This results in better performance.

Have a high level of equity is a very positive signal sent to the market on the solvency of the bank and its very low credit risk. Accordingly, such banks are able to reduce their financing costs, for example by paying low interest rates on their debt. In addition to the cost of debt is lower, a strongly capitalized bank, compared to a weakly capitalized bank, does not need to borrow as much to finance a given level of assets. Finally, taking the signal theory, the use of equity (more expensive than debt) to finance a project tells the market that the bank is very confident in its projects and their profitability will be up to the expectations.

- **Liquidity (Loan /Assets)**

Very often, liquidity is measured by the ratio of loans to assets. The higher the ratio, the lower the bank has liquidity. In fact, the loan agreements have various maturities, and thus, in case of urgent need of capital, the bank cannot rely on these loans, since they will only be reimbursed later.

The vast majority of authors found a positive relationship between this ratio and performance, and therefore a negative relationship between liquidity and performance. This result is surprising, especially in the worst case. Authors obtain results depend on result of (Berger A. , 2003.) which explain in detail the positive impact of liquidity on the value of banks. These authors argue that a bank with a high ratio of loans to assets may be less well equipped in case of occurrence of unanticipated crisis events. In addition, the bank is more likely to experience significant losses if a sale urgent (and therefore sold off) of assets necessary to meet liquidity needs. Other authors who have studied the impact on the performance of banks (not value) of assets ratio loans discover a positive relationship. Authors such as (Miller, 1997) in fact interpret the ratio of loans to assets as a measure of credit risk: the higher the ratio, the higher the number of loans granted by the bank is high, and therefore the risk of default (i,e credit risk) increases. To pay the higher credit risk, banks will increase their margins on interest on loans, which increases the NIM and performance.

Conclude this section on liquidity with a remark on the choice of the ratio, as a proxy for liquidity. In study of Bourke (1989) discovers a positive relationship between the liquidity ratio and ROE, which contradicts the arguments and findings described above, the following argument: the liquidity reserves, especially if they are imposed by law, are a burden for banks. In study of (Molyneux, 1995) seeking work Bourke verify, analyze data and find other a negative impact, but statistically insignificant.

- **Credit Quality**

Credit quality, fairly close to the concept of credit risk, is usually measured by two ratios: the ratio of provisions for credit losses to total loans and the ratio of provisions for doubtful debts on total loans. (To be completely accurate, note that these ratios actually measure the quality of non-credit).

As can be expected in study of (Liu, 2010.) Find that a deterioration of the credit quality reduces the ROA and ROE. The **impact on the NIM** seems positive as banks seek to increase their margins to compensate the one hand the risk of default, and other additional costs necessary to monitor these credits.

The study of (Dietrich, 2011.) On the performance of banks in Switzerland is particularly interesting because the authors study the impact of many variables on the performance of both pre-crisis and during the crisis. Thus, pre-crisis credit quality had no statistically significant impact on the performance of banks, perhaps authors suggest, because Swiss banks at that time had very few provisions for losses or bad debts. The arrival of the crisis changed the situation and significantly increased the number of such provisions recorded by Swiss banks. So it has a strong positive impact on the credit quality of their performance.

- **Efficiency (overheads to total assets)**

The efficiency is usually measured by the ratio of costs or result by the ratio of overheads to total assets. Firstly, I note with (Molyneux, 1995) that the level of effectiveness varies considerably in Europe, between different banks and also between different banking sectors. I generally agree to say that it improves the performance of banks. They found a positive relationship by studying Greek banks from 1985 to 2001 and explained that a bank is better able to more effectively use its resources better and reduce costs, which results in a better performance. This reasoning is echoed by (Liu, 2010.) in their analysis of Japanese banks from 2000 to 2007 regardless of the variable used to measure **performance (ROA, ROE and productivity or NIM),** and regardless of the type of control that is exerted on the bank (or private), the ratio of costs to income has a negative impact on performance.

- **Control**

Most authors show that public banks or nationalized banks are less efficient than private banks (Iannota, 2007), (Barth, 2004). These authors show that the nationalized banks:

- A higher credit risk and poor asset quality,
- Solvency ratios worse than private banks,
- Have a ratio of "core capital" pus low.

In study of Cornett, (Millon Cornett, 2010) point out that the difference in performance between private and public banks is even more pronounced in countries where power is heavily involved in the banking system and where political corruption exists. They also highlight the potential conflicts of interest which may lead politicians to prioritize their political interests before the public interest.

Some authors however nuanced the relationship between control and performance. Thus (Micco, 2007) find that the type of control over the bank has an impact on performance. But for them, this relationship is verified especially in developing countries where nationalized banks have low performance, low margins and high overhead. In developed countries, this relationship is much less marked. (Dietrich, Determinants of bank profitability before and during the crisis: Evidence from Switzerland. , 2011) Have studied the case of Switzerland and confirm that the nationalized banks are less efficient than private banks. But not in a crisis! The current financial crisis has reversed this trend, nationalized banks are then considered safer and better managed than private institutions.

Note, finally, that the two studies are not statistically significant impact on the type of control over the performance. In study of (Molyneux, 1995) describe that the banks of eighteen European countries from 1986 to 1989 are the only authors find that the nationalized banks are more efficient than private banks. This may be explained by the period, the 1980s. Since my study concerned only to the private banks, no need to present the argument in this thesis.

- **Degree of diversification (non-interest income related to loans)**

The degree of diversification is usually measured by the ratio of non-interest income related to loans on **operating income**. The study by (Dietrich, Determinants of bank profitability before and during the crisis: Evidence from Switzerland. , 2011) finds a positive effect of diversification on performance. Ferreira and Williams (2007) also find that more diversified banks are less likely to be successful and more likely to provide a poor performance. They finds that the diversification within an institution does not improve the stability of the banking system, which may explain why financial conglomerates content with a discount.

- **Amount of bank Deposits (level of deposits)**

Two arguments can be opposed on the one hand, a high level of deposits can increase performance, because they are more stable funding and less expensive than borrowed funds. On the other hand, such deposits require large teams and specialist departments to manage, causing many expenses. It seems that

only Kunt and Huizinga (1999) were interested in this issue. Their results support the second argument that the high costs generated by these deposits lead to weigh negatively on the performance of banks.

- **Governance**

Beltratti and Stulz (2009) included governance in their lists of independent variables. They used to do model Corporate Governance Quotient, which, on the basis of many criteria such as the **powers and composition of the board of directors, remuneration of directors, or the presence of an audit committee independent, emits a note.** The media and commentators have talked a lot about compensation, modes of governance, and how deficiencies in these areas have contributed to the severity of the crisis we are experiencing.

This argument rests on the idea that if bankers actually acted in the interest of shareholders, they would not take steps to improve the share price in the short term, to worry about long-term performance. However, passed through the prism of a quantitative analysis of the current crisis, it becomes much less relevant.

- **The market share (measured by NIM)**

The impact of market share has mainly been studied by (Liu, 2010.). These authors show that, at least in Japan, a negative relationship between market share and performance (measured by NIM), and regardless of the type of bank. These loans are riskier, they will match the higher interest rates, which will increase their performance and their NIM (Martinez-Peria, 2004) result in the short term, reduce the NIM and the performance of these banks.

B. The external determinants

External determinants of banks, such as the economic environment, inflation, or interest rates also affect performance.

- **The inflation**

The impact on performance is dependent on the rate of growth in **operating expenses:** if these expenses are rising faster than inflation, there is a negative impact on performance. If, the growth rate is lower, there is a positive impact. If inflation is fully anticipated, then it can be passed on to prices, and this

improves the Performance. If, however, it is not anticipated, the costs will rise faster than prices and the impact on performance is negative. Many other authors have focused on inflation, and found a positive and statistically significant (Molyneux, 1995). He conclude that inflation has a negative impact on interest margins. The main activity of banks (mostly commercial) is lending. The market is therefore based on an offer of credit (provided by banks) and demand (the individuals and companies). Inflation reduces the demand for credit because it increases uncertainty about the future.

- **GDP growth**

It is easy to assume that the growth in economic activity, measured by GDP, has a positive impact on the performance of banks: a period of high growth leads to higher investment and consumption, which increased the credit, and hence increase the performance of banks.

This is actually the result reached by the majority of authors who have studied this relationship, namely (Arpa, 2001) (Schwaiger, 2008) even find an inverse relationship between GDP growth and performance of banks. Argued that, in periods of recession, the risk of borrower default increases. To compensate for this increased risk, banks increase interest rates on loans, which improve their performance.

- **The tax**

The tax is deducted from the result; it automatically assigns the **ROA and ROE**. However, a study by (Albertazzi, 2009) finds a very low impact of taxation on performance. Indeed, the authors consider that it is very easy for banks to pass their taxes on other actors (depositors, borrowers, customers paying commissions).

- **Market concentration**

The first, called "Structure conduit performance" states that an increase in market share and market concentration leads to monopoly powers. The second, "Efficient-structure" refutes this idea. The results of (Molyneux, 1995) show that bank concentration ratio has a positive and statistically significant impact on the performance of banks. This bears out the theory first theory. But other studies, such as those of (Demirgüç-Kunt, 1999) lead to precisely the opposite result, which would tend to support the second theory.

- **The maturity of the banking sector**

The (Demirgüç-Kunt, 1999) are analyzed the relationship between bank performance and maturity of the banking system as a whole, as measured by its size or level of development. In their 1999 study, the authors conclude that there is a negative relationship between the size of the banking sector and the banks' performance. They explain that most banking market, the greater the number of players is important and the competition is fierce. This gradually reduces the maximum performance of each player.

They confirm this result in a second study published in 2001. The authors analyze, on the basis of data covering a large number of countries over the period 1990-1997, the relationship between bank performance and financial market development, the level of complexity of its structure. They show that there are statistically significant: a developed banking system reduced performance due to greater competition.

- **The stock market**

That (Naceur, 2010) analyzed is not so much the relation "immediate" between the market price of the banks and their performance measured by **ROE, ROA and NIM**. They further considered the level of stock market development. They find that banks that operate in areas where the stock market is well developed experiencing higher profits that banks operating in areas where the award is undeveloped.

- **The choice of a country**

Numerous studies have confirmed the existence of highly heterogeneous performance between banks in different countries. Studies by (Albertazzi, 2009), (Stulz, 2003)provide evidence suggesting that legal systems, accounting rules, cultures and religions explain differences in cross-border economic growth and business development. They also ring a new element if performance differences between such and such a country such period, do not necessarily mean that the choice of a country brings in itself an advantage in terms of performance over its competitors.

2.4.3.2 Determinants of Bank performance

As stated in the above, the theoretical literatures review showed that "the banking performance" is represented mainly by quantitative financial indicators (ROA, ROE, etc.). Since banks are a multi-product company, which operates in an uncertain and volatile (Stiroh, 2006) probably affected by internal and external variables. Bank performance is usually measured by return on assets (ROA), return on equity (ROE) and Productivity all of them are a function of internal and external determinants.

Internal determinants are also sometimes called microeconomic determinants or inherent performance, while external determinants are variables that reflect economic and legal environment in which the bank operates.

Many studies have attempted to explain the contribution of a particular variable on the performance of banks. It should be noted that very often, the authors found different results even contradictory. This is mainly due to the different data they use, which covers different areas and periods. (Molyneux, 1995) Was studied the performance data from several countries.

2.5 Empirical study:

Bank performance is represented mainly by quantitative financial indicators. Since banks are a multi-product company, which operates in an uncertain and volatile environment probably affected by internal and external variables. Internal determinants are also sometimes called microeconomic determinants or inherent performance, while external determinants are variables that reflect economic and legal environment in which the bank operates.

Many studies have attempted to explain the contribution of a particular variable on the performance of banks. It should be noted that very often, the authors found different results even contradictory. This is mainly due to the different data they use, which covers different areas and periods. Following the above literatures argument and also others scholars. However, this study uses ROA, ROE and Productivity as the dependent variable.

ROA shows the profit earned per dollar of assets and most importantly, it reflects the management's ability to utilize the banks financial and real investment resources to generate profits. Bank profitability is

best measured by ROA in that ROA is not distorted by high equity multipliers and ROA represents a better measure of the ability of a firm to generate returns on its portfolio of assets. ROE on the other hand, reflects how effectively a bank management is in utilizing its shareholders funds. Since ROA tend to be lower for financial intermediaries, most banks heavily utilize financial leverage heavily to increase their ROE to competitive levels. In this research paper the researcher is try to address the relationship between Investment on AIS and the above stated bank performance indicators.

(Fadzlan Sufian, 2005) *"The empirical findings of this study suggest that all the bank-specific determinant variables have a statistically significantly impact on the profitability of the Philippines banks. During the period under study, the results suggest that size, is negatively related to bank profitability"*

(Damanpour and Gopalakrishan, 2001). *Despite of some authors who postulate that the direction of the cause-effect relationship is only that companies achieve a high performance when they can afford the implementation of certain technological developments.*

(Wah, 2000). *Others indicate that firm performance drops just after the implementation, taking several years to realize the benefits from Information system adoptions.*

There are studies which obtain a positive relationship between investment in Information system and economic profitability, financial profitability and value added (Menachemi, Burkhardt, Schewchuk, Burke, & Brooks, 2006); Verhees and Meulenberg ,2004; Brynjolfsson and Hitt, 2003; Santhanam and Hartono, 2003; Bharawadj, 2000; Li and Ye, 1999; Powell and Dent-Micallef ,1997; Barua et al., 1995; Dos Santos and Peffers, 1995).

2.5.1 AIS and bank performance measure

Existing literature offers scant evidence of the relationship between these AIS and performance measures; though it is important to highlight the study made by Ismail and King (2005) which discovered a positive association between AIS alignment and performance measures. Naranjo-Gil (2004) posits an indirect relationship between AIS and firms' performance via the varying strategies that may be adopted by companies. Thanks to investment in AIS, the scope for action is expanded, thus providing time saving in trips to and dealings with banks, the Administration, etc. This reduces firms' costs.

Performance increases when these innovations are properly used. Insofar as a firm's culture is open to the introduction of new accounting information systems this will lead to a more holistic view of it and make for greater flexibility and dynamism in organizational search for improved results.

Despite of some authors who postulate that the direction of the cause-effect relationship is only that companies achieve a high performance when they can afford the implementation of certain technological developments (Damanpour and Gopalakrishan, 2001). Others indicate that firm performance drops just after the implementation, taking several years to realize the benefits from Information system adoptions (Wah, 2000).

There are studies which obtain a positive relationship between investment in Information system and economic profitability, financial profitability and value added (Menachemi, Burkhardt, Schewchuk, Burke, & Brooks, 2006)

Given that AIS are a basic component derived from technologies in general, the main issue is whether applying accounting information systems contributes to firms' improving their results. For this reason, and in view of the scarcity of studies on the subject, this thesis focuses on analysing whether there is any relationship between economic and financial profitability and how much AIS are used in Ethiopia private banks.

2.5.2 Investment on AIS and bank performance

Accounting Information Systems (AIS) are a tool which, when incorporated into the field of Information systems, were designed to help in the management and control of topics related to firms' economic-financial area. But the stunning advance in technology has opened up the possibility of generating and using accounting information from a strategic viewpoint. Since this is important for all firms, it is more important even for Banks ones which need this information to deal with a higher degree of uncertainty in the competitive market (El Louadi, 1996). Thus, they need to improve their systems and data processing capacity to match their information needs.

Investing in staff training, improving the quality of products and internal processes and increasing AIS investment will be the leverage for achieving a stronger, more flexible corporate culture to face continual changes in the environment.

Innovation is the incentive with which a virtuous circle will be put in place, leading to better firm performance and a reduction in the financial and organizational obstacles, while making it possible to access capital markets.

In order to deploy these strategies, Ethiopian Private banks have needed to invest in technology to promote information and communication in different areas of the organization such as production, design, innovation, marketing, commercial management or after sales service, because all of them are very directly identified with gaining or losing market share. This, in turn, has to be reflected in the results and productivity achieved. Although in comparative organizational cultures among countries Ethiopia appears as a country with high resistance to changes that deliver uncertainty such as companies' investments in Information System (Hofstede, 2001).

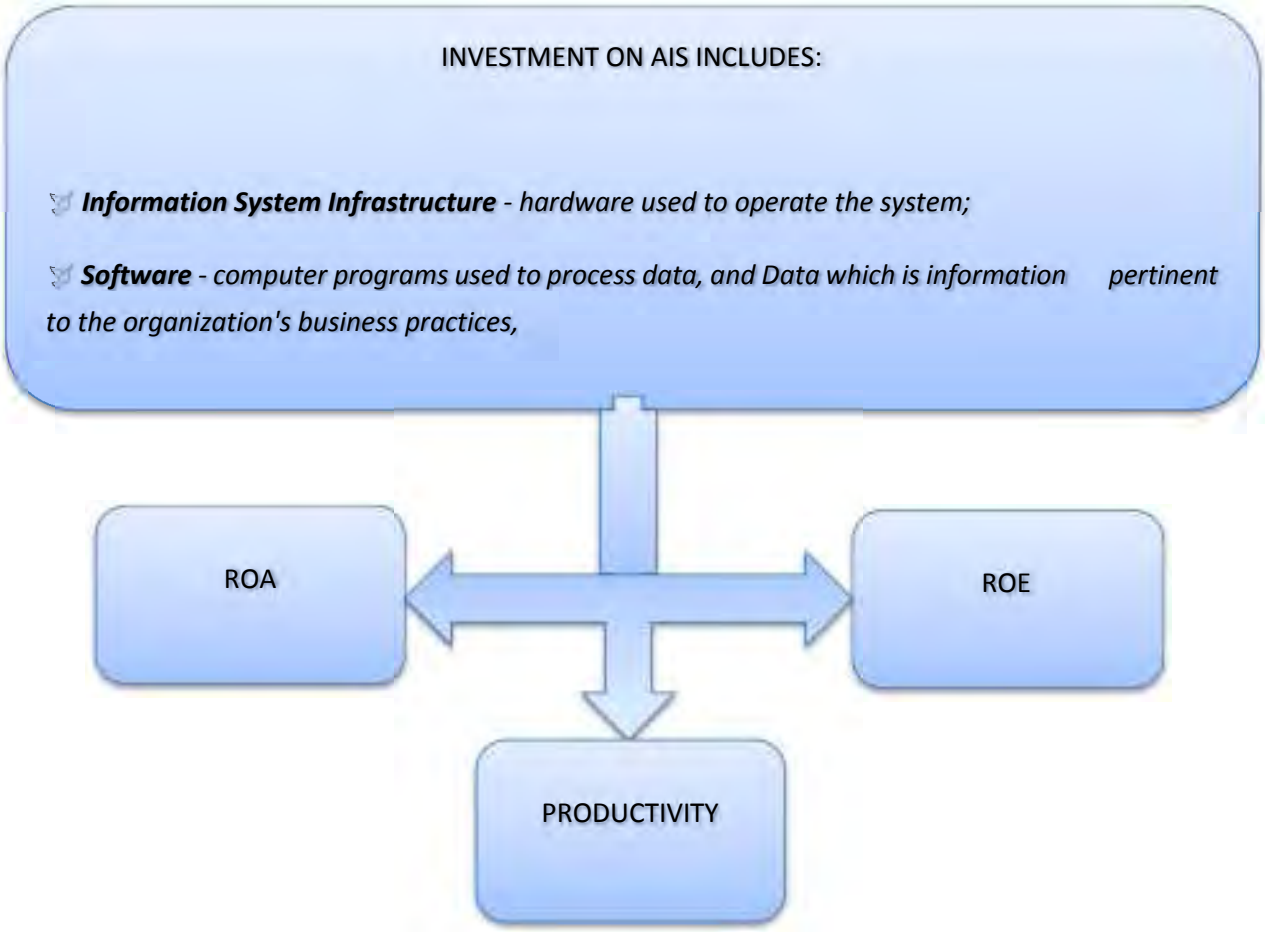
Moreover, the development of the electronic banking allows the companies to save a lot of time in their transactions; moreover AIS have fastened tax management. Thus, and in accordance with several authors, it is of great interest to analyze the impact of AIS on economic and financial profitability indicators (Return on Assets (ROA) and Return on Equity (ROE)) and the productivity of private Banks in Ethiopia.

2.6 Conceptual framework

Different empirical evidences suggested that profitability of financial institutions specifically banks is affected by internal and external factors. This study used ROA, ROE and productivity parts of measure of bank performance.

The study shows how these variables are affected due to investment made on Accounting Information System. Accordingly, the following diagram shows the relationship between investment on Accounting Information System and Bank performance indicators such as ROA, ROE and productivity.

Figure 1 shows the effect of Accounting Information System on bank performance



Source: Self-extracted

THAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This section discusses the research design and methodology. The chapter is organized in six sections. Section 3.1 discusses the research design section 3.2 consists of Methods of data collection in section 3.3 and 3.4 sampling design and analysis are presented respectively. In section 3.5 data analysis model assumption and data properties of the study are presented. Lastly in section 3.6, limitation of the methodology is presented.

3.5 Research Design:

The main objective of this study was to investigate the Impact of Investment on AIS on Bank performance the case of private commercial banks in Ethiopia. And this study adopted model for the study of panel research design to realize a stated objective. As quoted from (Tobias and Themba, 2011) 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 (Baltagi, 2005).

The study was employed quantitative research approach by using both primary and secondary data gathered from managers and financial statement of private commercial banks respectively. For primary data researcher were made discussion between head of accounting and finance particularly designated accounting clerk of each banks at the head office level in order to get the separated ledger cost of Infrastructure, software and IT service. As a trend and for tax purpose the cost of software was categorized under infrastructure section and IT service cost is also under Administration section of stated notes to Financial Statement of majority Banks. Whereas, the secondary data consists of banks annual audited financial report, websites, books and Articles used to construct the related literature review and source of data for analyses. ***Banks annual audited financial reports*** are the main source of data in which researcher was relayed. Because the subject matter of this research was relayed on a large and wider coverage of annual data since year 2005 up to year 2014.

Panel data of ten years (10) annual audited financial report of selected banks since year 2005 up to year 2014, it was analyzed using EViews (Econometric Views) which is a Statistical Package for Windows ***EViews Version 6.0***, was used. Additionally, ***Statistical Package for the Social Sciences (SPSS) method*** was also

deployed it is an application that can aid in quantitative data handling. In the SPSS test it would be possible to ***test hypothesis*** to get the relationship between Investment on Accounting information system and Performance of Private commercial banks in Ethiopia.

3.6 Method of Data Collection

The study was employed quantitative research approach by using both primary and secondary data gathered from managers and financial statement of private commercial banks respectively. ***Banks annual audited financial reports*** were collected from National Bank of Ethiopia's website of the private banks annual reports, physically from head office of each banks for unavailable data on the website. Financial statements and other published and unpublished documents also used to construct the literature part of this thesis and cited accordingly.

For primary data researcher were made discussion between head of accounting and finance particularly designated accounting clerk of each banks at the head office level in order to get the separated ledger cost of Infrastructure, software and IT service.

3.7 Sampling design

The research sample framework cover the study of collected annual audited financial reports of selected private commercial banks in Ethiopia from year 2005 up to year 2014. The population of this study included all private commercial banks in Ethiopia. However, commercial banks which started their operation after 2005 were not considered. As results, out of the 16 private commercial banks, seven commercial banks Abyssinia Bank, Awash Bank, Dashen Bank, Nib International Bank, United Bank, Cooperative Bank of Oromia and Wegagen Bank are selected. All private commercial banks included in this study are operated for more than ten years except Cooperative Bank of Oromia started its operation in 2005. Thus, the study used a ten years data for all sellected banks.

3.7.1 Sample size

Currently, there are nineteen (19) Commercial banks in Ethiopia; of which 3 of them are Government Owned: Commercial Banks of Ethiopia, Construction and Business Bank, and Development Bank of Ethiopia. While, the remaining 16 banks are Private owned Commercial banks: Abay Bank S.C., Addis International Bank S.C., Awash International Bank S.C., Bank of Abyssinia S.C., Berhan International Bank S.C., Bunna International Bank S.C., Cooperative Bank of Oromia S.C., Dashen Bank S.C., Debub Global Bank S.C., Enat Bank S.C., Lion International Bank S.C., Nib International Bank S.C., Oromia International Bank S.C., United Bank S.C., Wegagaen Bank S.C. and Zemen Bank S.C. (National Bank , 2015)

Of the total population 16 Private owned Commercial banks understudy 7 (44%) Banks are selected as a sample size for study. The selection criteria was purposive based on years of establishment of banks (at least more than five average years).

3.8 Data analysis

Collected audited financial reports was analyzed by using E-views 6. The analysis included test of descriptive statistics, correlations, and multiple linear regression analysis.

Descriptive Statistics include: Mean, minimum, maximum and standard deviation values these were used from in order to analyze data collected since year 2005 to 2014 in relation to assigned variables for study. A correlation matrix was used to examine the relationship between the dependent variable and explanatory variables to investigate multicolinearity problem between variables. (John Creswell, 2009).

3.8.1 Variables

The followings are independent and dependent valuables, in which the researcher was tested for their relationship based on the model. The selection criterion of Independent Variable is the definition of AIS.

A. Independent Variable

Independent variables are those variables describes investment on Accounting Information system (IAIS) characterized by the following components:

- **Information System Infrastructure** - hardware used to operate the system;
- **Software -** computer programs used to process data, and Data which is information pertinent to the organization's business practices,
- **Services** - include People /system users. (based on their payroll) Procedure and Instructions - methods for retrieving and processing data and Internal controls - security measures to protect sensitive data, (based on cost of training),

B. Dependent variable

Dependent variables are those variables affected due to change in independent variables stated under section A. all stated dependent variables are inferred by researcher as measure of performance of private banks in Ethiopia. The followings are parameters (indicators) of bank performance which are characterized by their components or measurements:

1. **Return on Asset (ROA), divide net profit by total Assets:** It is the most common profitability ratio of performance measure used by banks in order to evaluate performance comparing the efficiency of a number of different investments. (Berger A. , 1995).

$$ROA = \frac{Net\ Income}{Total\ Asset}$$

2. **Return on equity (ROE), divide net profit by total Shareholder's Equity**. It measures how efficiently a bank can use the money from shareholders to generate profits and grow. It is a profitability ratio from the investor's point of view. This ratio calculates how much Investment is made based on the investors' investment in the bank, not the company's investment in assets or something else (Molyneux, 1995), Belayneh (2011).

$$ROE = \frac{Net\ Income}{Total\ Equity\ Capital}$$

3. **Productivity** measure using Investment on AIS (input activities that have substantial Investment or total assets) as a factor changes income or direct revenue that banks earn (outputs) over time; **Divide**

Annual income (sales) by total assets. It is an average measure of the efficiency of Bank's service using asset investment. The objective is to be maximized in services process. Productivity is an average measure of the efficiency of Bank's service using deployed invested assets.

Productivity is a required tool in evaluating and monitoring the performance of bank. When directed at specific issues and problems, productivity measures can be very powerful. In essence, productivity measures are the yardsticks of effective resource use. Managers are concerned with productivity as it relates to making improvements in the bank. Proper use of service delivery measures can give the manager an indication of how to improve it. Managers are also concerned with how productivity measures relate to competitiveness or trend of services. James Nguyen (2006), Angbazo (1997), Levine (2004), and Claeys et al. (2004).

$$Bank\ Productivity = \frac{Annual\ Income}{Total\ Asset}$$

Table 3.1 Summary of variables to be tested, expected sign and explanations.

Dependent Variables	**Explanation**	**Notation**	**Expected sign**
ROA	*Net income after tax over Total assets*	ROA	NA
ROE	*Net income after tax over Shareholders' Equity*	ROE	NA
Productivity	*Annual income over Total assets*	PROD	NA
Independent Variables			
Infrastructure	*It includes hardware used to operate the system;*	INFRA	+
Software	*Computer programs used to process data, and Data which is information pertinent to the banks' business practices,*	SOFT	+
Services	*Includes cost for IT personnel /system users. Procedure and Instructions - methods for retrieving and processing data and Internal controls - security measures to protect sensitive data, including cost of training*	SERV	+
Size	*Total assets of each selected banks*	SIZE	+/-

3.9 Data analysis Model

Based on researcher's objective, the study was conducted primarily on panel data obtained through structured document review *(annual Audited Financial Report).* The advantage of using panel data is that it controls for individual heterogeneity, leads to less collinearity among variables and tracks trends in the data. (Baltagi 2005) Hence, this panel data was examined using descriptive statistics, correlations, multiple linear regression analysis and inferential statistics. Mean values and standard deviations were used to analyze the general trends of the data from 2005 to 2014 based on the sample of 7 Private commercial Banks in Ethiopia and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables.

A random effect method of panel multiple linear regression test was used to determine the significance level of each independent and control variable in influencing performance. The multiple linear regressions model was run using OLS through EViews 6.0 econometric software package, to test the casual relationship between the banks' performance and Investment on AIS in order to determine the most significant and influential indicators and other control variables affecting the performance of Private commercial Banks in Ethiopia.

To test the relationship between Investment on AIS and bank Performance described earlier, the researcher estimate a linear regression model in the following form:

Performance of Private Commercial banks in Ethiopia = function of (Investment on Accounting Information System)

$$P_{jt} = \beta o + \beta_{jt} IAIS_{jt} + \varepsilon_{jt} \quad \ldots\ldots (1)$$

For further investigation AIS investment components (Infrastructure & software, Service) are considered as independent variable. Accordingly, the researcher re-write the model as follows:

$$P_{jt} = \beta o + \beta_{jt} INFRA_{jt} + \beta_{jt} SOFT_{jt} + \beta_{jt} SERV_{jt} + \varepsilon_{jt} \quad \ldots\ldots (2)$$

Whereas;

P_{it} = refers to Performance of Private Commercial Banks in Ethiopia and is the observation of private bank j in a particular year t;

j = refers to individual private bank; **t =** refers to year;

β_o = refers to constant term; and β_{jt} = refers to change in factors term;

$IAIS_{jt}$ = represents Investment on Accounting Information System;

$INFRA_{jt}$ = represents Investment on AIS's infrastructure/ hardware;

$SOFT_{jt}$ = represents Investment on AIS's software;

$SERV_{jt}$ = represents Investment on AIS's Services; and

ε_{jt} = is a normally distributed random variable disturbance term.

The researcher apply the least square method to a fixed effects (FE) model, where the standard errors are calculated by using White's (1980) transformation to control for cross-section heteroscedasticity. The opportunity to use a fixed effects model rather than a random effects model has been tested. To check for the robustness of the results, the researcher also reported results from the random effects model.

In the context of this research paper, measure of bank performance are ROA, ROE and Productivity. The researcher develops additional model to see the clear impact of Accounting Information System Investment on stated measure of bank performance ROA, ROE and Productivity. The followings are further described better model of performance measures fits researcher's title objective.

ROA, ROE, PROD = f (Investment on AIS's Infrastructure + Investment on AIS's software + Investment on AIS's services) Therefor:

Model for ROA, ROE and Productivity

$$P_{jt} = \beta o + \beta_1 LN(INFRA)_1 + \beta_2 LN(SOFT)_2 + \beta_3 LN(SERV)_3 + \beta_4 LN(SIZE)_4 + \beta_5 (CBO5)_5 + \beta_6 (CBO6)_6 + \beta_7 (CBO14)_7 + \beta_8 (ABY8)_8 + \varepsilon_{jt} \quad \ldots\ldots (3)$$

Followings are interpretation for size effect and other control Variables Introduced

LN (INFRA) *= represents logarithm of Investment on AIS's infrastructure to control size effect;*

LN (SOFT) *= represents logarithm of Investment on AIS's software to control size effect;*

LN (SERV) *= represents logarithm of Investment on AIS's Services to control size effect;*

LN (SIZE) *= represents logarithm of Investment on AIS's on firm size it is a control variable intorduced;*

COB5, 6 and 14 *= represents demi variable introduced to overcome the exaggerated figures due to loss faced to Cooperative bank of Oromia during fiscal years 2005, 2006 and high profit report on 2014;*

ABY8 *= represents demi variable introduced to exaggerated figures reported by Bank of Abyssinia during fiscal years 2008.*

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATIONS

In this section the researcher present the test results and analysis of collected data. The chapter is organized into three sections. Section 4.1 shows the specification of model. Section 4.2 presents the descriptive statistics results and the classical linear regression model assumptions and finally section 4.3 indicates the hypothesis testing.

4.4 Research Model Specification

In order to achieve the objective of the study, researcher presented model with some modification made in order to control the impact of other variables to explain the relationships between investment on AIS and Bank Performance: A case of private commercial banks in Ethiopia.

$$ROA_{jt} = \beta o + \beta 1\ LN(INFRA)1 + \beta 2\ LN(SOFT)2 + \beta 3\ LN(SERV)3 + \beta 4\ LN(SIZE)4 + \beta 5\ (CBO5)5 + \beta 6\ (CBO6)6 + \beta 7\ (CBO14)7 + \beta 8\ (ABY8)8 + \varepsilon jt$$

$$ROE_{jt} = \beta o + \beta 1\ LN(INFRA)1 + \beta 2\ LN(SOFT)2 + \beta 3\ LN(SERV)3 + \beta 4\ LN(SIZE)4 + \beta 5\ (CBO5)5 + \beta 6\ (CBO6)6 + \beta 7\ (CBO14)7 + \beta 8\ (ABY8)8 + \varepsilon jt$$

$$PROD_{jt} = \beta o + \beta 1\ LN(INFRA)1 + \beta 2\ LN(SOFT)2 + \beta 3\ LN(SERV)3 + \beta 4\ LN(SIZE)4 + \beta 5\ (CBO5)5 + \beta 6\ (CBO6)6 + \beta 7\ (CBO14)7 + \beta 8\ (ABY8)8 + \varepsilon jt$$

Whereas:

The dependent variable in the model are Return on Asset (ROA), Return on Equity (ROE) and Productivity (PROD)

ROA = Annualized Net Income/Total Asset

ROE = Annualized Net Income/Total Shareholders' Equity

PROD = Annual Income/Total Asset

While the explanatory variables are infrastructure, software, service and size. The researcher also controlled for the effects of other factors on bank performance using Log and introducing demi variables which affects significantly.

4.5 Tests and results

Discusses the basic findings and presents the tests for the classical linear regression model. It is structured as follows.

4.5.1 Descriptive statistics

The descriptive statistics of the dependent and explanatory variables of selected Banks is summarized in Table-4.1. The table presents mean, standard deviation, maximum, minimum and median values for the dependent and independent variables for the total observation of 70. The researcher described the result as follows based on the indicated figures of Eviews output.

Table 4.1 Descriptive statistics result

	ROA	ROE	PROD	LN_INFRA_	LN_SOFT_	LN_SERV_	LN_SIZE_
Mean	0.026337	0.218332	0.073332	16.64364	16.33724	15.86080	22.28526
Median	0.028527	0.232027	0.073952	16.75020	16.37128	16.02964	22.48432
Maximum	0.054271	0.356701	0.139216	18.76581	18.95446	18.35390	23.81913
Minimum	-0.022201	-0.040511	0.000239	11.45549	11.45549	11.91970	18.67532
Std. Dev.	0.010942	0.079606	0.018520	1.367261	1.299673	1.663676	0.997084
Observ.	70	70	70	70	70	70	70

Source: Eviews test result

The mean ROA of selected Private Banks was 2.63 percent with the standard deviation of 1.09 percent. It shows that the selected Private Banks have reached a performance rate of 2.63 percent for the period taken and the standard deviation shows that there is variance on the reported performance. Even if there were Private Banks that reported a ROA which was as high as 5.42 percent, there were also Private Banks with low performance reported at -2.2 percent.

Performance for the sample period has ranged from -2.2 percent to 10.09 percent with a standard deviation of 1.09 percent. Even if the standard deviation shows the existence of low level of variation in the group performance, the range shows the existence of great variation in performance among the selected Private commercial Banks in Ethiopia.

The explanatory and control variables of ROE for the period of ten years is surprisingly 21.8 percent, which can be considered as good performance. From the above mean result it can be well understood that selected Private commercial Banks in Ethiopia under the study have a good performance. The standard deviation of ROE which is 7.9 percent shows that the result applies to the selected Private commercial Banks in Ethiopia with variation.

The minimum recorded ROE was as low as -4.05 percent while the maximum was about 35.6 percent. This individual range result shows a wide dispersion on the level of ROE of selected Private commercial Banks in Ethiopia taken under the study. This shows that some Banks in Ethiopia are very loose in their Performance. The overall effect of both ROA and ROE result shows a **positive** implication with big variance of explaining their performance between the stated periods from 2005 to 2014.

Productivity ratio is the other performance indicator, averaged at 7.33 with standard deviation of 1.85 percent. The average performance result of the Private commercial Banks in Ethiopia taken under the study had low level of standard deviation which applies to most of the selected Banks. The maximum score of Productivity for the Private commercial Banks in Ethiopia sampled was found to be at 13.92 percent and the minimum was nil (0 percent). The result of the Max and Min range shows that, even if there are some Banks were productive, the maximum value is also an indicator that there was Private commercial Banks found which are not productive. Relative to other European banks and sub-Saharan banks, Private commercial Banks in Ethiopia were perform well this is due to absence of foreign banks. Mean average of European banks are ROA, ROE and productivity is 0.6, 12.19 and 47.79 percent consecutively and the standard deviation is also 27.26 percent. (Macer- ata 2014).

4.5.2 Correlation Analysis

It is the measures used to identify the degree of linear association between variables. Values of the correlation coefficient are always ranged between +1 and -1. A correlation coefficient of +1 indicates that the existence of a perfect positive association between the two variables; while a correlation coefficient of -1 indicates perfect negative association. A correlation coefficient of zero, on the other hand, indicates the absence of relationship (association) between two variables (Brook, 2008). In this study, the researcher employed the Pearson product moment of correlation coefficient in order to find the association of the independent variables with the performance of selected private commercial Banks in Ethiopia.

As per the result of the correlation matrix in Table-4.2, ROA (dependent variable) was positively correlated with the explanatory variables AIS's infrastructure and software investment as well as AIS's service investment.

Table 4.2.1: Correlation (Pearson) matrix

	ROA	LN_INFRA_	LN_SOFT_	LN_SERV_	LN_SIZE_
ROA	1.000000				
LN_INFRA_	0.609828	1.000000			
LN_SOFT_	0.107866	0.742096	1.000000		
LN_SERV_	0.643627	0.593076	0.524776	1.000000	
LN_SIZE_	0.553352	0.716766	0.775026	0.659906	1.000000
	ROE	**LN_INFRA_**	**LN_SOFT_**	**LN_SERV_**	**LN_SIZE_**
ROE	1.000000				
LN_INFRA_	0.603669	1.000000			
LN_SOFT_	0.504590	0.742096	1.000000		
LN_SERV_	0.342180	0.593076	0.524776	1.000000	
LN_SIZE_	0.631154	0.716766	0.775026	0.659906	1.000000
	PROD	**LN_INFRA_**	**LN_SOFT_**	**LN_SERV_**	**LN_SIZE_**
PROD	1.000000				
LN_INFRA_	0.510942	1.000000			
LN_SOFT_	0.633373	0.742096	1.000000		
LN_SERV_	0.246811	0.593076	0.524776	1.000000	
LN_SIZE_	0.592929	0.716766	0.775026	0.659906	1.000000

Source: Eviews 6.0

Both investment on AIS's Infrastructure, software as well as services of Private commercial Banks in Ethiopia have a **positive** correlation with ROA, ROE and Productivity. Indicating that, when investment on AIS's Infrastructure increase, Performance will also move in the same direction. It was correlated at 60.9, 10.7, 64.3 and55.3 with ROA, at 60.3, 50.4, 34.2 and 63.1with ROE, and at 51.09, 63.33, 24.68 and 59.2 with Productivity, respectively.

The log results of above stated explanatory variables had hive value of positive correlation and interpreted as value of investment made on accounting information system have significance and positive effect on private commercial banks performance.

4.5.3 Classical Linear Regression Model Assumptions test

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

Assumption1: The errors have zero mean (E (ε) = 0)

The first assumption states that the average value of the errors should be zero. According to (Brook, 2008) if the regression equation contains a constant term, this presumption will never be breached. Therefore, since the constant term (i.e. $\beta 0$) was included in the regression equation; this assumption holds good for the model.

Assumption 2: homoscedasticity (variance of the errors is constant (Var (u_t) = $\delta^2 < \infty$)

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

Table 4.2.2 presents three different types of tests for heteroscedasticity. Since the p-values of all the three tests are considerably in excess of 0.05 it's a clear indicator that there is **no evidence for the presence of heteroscedasticity**. Hence, the model passes the second test also.

Table 4.2.2: Heteroscedasticity Test: White test

ROA

Heteroskedasticity Test: White

F-statistic	1.433709	Prob. F(18,51)	0.1565

Obs*R-squared	23.51972	Prob. Chi-Square(18)	0.1714
Scaled explained SS	23.87921	Prob. Chi-Square(18)	0.1590

ROE

Heteroskedasticity Test: White

F-statistic	0.666246	Prob. F(14,55)	0.7962
Obs*R-squared	10.14996	Prob. Chi-Square(14)	0.7511
Scaled explained SS	7.833759	Prob. Chi-Square(14)	0.8978

PROD

Heteroskedasticity Test: White

F-statistic	0.891742	Prob. F(18,51)	0.5903
Obs*R-squared	16.75723	Prob. Chi-Square(18)	0.5399
Scaled explained SS	11.11831	Prob. Chi-Square(18)	0.8893

Source: Eviews 6.0

Assumption 3: covariance between the error terms over time is zero (cov (u_i, u_j) = 0)

This assumption states that covariance between the error terms cross-sectional, for that type of data is zero. That is, the errors should be uncorrelated with one another. If the errors are not uncorrelated with one another it is an indicator for the presence of Auto correlation or serial correlation (Brook, 2008).

Accordingly, two tests were made in order to figure out the presence of autocorrelation. The two tests used in this study are the **Durbin-Watson (DW) and Breusch–Godfrey serial correlation LM test**. According to (Brook, 2008), DW has 2 critical values: an upper critical value and a lower critical value, and there is also an intermediate inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected or inconclusive.

The null hypothesis is rejected and the existence of positive autocorrelation presumed if DW is less than the lower critical value; the null hypothesis is rejected and an existence of negative autocorrelation is presumed if DW is greater than 4 minus the lower critical value; the null hypothesis is not rejected and no significant residual autocorrelation is presumed if DW is between the upper critical value and 4 minus the upper limits; the null hypothesis is neither rejected nor not rejected if DW is between the lower and the upper limits, and between 4 minus the upper and 4 minus the lower limits. The simplest way to judge the absence of autocorrelation is by looking at the DW measure's value in the regression result and if this value is close to 2, then it's an indicator of the absence of autocorrelation. Table 4.2.3 presents the Durbin-Watson test value for the autocorrelation of residual.

Table 4.2.3 Autocorrelation test after the inclusion of lagged variable

ROA

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.317340	Prob. F(2,59)	0.7293
Obs*R-squared	0.744996	Prob. Chi-Square(2)	0.6890

ROE

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.240686	Prob. F(5,17)	0.3224
Obs*R-squared	53.66077	Prob. Chi-Square(5)	0.1763

PROD

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.271956	Prob. F(5,56)	0.2545
Obs*R-squared	38.62289	Prob. Chi-Square(5)	0.1344

Source: Eviews 6.0

DW test result of the researcher indicates; test result of ROA, ROE and PROD are 2.008, 1.902 and 1.928 respectively which is very close to 2; therefore without going through the above analysis it can be easily judged that there is no problem of autocorrelation. Since the Durbin-Watson statistic can be difficult to interpret and it is difficult to judge the presence of autocorrelation if the value lies in the inconclusive region. Another way of showing the presence/absence of autocorrelation is by using the Breusch–Godfrey test (shown in above table 4.2.3). The result of the statistic labeled "obs*R-squared", which is the LM test statistic for the null hypothesis of no serial correlation shows a p-value of ROA, ROE and Productivity 0.6890, 0.1763and 0.1344 (which is greater than 0.05) it indicates the **absence of autocorrelation**.

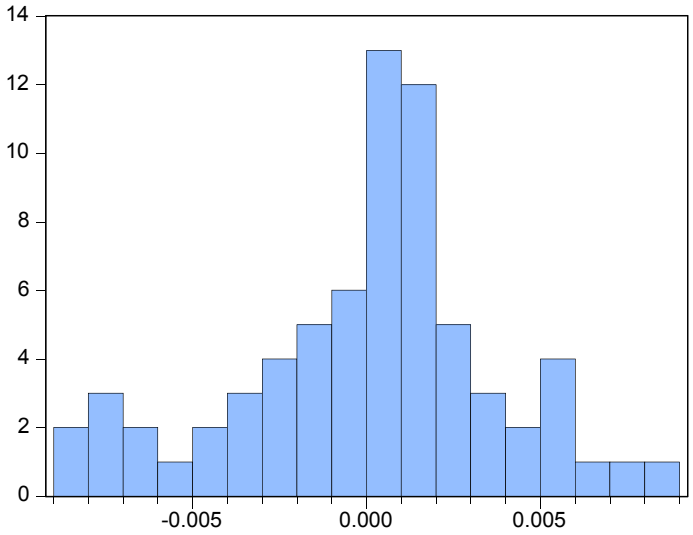
But before reaching to this result of DW value and LM test, the researcher has faced the problem of autocorrelation. The test result suggests that the original model specification should be modified in order to take account to the problem of serial correlation. One approach (which was used in this study) used in order to solve this problem of autocorrelation is to include lags of the independent variables (i.e. using lagged variables). "Lagged effects is likely to reduce, and ossibly remove, serial correlation which was present in the static model's residuals" (Brook, 2008). The software EViews automatically adjust the estimation sample and observation to accommodate the additional lagged variables and the lagged variables will be presented in the regression model and regression result labeled (-1).

Assumption 4: Normality (errors are normally distributed ($ut \sim N(0,\delta 2)$)

A normal distribution is not skewed and is defined to have a coefficient of kurtosis ≈ 3. Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis are ≈ 0 and ≈ 3 respectively. Normality assumption of the regression model can be tested with the Jarque- Bera measure. If the Jarque Bera value is greater than 0.05, it's an indicator for the presence of normality (Brook, 2008). The normality tests for this study is shown in Figure 4.2.1

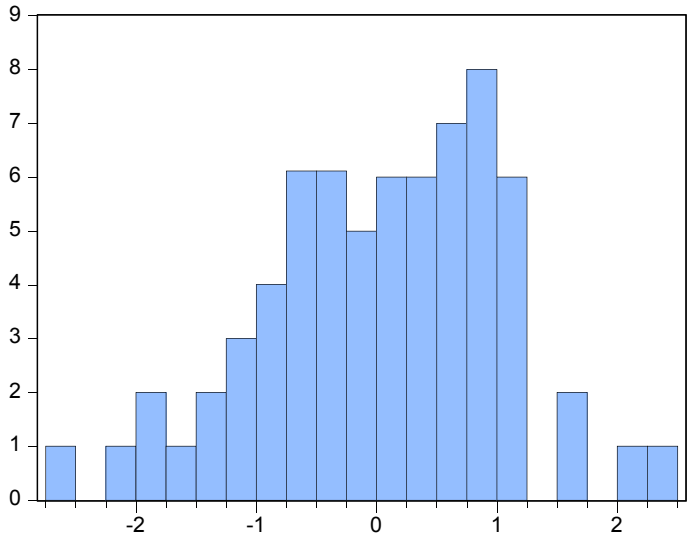
Fig. 4.2.1 Normality Test Result of ROA, ROE and Productivity

Normality test result of ROA



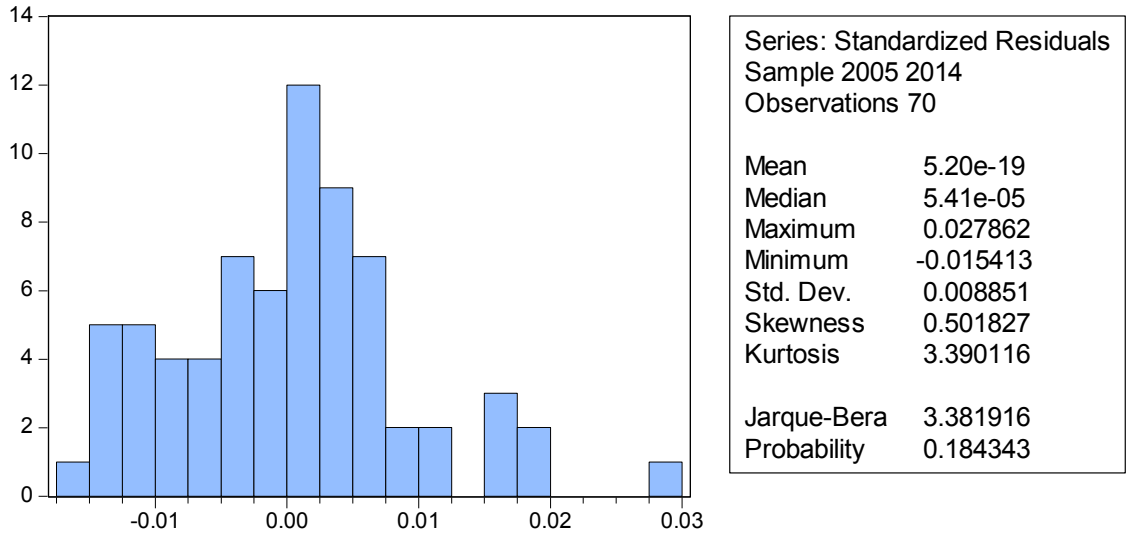
Series: Standardized Residuals	
Sample 2005 2014	
Observations 70	
Mean	2.48e-20
Median	0.000292
Maximum	0.008105
Minimum	-0.008516
Std. Dev.	0.003717
Skewness	-0.343702
Kurtosis	3.091456
Jarque-Bera	1.378410
Probability	0.501975

Normality test result of ROE



Series: Standardized Residuals	
Sample 2005 2014	
Observations 70	
Mean	2.38e-16
Median	0.068810
Maximum	2.256832
Minimum	-2.601395
Std. Dev.	0.992853
Skewness	-0.278822
Kurtosis	3.106380
Jarque-Bera	0.938302
Probability	0.625533

Normality test result of Performance



Source: Eviews 6.0

Based on the above graphs of ROA, ROE, Productivity, the test result confirmed that it is **normal.**

Assumption 5: Multicollinearity Test

(Churchill, 9th Edition. USA:)2005, multicollinearity is concerned with the relationship which exists between explanatory variables. When there exists the problem of multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases and as a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. How much correlation causes multicollinearity? However, is not still clearly defined.

Many authors have suggested different level of correlation to judge the presence of multicollinearity. While (Hair, 2006) argued that correlation coefficient below **0.9** may not cause serious multicollinearity problem. (Malhotra, 2007.) Stated that multicollinearity problem exists when the correlation coefficient among variables is greater than **0.75.** This indicates that there is no consistent agreement on the level of correlation that causes multicollinearity. Correlation matrix for six of the independent variables is shown below in Table 4.2.4.

Table 4.2.4 Multicollinearity test

	LN_INFRA_	LN_SOFT_	LN_SERV_	LN_SIZE_
LN_INFRA_	1.000000			
LN_SOFT_	0.742096	1.000000		
LN_SERV_	0.593076	0.524776	1.000000	
LN_SIZE_	0.716766	0.775026	0.659906	1.000000

Source: Eviews 6.0

The results of the estimated correlation matrix shows that the highest correlation of 0.775 which is between Log of AIS's Investment on software ratio (LN_SOFT_) and Log of total assets ratio (LN_SIZE_). So, the researcher concluded that, there is **no problem of multicollinearity** (Hair, 2006) .

4.5.4 Regression results

There are broadly two classes of panel estimator approaches that can be employed in a panel data financial research: fixed effects models (FEM) and random effects models (REM) (Brook, 2008).

Even if this two approaches end up with nearly the same result, there are situations that they will deviate widely. To check which of the two (FEM or REM) models provide consistent estimates (is preferred) for this study; Hausman test was employed and the result is presented as follows.

Table 4.2.5 Correlated Random Effects - Hausman Test

ROA, ROE and PROD

Correlated Random Effects - Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random ROA	1.775749	4	0.7769
Cross-section random ROE	1.539035	4	0.7547
Cross-section random PROD	1.339035	4	0.8547

Source: EViews 6.0

The null hypothesis of the Hausman test of Table 4.2.5 showed that, the p-value for the test is > 0.05, which indicates that the **null hypothesis was not rejected**. Thus, the relationship between Bank Performance and the explanatory variables was examined by the random effects model in this study. According to the following table of result, The R-squared value measures how well the regression model explains the actual variations in the dependent variable (Brook, 2008). Thus, the R-squared value in Table 4.2.6 below indicates that 0.85, 0.95 and 0.93 percent variation in performance (ROA, ROE and Productivity) of the selected private commercial banks in Ethiopia respectively.

Table 4.2.6 Regression result- Random Effect Model

Dependent Variable: ROA

Method: Panel EGLS (Cross-section weights)

Date: 06/23/15 Time: 21:42

Sample: 2005 2014

Periods included: 10

Cross-sections included: 7

Total panel (balanced) observations: 70

Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.072868	0.022660	-3.215759	0.0022*
LN_INFRA_	-0.001818	0.001064	-1.708978	0.1931
LN_SOFT_	-0.001095	0.001388	0.788855	0.0936***
LN_SERV_	0.003611	0.000771	-4.686017	0.0000*
LN_SIZE_	0.007605	0.001904	3.994432	0.1002
D1	-0.025095	0.006945	-3.613618	0.0007*
D2	-0.032332	0.006998	-4.620094	0.0000*
D3	0.033299	0.006787	4.906300	0.0000*
D4	-0.019084	0.003644	-5.237145	0.0000*
Effects Specification				

Cross-section fixed (dummy variables)

Weighted Statistics			
R-squared	0.853756	Mean dependent var	0.035322
Adjusted R-squared	0.816531	S.D. dependent var	0.022665
S.E. of regression	0.004163	Sum squared resid	0.000953
F-statistic	22.93462	Durbin-Watson stat	1.995595
Prob(F-statistic)	0.000000*		

Significant at *1%, and at ***10% significance level

Dependent Variable: ROE

Method: Panel EGLS (Cross-section weights)

Date: 06/24/15 Time: 17:07

Sample: 2005 2014

Periods included: 10

Cross-sections included: 7

Total panel (balanced) observations: 70

Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.490555	0.115392	-4.251200	0.0001*
LN_INFRA_	-0.013896	0.004292	-3.238039	0.1220
LN_SOFT_	0.007796	0.003740	-2.084457	0.0418**
LN_SERV_	0.016962	0.004842	-3.503287	0.0009*
LN_SIZE_	0.060124	0.008576	7.011019	0.1900
D1	-0.167297	0.025294	-6.614219	0.0000*
D2	-0.089221	0.025701	-3.471454	0.0010*
D3	0.178953	0.023476	7.622788	0.0000*
D4	-0.154360	0.012916	-11.95071	0.0000*

Effects Specification
Cross-section fixed (dummy variables)

Weighted Statistics			
R-squared	0.952131	Mean dependent var	1.692321
Adjusted R-squared	0.939947	S.D. dependent var	12.00038
S.E. of regression	1.057921	Sum squared resid	61.55580
F-statistic	78.14117	Durbin-Watson stat	1.902322
Prob(F-statistic)	0.000000*		

Significant at *1%, and at **5% significance level

Dependent Variable: PROD

Method: Panel EGLS (Cross-section weights)

Date: 06/24/15 Time: 16:39

Sample: 2005 2014

Periods included: 10

Cross-sections included: 7

Total panel (balanced) observations: 70

Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.117162	0.036972	-3.168970	0.0025*
LN_INFRA_	-0.001125	0.001441	-0.780596	0.1984
LN_SOFT_	-0.003364	0.002264	1.486143	0.1830
LN_SERV_	0.003790	0.001180	-3.210550	0.0022*
LN_SIZE_	0.009633	0.003070	3.137283	0.1327
D1	-0.051291	0.008325	-6.161100	0.0000*
D2	-0.030669	0.008518	-3.600555	0.0007*

D3	0.057343	0.008046	7.127007	0.0000*
D4	0.004150	0.003732	1.112081	0.1709

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.939045	Mean dependent var	0.114914
Adjusted R-squared	0.923529	S.D. dependent var	0.073451
S.E. of regression	0.007706	Sum squared resid	0.003266
F-statistic	60.52152	Durbin-Watson stat	1.928408
Prob(F-statistic)	0.000000*		

Significant at *1% and at ***10% significance level

Source: Eview 6.0

The regression model arising from the above data indicated as follows;

ROA = 0.072868 - 0.001818 LN (INFRA) + 0.001095 LN (SOFT) + 0.003611 LN (SERV) + 0.007605 LN (SIZE) + Ɛ

ROE = 0.490555 - 0.013896 LN (INFRA) + 0.007796 LN (SOFT) + 0.016962 LN (SERV) + 0.060124 LN (SIZE) + Ɛ

PROD = 0.117162 - 0.001125 LN (INFRA) - 0.003364 LN (SOFT) + 0.003790 LN (SERV) + 0.009633 LN (SIZE) + Ɛ

The model above can be interpreted starting from the constant variable; it shows that if any Private commercial bank of Ethiopia invest on accounting information system it will have constant amount of 0.072868, 0.490555 and 0.117162 performance other things being constant described by ROA, ROE and Productivity respectively.

The coefficient of LN (INFRA) are - 0.001818, - 0.013896 and - 0.001125 respectively on ROA, ROE and Productivity which measurements of Performance. Indicating that the amount of investment on AIS's Infrastructure has a **negative relationship** with the performance of a specific private bank, **but the relationship is not significant**. The coefficient of LN (SOFT) are 0.001095, 0.007796 and -0.003364

respectively on ROA, ROE and Productivity which measurements of Performance. Indicating that the amount of investment on AIS's Software has **positive relationship** with the ROA and ROE but **negative relation** to Productivity performance of a specific private bank.

Additionally, the magnitude of the LN (SERV) coefficient suggests that a percentage change (increase) in Investment on AIS's service increases ROA, ROE and Productivity of selected Private commercial Bank in Ethiopia by 0.36, 1.69 and 0.37 percent respectively. Finally, the result suggests that the size of Private commercial Bank in Ethiopia have a coefficient of 0.007605, 0.060124 and 0.009633. Size of bank is matter and it has a positive impact on the level of performance of private banks in Ethiopia regarding the Investment made on Accounting Information System. However, exaggerated loss or profit reported by some banks also should controlled.

4.6 Testing of Hypothesis

The following section provides a brief analysis of the results for each explanatory and control variables and their importance in determining the performance of selected Private commercial Banks in Ethiopia through testing hypothesis. And also, the statistical findings of the study in relation to the previous empirical evidences are discussed.

Hypothesis 1. H0: Investment made on AIS's infrastructure has positive and significant impact on ROA, ROE and Productivity of Private commercial banks in Ethiopia!

> **H1:** Investment made on AIS's infrastructure has not positive and significant impact on ROA, ROE and Productivity of Private commercial banks in Ethiopia!

The results of the random effect model in Table 4.2.6 indicated that the level investment on AIS's Infrastructure have a **negative relationship** with both Return on Assets, Return on Equity and Productivity of the selected Private Commercial Banks in Ethiopia but this relationship was found to be **insignificant** (p-value = 0.1931, 0.1220 and 0.1984 respectively).

Reason: Probability of committing type I error as indicated by the p-value is high and also the beta coefficient value ***-0.001818, -0.013896 and -0.001125*** respectively.

Implication: It is not forced to reject the null hypothesis of a percentage change in the level of investment on AIS's infrastructure will result change in the ROA, ROE and Productivity performance of the selected

private commercial Banks in Ethiopia. Because the magnitude of change is **insignificance and irrelevance to reject** the argument stated in the hypothesis.

The negative sign indicated that, private commercial banks were not utilize infrastructure resources properly this lead to report low AIS's infrastructure performance relative to the huge amount of investment they made. It is why higher AIS's Infrastructure investments are not associated with higher profit efficiency. This confirms the productivity paradox, and implies that banks with higher AIS's infrastructure investments are not able to apply a premium to the price given the higher quality of their outputs. (N, 2001); (Rai, 1997); (Hitt, 1996)

Hypothesis 2. H0: Investment made on AIS's Software has positive and significant impact on ROA, ROE and Productivity of Private commercial banks in Ethiopia!

> **H1:** Investment made on AIS's Software has not positive and significant impact on ROE of Private commercial banks in Ethiopia!

The results of the random effect model in Table 4.2.6 indicated that the level of investment on AIS's Software have a **Positive** relationship with both Return on Assets and Return on Equity but negative to Productivity of the selected Private Commercial Banks in Ethiopia this relationship was found to be **significant** for ROA and ROE but **insignificance** to Productivity measure of performance (p-value = 0.0936, 0.0418 & 0.1830 respectively at 95% and 90% confidence level).

Reason: Since the probability of committing type I error as indicated by the **p-value is very low** for ROA and ROE, **do not reject the null hypothesis**. However, it was true that the **p-value of** Productivity category is **high** but **insignificance.**

Implication: The beta coefficient value (+0.001095, +0.007796 and - 0.003364) shows a percentage change in the level of investment on AIS's Software result positive change in both ROA, ROE but negative in Productivity performance of the selected private commercial Banks in Ethiopia to the extent of 0.1, 0.7 and 0.3 percent respectively.

Using the latest Accounting software lead each private banks to report good performance on Asset and equity category due to increase the investment output. However, regarding the Productivities aspect on accounting software availability, the banking industry still cannot meet up with the demands of the users because they may not be accurate and timely. The technology of software needs further research and development in order to accurately and timely meet the needs of the users.

The nature and application of different accounting software are bound to influence the behavior of private commercial banks' financial statement users. When the applications of software are not properly implemented or not timely used, they will have negative impact on the behavior of private banks' financial statements users and to the country too. Private commercial banks in Ethiopia depend on ledger branch local network for their operations; these have negative impact on the performance of the banks before the advent of on-line system. (Rahahleh, 2007); (Qadalji, 2005)

Hypothesis 3. H0: Investment made on AIS's Services has positive and significant impact on ROA, ROE and Productivity of Private commercial banks in Ethiopia!

> **H1:** Investment made on AIS's Services has not positive and significant impact on ROA, ROE and Productivity of Private commercial banks in Ethiopia!

The results of the random effect model in Table 4.2.6 indicated that the level investment on AIS's Infrastructure & software have **positive** relationship with Return on Asset, Return on Equity and Productivity of the selected Private Commercial Banks in Ethiopia and this relationship was found to be **significant** (p-value ≈ 0 in all mater).

Reason: The probability of committing type I error as indicated by the p-value is very low. And also beta coefficient value (+0.003611, + 0.016962 and + 0.003790 respectively.

Implication: It is not forced to reject due to percentage change in the level of investment on AIS's Services result change in all dependent variables; Return on Asset, Return on Equity and Productivity performance of the selected private commercial Banks in Ethiopia to the extent of 0.3, 0.1 and again 0.3 percent respectively. AIS's services includes consulting services, implementation services, training and education,

support services. The AIS's Improve quality, customer services, speed and responsiveness, product variety and so on (Sambamurthy, 1994); (InternationalDataCorporation, 2002); (AbdulRazzaq, 2003).

It seems that the opportunities associated with investments in Infrastructure and software can only be fully exploited together with AIS's services in order to improve their performance. AIS's investment is predominantly used for strategic reasons particularly in order to lower or increase entry barriers. Most banks have found that computers greatly simplify the task, enabling managers and other employees to get financial reports exactly when they want them. This should have to support by appropriate usage of software and quality services.

Control Variable. Size of each private commercial banks has positive and significant impact on ROA, ROE and Productivity!

The results of the random effect model in Table 4.2.6 indicated that, the Size have positive relationship with stated dependent variables Return on Asset, Return on Equity and Productivity of the selected Private Commercial Banks in Ethiopia and this relationship was found to be **insignificant** (p-value = 0.1002, 0.1900 and 0.1327 respectively).

Since the probability of committing type I error as indicated by the p-value is high with beta coefficient value of +0.007605, +0.060124 and +0.009633 respectively, the size of each Private Commercial Banks no more effect on their performance in relation to AIS. A percentage change in the size result insignificant change in the Return on Asset, Return on Equity and Productivity performance of the selected private commercial Banks.

Table 4.2.7 Comparison of test results with explanations.

Indep.	Expected Relation			Actual result			Statistical Signif. Test		
Variables	**ROA**	**ROE**	**PROD**	**ROA**	**ROE**	**PROD**	**ROA**	**ROE**	**PROD**
INFRA	+	+	+	-	-	-	InSig	Insig	Insig
SOFT	+	+	+	+	+	-	Sig	Sig	Insig
SERV	+	+	+	+	+	+	Sig	Sig	Sig
SIZE	+/-	+	+/-	+	+	+	Insig	Insig	Insig

CHAPTER FIVE

SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.4 Summary of major findings

This study originated from the researcher's aim of examining how Investment on Accounting Information System affect the performance of Private commercial Banks in Ethiopia. Using a 10 years data and 7 selected Private commercial Banks in Ethiopia, the study was carried out by constructing a balanced panel regression model based on OLS and random effects estimates of the secondary data obtained from the financial statements, mainly Annual Audited report of the Private commercial Banks in Ethiopia under the study.

As was indicated in the methodology section, the researcher used a non-random sampling method or purposive sampling. The overall result obtained from the regression model indicates that investment on AIS has positive significance impact on performance of Private commercial Banks in Ethiopia to an important extent with some improvement observed from implementation of appropriate software and quality of services which leads the performance of AIS's on infrastructure. The independent variables (components of AIS) used in order to achieve the objectives stated were; Infrastructure, software and related service. Size factor was also taken into consideration which was represented by the total Asset Investment of each private Banks in order to control its effect on interpretation.

All of the above indicators was used in the study, Investment on AIS's Services was appears to be adding the most significant weight relatively and followed by investment on AIS's software.

On the other hand, among the control variables the size of banks was found to have a significant and positive impact on the performance of Private commercial Banks in Ethiopia to an important extent. This result was fairly validated by relevant previous studies who found out similar result taken as a factor. On one of the control variables used, Bank size indicated that the size of the Private commercial Banks in Ethiopia is not an important predictor of Performance given stated title of this research.

5.5 Conclusions

- AIS's infrastructure will result change in the ROA, ROE and Productivity performance of the selected private commercial Banks in Ethiopia. However, the magnitude of change is insignificance. Thus, the researcher conclude that, the negative sign indicate private commercial banks were not utilize infrastructure resources properly this lead to report low AIS's infrastructure performance relative to the huge amount of investment they made. It is why higher AIS's Infrastructure investments are not associated with higher profit efficiency. This confirms the productivity paradox, and implies that banks with higher AIS's infrastructure investments are not able to apply a premium to the price given the higher quality of their outputs.

- Using the latest Accounting software lead each private banks to report good performance on Asset and equity category due to increase the investment output. Regarding productivities the aspect on accounting information system software availability, the banking industry still cannot meet up with the demands of the users because they may not be accurate and timely. The technology of software needs further research and development in order to accurately and timely meet the needs of the users.

- The nature and application of different accounting software are bound to influence the behavior of private commercial banks' financial statement users. When the applications of software are not properly implemented or not timely used, they will have negative impact on the behavior of private banks' financial statements users and to the country too. Private commercial banks in Ethiopia depend on ledger branch local network for their operations; these have negative impact on the performance of the banks before the advent of on-line system.

- AIS's Services resulted in positive change on Return on Asset, Return on Equity and Productivity performance of the selected private commercial Banks in Ethiopia this includes consulting services, implementation services, training and education, support services. The AIS's Improve quality, customer services, speed and responsiveness, product variety and so on. Opportunities associated with investments in Infrastructure and software can only be fully exploited together with AIS's services in order to improve banks performance.

- AIS's investment is predominantly used for strategic reasons particularly in order to lower or increase entry barriers. Most banks have found that computers greatly simplify the task, enabling managers and other employees to get financial reports exactly when they want them. This should not supported by appropriate usage of software and quality services. They were not invest more on accounting information system services like hiring and Training of IT personnel who are capable on facilitating the quality of services directly related to the performance of the bank instead they lose more money on infrastructure in order to increase branch size without evaluating the return from existed accounting information system services.

- The value invested on infrastructure may increase the banks capacity of being approached to its customers and expand its size to get market share from the competition (investing on computers, ATM Machines, POS, servers, networks, electronic banking and related). Howe ever quality of service to customers was compromised and ignored due to implementation of inappropriate software.

- Size effect (broaden market share): related to introduction of new Brach banking, geographical and regional expansion, including installing networks, use of core banking system, installing new ATM machines (serve as a branch by itself), and other related infrastructure investment used in order to enrich bank services to its customers by spending huge amount of money described in its asset investment particularly during this competition era. Surprisingly, this was also not productive as expected as possible instead even if the size of the bank gets large performance is not significant as expected.

5.6 Recommendations

Based on the conclusions made above the researcher passed the following recommendations:

- Private commercial banks in Ethiopia recommended to utilize their AIS's infrastructure resources properly in order to overcome problem faced due to low performance against value of investment they made on it. Value invested on infrastructure may increase the banks capacity of being approached to its customers and expand its size to get market share from the competition (investing on computers, ATM Machines, POS, servers, networks, electronic banking and related). Howe ever

quality of service to customers should have to under consideration to be better competitor and effective in performance.

- AIS's investment is predominantly used for strategic reasons particularly in order to lower or increase entry barriers. Most banks have found that computers greatly simplify the task, enabling managers and other employees to get financial reports exactly when they want them. This should supported by appropriate and advanced Accounting information system software and quality services like hiring and Training of IT personnel related to the performance of the bank instead of wasting money on infrastructure without evaluating the return from existed accounting information system services.

- Latest Accounting software lead private banks to have better performance on Asset and equity category in order to meet up users need accurately and timely. Use of appropriate applications of software will have positive impact on the behavior of private banks' financial statements users and support the economic growth of the country too. So, recommended to evaluate before implementing Accounting information System's Software.

- There is the need to harmonize and standardize the deployment of software packages in the banks to engender uniformity and assist the regulatory authorities in their supervisory roles. Poor management of the accounting information system due to technical problems, communication problems, and poor training and maintenance culture should overcome because the said failures may result into low productivity, loss of the information technology inventory as well as loss of important and confidential data.

- AIS's Services includes consulting services, implementation services, training and education, support services so it improve quality, customer services, speed and responsiveness, product variety and so on. Opportunities associated with investments in Infrastructure and software can only be fully exploited together with AIS's services.

- Size effect (broaden market share): in relation with the introduction of new Brach banking, geographical and regional expansion, installing networks, use of core banking system, installing new ATM machines, and other related infrastructure which require huge amount of investment but not

productive as expected particularly during this competition era. Private commercial Banks are recommended to revise their AIS's investment policy, asset management and related service aspects.

- They should also identify whether or not they are required to find a balance between use of technology and personal contact to service delivery and provide customers with some technological training instead of assuming that they will automatically accept and use the technology.

Suggestions for further studies

As was indicated in the scope and limitation section this study was only confined to the Private commercial Banks in Ethiopia. Hence, the study could be further enhanced by including the State owned banks. The study could also developed by including more independent and control variables to the regression model. Moreover, if further studies are supplemented with qualitative data, the findings would be more informative.

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