



IMPACT OF INFORMATION TECHNOLOGY INVESTMENT ON PERFORMANCE OF COMMERCIAL BANKS IN ETHIOPIA

Msc Thesis submitted to College of Business and Economics of Addis Ababa University in partial fulfillment of the requirement for award of the degree of Master Science in Accounting and Finance Program.

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Statement of Declaration

I, Dawit Mezgebu Shewaye , hereby declare that this thesis entitled “Impact of IT investment on performance of Commercial Banks in Ethiopia” submitted by me for the award of the degree of Master of Accounting and Finance, Addis Ababa University at Addis Ababa, Ethiopia, is my original work and it has never been presented in any university. All sources and materials used for this thesis have been duly acknowledged.

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This is to certify that the thesis entitled, “Impact of IT investment on performance of Commercial banks in Ethiopia” was carried out by Dawit Mezgebu Shewaye under the supervision of Laxmikantham .P (Phd), submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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List of Acronyms

AIB - Awash International Bank

BOA - Bank of Abyssinia

CBE - Commercial Bank of Ethiopia

CBO- Cooperative Bank of Ethiopia

DB - Dashen Bank

NBE - National Bank of Ethiopia

NIB - Nib International Bank

ROA - Return on Asset

UB - United Bank

WB - Wegagen Bank

IT- Information technology

HW- Hardware

SW- Software

ITS- Information technology services

MC- Market concentration

INF- Inflation

ATM- Automated teller machine

POS- Electronic point of sale

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Abstract

Banking in Ethiopia has undergone remarkable changes since 1991 following the change of government. The era of armchair banking has gone. It has become a different ball game in terms of competition and its inherent strategies. This transition eventually brings the Ethiopian banks to be in need of adopting different technologies.

The main aim of this study is to assess the impact of Investment in Information technology on performance of commercial Banks in Ethiopia. In order to fulfill the stated objective a mixed approach with an explanatory research design is used. To this end, the researcher relied on consecutive ten years Annual Audited Financial Report and other relevant documents of selected eight Commercial Banks in Ethiopia using a purposive sampling method for the period 2006 – 2015.

The study employed a multivariate regression model using Return on Asset (ROA), as a dependent variable for measuring the financial performance of the selected Banks and six independent explanatory variables of which three IT investment variables (hardware, software, and IT service) three control variables (employee efficiency, market concentration, and inflation).

Based on a balanced panel constructed ordinary least squares (OLS) and fixed effects, the study finds that Investment on IT services has a significant and positive impact but investment on hardware and investment on software have negative and significant impact which is inconsistent with the researcher's expectation. The remaining variable, employee efficiency had negative and insignificant effect on performance, similarly market concentration has positive insignificant effect and inflation positive and significant effect. The overall results revealed that IT investment have negative significant impact on the financial performance of commercial Banks in Ethiopia.

Hence, based on the findings of the study the researcher concluded that, the negative significant relation between IT investment and financial performance is consistent with the productivity paradox theory for commercial banks in Ethiopia.

Finally, as indicated in the scope and limitation section this study was only confined to the three IT investment variables . Hence, the study could be further enhanced by including specific variables .

Key words: IT investment, Commercial, Bank performance, Panel, Ethiopia.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Information Technology (IT) is the automation of processes, controls, and information production using computers, telecommunications, software and ancillary equipment such as automated teller machine and debit cards (Johnson 2005). Irechukwu (2000) lists some banking services that have been revolutionized through the use of ICT as including account opening, customer account mandate, and transaction processing and recording. Communication technology deals with the physical devices and software that link various computer hardware components and transfer data from one physical location to another (Laudon and Laudon; 2001). ICT products in use in the banking industry include automated teller machine, smart cards, telephone banking, electronic funds transfer, electronic data interchange, electronic home and office banking (Johnson, 2005).

IT including computer based information systems used by an organization and their underlying technologies have propelled changes in the banking sector (Langdon and Langdon, 2006). Technological innovation for that matter affects not just banking and financial services, but also the direction of an economy and its capacity for continual and sustainable growth. Most banking industry and development analysts assert that technological change is one of the important factors underlying the dynamics in the banking industry structure and performance today which leads to cost competitiveness and diversification into new lines of business to improve profitability, through strategic positioning and processes.

In order to either sustain or enhance on their competitive advantage in an ostensibly growing industry, banking institutions invest fortune or substantial amounts in IT resources, which could also reveal new means of creating value for both the bank and the customer. However, expenditures that affect banks' ability to compete are usually discretionary. These expenditures are made to sustain or increase shareholder value through (1) a revenue growth strategy by

expanding into new markets, new customers, products and services and (2) a productivity strategy whereby improvements are made in the cost structure and in asset utilization. Technology is being increasingly employed in service organizations to enhance customer service quality and delivery, reduce costs, and standardize core service offerings (Bauer .H 2005). These tend to increase the profitability of banks marginally.

Banking is one of the sectors that the technological progress is monitored closely and used widespread. It is difficult to develop new products and services for banking market as in many financial markets. Hence, the new forms of existing banking products offered to customers is great important. Technology-based applications such as internet banking, mobile banking, telephone banking, ATM and POS network brings significant advantages to customers in the delivery of existing products. The most important of these advantages is available to every banking products with lower cost banking operations for 24 hours to 7 days. Consequently, the dependency to branches is decline. All of these features encourage banks to take electronic-based services for customers which are increasing day by day The increasing demand for such services enforced to banks invest a great deal of investment to this field. On the other hand, it is expected to continue in the future.(Ilias Akihisar 2015)

The impact of Information Technology (IT) investments in a banking industry is an important issue as this type of investment constitutes a substantial component of costs and exerts a strong influence on bank operations and strategy. Most financial products and services use IT at some point in the production and delivery process, and a bank's information system places strong constraints on the type of products offered, the degree of customization possible, and the speed at which banks can respond to competitive opportunities or threats.(*Elena Beccalli 2005*).

A cursory look at the financial statements of banks discloses a significant outlay of its resources in information technology (IT) acquisition and deployment. In fact, for some banks the investment in IT constitutes about one-half of their total fixed assets investments for some years. This emphasis on IT deployment suggests that there may be an important correlation between IT deployment and bank profitability (Wilson U Ani, Cosmas O Odo & Ezeudu Ikenna,2014).

Based on literature on management strategy, unique resources in a firm played role for competition (Huang, Ou, Chen, Lin, 2006). Information technology (IT) can be accepted as a unique resource in a firm in the ends of the 20th century and 21th century. According to Grant, IT- based resources can be classified as: tangible resources that comprising the physical IT infrastructure components, human IT resources that comprising the technical and managerial IT skills, and intangible IT resources, such as knowledge assets, customer orientation and synergy. The long term survival of firms is closely related to their ability to successfully managed information technologies (IT) in today's harsh and rapidly changing business environment. IT is the fastest growing sector in the economy, with 68 percent increase in output growth rate projected between 2002 and 2012 (Callahan, Gabriel and Smith, 2009). And corporations have invested billions of dollars in information technology (IT) over the last 20 years (Ta Byrd, Te Marshall; 1997).

Despite the substantial investments in IT by corporations, direct linkage between technology investment and increases in productivity and performance has been extremely elusive. Anticipated benefits from technology investments include reduced costs, improved quality, increased flexibility, improved customer satisfaction, higher productivity and ultimately, higher financial performance. Because of the enormous expenditures on IT by today's organizations, researchers and practitioners through investigation, are seeking to understand better the relationship between IT and performance. To determine this relationship, researchers must discover the relationship between IT and organizational performance. Although, for over a decade, the researchers have studied the impact of IT investments on firm performance, studies are inconsistent. Some studies have found positive relationship between IT investments and performance, other studies found a negative relationship, and numerous other studies showed no relationship (Ta Byrd, Te Marshall; 1997).

To overcome this perplexing situation, many IT scholars have used more rigorous and scientific research framework; large sample datasets, including additional factors such as a time lag, the information intensity of the industry, new methodology and new theories (Kim, Xiang, Lee, 2009). Moreover, the relationship between IT and firm performance differs from developing countries to developed countries. Because, economic growth, regulation levels, labor costs, IT

skills and availability, and heterogeneity, competition, complementary organizational innovations and culture can be different across countries (Kim, Xiang, Lee, 2009). Therefore, the primary purpose of this paper is to investigate the relationship between IT investments and performance of commercial banks in Ethiopia .

(Osei and Harvey, 2011, cited in Adekunle. O,2014) in their study (covering fifteen banks over a period of ten years) on investments in ICT and bank business performance in Ghana find that investment in ICT tend to increase profitability (ROA and ROE) for high ICT level banks than for lower ICT level banks. Bilkisu .K (2015) found that there was a significant relationship between investment in IT and financial performance of Nigerian banks when measured by ROA. Taddesse .K(2015) in his study in investment on accounting information system effect on performance private commercial banks in Ethiopia indicates that investment on AIS has positive significance impact on performance of Private commercial Banks in Ethiopia. Similarly Rahel. A (2015) studied on the same topic taking into consideration only private commercial banks those studies in Ethiopia recommend further investigation considering all banks in Ethiopia. To the extent that these facts are concerned my research aims to contribute some knowledge about the impact on performance of banks in Ethiopia.

In this first chapter statement of the problem, general and specific objectives of the study, research hypothesis formulation, significance of the study and scope and limitations of the study are discussed in detail. This study aims to fill the existing empirical research gap by analyzing the impact of IT investment on financial performance of commercial banks in Ethiopia. Three IT investment variables (hardware, software, and IT service) and bank specific (employee efficiency) industry specific (market concentration) and macroeconomic (inflation) control variables are used in this research. This study will help the banks' management, potential and existing shareholders, other stakeholders, policy makers of the country and those who want to conduct further study in this field.

1.2 STATEMENT OF THE PROBLEM

During the past decade, information technology (IT) has been at the heart of international competition. It has had a deep impact in all economic fields, and it is now integrated into most

production activities. However, it has been difficult to determine the relationship between IT investment and the financial performance or productivity gains of businesses. Therefore, some authors questioned the impact of information technology on productivity in the banking industry. This question began as a major literary trend in 1987 when Robert Solow, winner of the Nobel Prize in Economics, proposed his famous "*productivity paradox*" during his Nobel speech. "*You can see the computer age everywhere but in the productivity statistics!*". This statement led to countless studies in the United States and Europe and gave birth to varied explanations. Research assessing the impact of IT investment had begun (Syrine B. R. 2013).

The impact of information technology (IT) investments on firm performance has been the subject of active research in recent years. However, findings of almost all studies are based on data collected in the United States. Little work has been done elsewhere (Gideon T.Y, 2011). And similarly studies about impact of IT investments on banks' business value and performance have received massive attention in Europe, the Americas and Asia with mixed results. Nevertheless, the focus on Africa and West Africa, for that matter, tends to be parsimonious in comparison with the theoretical and empirical evidences from the developed economies. Whether the level of investment done in IT actually brings real benefits to the banks, is still a matter of debate in academic circles. Researchers and practitioners have agreed to the fact that traditional analysis – focused only on financial or technological aspects – is not complete. Different alternative methods have been suggested to complement evaluation of IT investment. ((Kar Yan Tam, 1998).).

The payoff from information technology (IT) investment has been studied by academic researchers, economists, and business practitioners in recent years. However, research findings about the impact of IT on firm performance have shown conflicting results across studies. Early empirical studies found that there was either no relationship, or a slightly negative relationship, between firm performance and IT investments (D.Wilson 1993). However, in the late 1990s, several studies indicated a positive relation between IT investments and firm performance, such as productivity or profitability (A. Bharadwaj, S. Bharadwaj, and B. Konsynski 1999).

Rahel (2016) researched on impact of IT investment on private commercial banks with a single variable of interest which is IT capital and with other four control variables and similarly Tadesse (2015) researched on investment on accounting information system and effect on performance private commercial banks in Ethiopia. However, no knowledge exists that defines clearly the impact of investment in IT on the financial performance of the whole commercial banks in Ethiopia. The prior studies only focus on private commercial banks with the general IT investment variable. To fill this gap my study focuses on all commercial banks in Ethiopia taking three domains of IT investment variables which are HW investment, SW investment, and IT service investment.

1.3 OBJECTIVES

The general and specific objectives of the study are discussed below:

1.3.1 GENERAL OBJECTIVE

The study has a general objective of investigating the impact of IT Investment on the financial performance of commercial banks in Ethiopia.

1.3.2 SPECIFIC OBJECTIVES

The specific objectives of the study are to examine:

- I. Whether hardware investment positively and significantly affect performance of commercial banks in Ethiopia
- II. Whether software investment positively and significantly affect performance of commercial banks in Ethiopia
- III. Whether IT service investment positively and significantly affect performance of commercial banks in Ethiopia

1.4. RESEARCH QUESTIONS

The study attempts to answer the following research questions:

- ❖ What do mean by IT investment for the banking sector in Ethiopia?

- ❖ What type of relationship is there between IT investment and financial performance of commercial banks in Ethiopia?
- ❖ What are the challenges of IT investment in relation to the financial performance of commercial banks in Ethiopia?

1.5 RESEARCH HYPOTHESIS

The purpose of this study is to examine the impact of information technology (IT) investment on the financial performance of commercial banks in Ethiopia. The empirical studies made around the world demonstrate various outcomes on impact of IT investment on financial performance of commercial banks. Reviewed empirical literatures showed that there is no consensus among international researches on the sign of coefficient of estimate of hardware investment, software investment and IT service investment variables. Thus, the researcher has developed the following hypothesis to estimate the significance of relationship IT investment variables and three control variables with financial performance of commercial banks in Ethiopia.

H₀: There is no significant relationship between hardware investment (HW) and financial performance of commercial banks in Ethiopia.

H₀: There is no significant relationship between software investment (SW) and financial performance of commercial banks in Ethiopia.

H₀: There is no significant relationship between IT service investment (ITS) and financial performance of commercial banks in Ethiopia.

H₀: There is no significant relationship between employee efficiency (EMP) and financial performance of commercial banks in Ethiopia.

H₀: There is no significant relationship between market concentration (MC) and financial performance of commercial banks in Ethiopia.

H₀: There is no significant relationship between inflation (INF) and financial performance of commercial banks in Ethiopia.

1.6 SIGNIFICANCE OF THE STUDY

When compared to the growing trend of Ethiopian commercial banks to invest on Information Technology, more number of studies should have been conducted up to now to study the impact of IT investment on companies' performance. One of the factor that motivated the researcher to study this area is the lack of sufficient study made on the topic. This study contributes to the knowledge on the area and can also give chance for other researchers to have insight on the study area and to make further detailed study on the subject matter.

The study attempted to assess the IT investment trend of commercial banks in Ethiopia and its pay off in relation to huge amount of capital invested. The study's findings help commercial banks to capture the impact and pay off of the investment they made on Information Technology. Apart from practical implications for commercial banks managers, the study will extend the existing literatures by providing evidence on the impact of IT investment on financial performance of commercial banks. Moreover, the study will play a significant role as a literature base on future researches of verifying the current findings, other aspects of IT investment of Ethiopian banks and other related topics in the banking sector.

1.7 SCOPE AND DELIMITATION OF THE STUDY

The study principally focuses on IT investment and particularly on the three domains of IT investment. The researcher relied mostly on secondary sources of information not dating older than ten years to satisfy the qualitative aspects of the study such as the literature review. For the quantitative analysis, the researcher collected data on Hardware investment, Software investment and IT Service investment and the control variables from notes to the financial statement and ministry of finance and development economics.

In this study the researcher will only consider ten fiscal years i.e. from 2005/2006 to 2014/2015 for the IT investment analysis of the following eight selected commercial banks; Awash International bank, Bank of Abyssinia, Commercial Bank of Ethiopia, Cooperative bank of Oromia, Dashen Bank, Nib International Bank, United Bank, and Wegagen bank. The reason that the study did not include very recent data of 2015/2016 is that information for all

commercial banks was not available. Thus, this paper will show the trend of commercial banks but not become whole mirror for a wide period.

1.8 ORGANIZATION OF THE STUDY

The paper contains five chapters. The first chapter presented background of the study, statement of the problem, objectives, hypotheses, significance, and scope and limitations of the study. Discussion in chapter two focuses on literature review of important concepts that are relevant to the study. The third chapter deals with the methodologies, which include data source, sampling frame and sampling size, data collection instrument, data analysis method and research variables in the study. The fourth chapter discusses the empirical findings of the study. Based on the finding of the study, the Fifth chapter presents conclusion and recommendation of the study.

CHAPTER TWO

LITERATURE REVIEW

2. INTRODUCTION

In the previous chapter, the main problems and objectives to be addressed in this study have been stated. This chapter deals with the related literatures of the study. The literature review is organized into two major parts, i.e. the theoretical review and the empirical review part. The theoretical review part discusses the theories that states about Information technology, Information technology and the banking sector, Information technology investments and the variables that are claimed to affect bank performance. The empirical literature part reviews past studies that were conducted on the area of impact of IT investment on financial performance of commercial banks .

2.1 THEORETICAL REVIEW

Under this section of the chapter of the theoretical review of information technology and its relation with the performance of banks is addressed.

2.1.1. INFORMATION TECHNOLOGY

The term information technology usually refers to a computer-based system, one that is designed to support the operations, management, and decision functions of an organization. Information systems in organizations thus provide information support for decision makers. Information systems encompass transaction processing systems, Management information system, decision support systems, and strategic information systems (Laudon and Laudon, 2006). Information consists of data that have been processed and are meaningful to a user. Information Technology (IT), therefore, produces information that supports the management functions of an organization. In recent years, the utilization of information technology has been magnificently increased in service industries, particularly, the banking industry, which by using Information Technology

related products such as internet banking, electronic payments, security investments, information exchanges can deliver high quality services to clients with less effort, thereby enhancing their financial performance. (Berger, 2003) stated that an information system is a set of components (people, hardware, software, data, and procedures) that operate together to produce information that supports the operation and management functions of an organization. Laudon and Laudon (2006) defined IT as the study of information systems focusing on their use in business and management.

2.1.2. THEORIES OF INFORMATION TECHNOLOGY

IT becomes integral interactive tools deeply involved in the minute to minute operations and decision making for any organizations. The following theoretical explanations help us to understand how IT alters organizations operation to be more efficient, competitive and profitable.

The Economics theory of IT

From point of view of economics, IT changes both the relative cost of capital and the cost of Information. It can be viewed as a factor of production that can be substituted for traditional capital and labor. Hence IT result in a relative decline in the number of middle managers and clerical workers as information technology substitutes for labor, and decrease the cost of information by substitute other forms of capital such as buildings which remain relatively expensive. Eventually we expect managers to increase their investments in IT because of its declining relative to other capital investments (Kenneth & Jane, 2009).

Transaction cost Theory of IT

IT affects the quality and cost of acquire information and by doing this it helps firms' contract in size because it can reduce transaction cost which is the cost incurred when a firm buys on the marketplace what it is cannot make itself. According to Transaction cost theory, firms and individuals seek to economize on transaction costs, much as they do on production cost. Traditionally, firms have tried to reduce transaction cost through vertical integration, by getting bigger, hiring more employees, buying their own suppliers and distributors.

IT, especially the use of networks, can help the firms lower the cost of market participation (transaction cost), making it worthwhile for firms to contract with external suppliers instead of using internal sources. Firms traditionally grew in size to reduce transaction cost. IT potentially reduces the costs of a given size, shifting the transaction cost curve inward, and opening up the possibility of revenue growth without increasing size, or even revenue growth accompanied by shrinking size. This is thought enabling the company online finding of low cost suppliers all over the world (Kenneth & Jane, 2009).

Agency Theory of IT

IT also reduces internal management cost. According to agency theory firm is viewed as “Nexus of contracts” among self interested individuals rather than as a unified profit maximization entity. A principal (owners) employs “agent” (employees) to perform work on his or her behalf. However, agents need constant supervision and management. Otherwise, they will tend to pursue their own interest rather than those of the owners. As firms grow in size and pursue their own interests rather than those of the owners. As firms grow in size and scope, agency costs or coordination costs rise because owners must expend more and more effort supervising and managing employees. IT by reducing the cost of acquiring and analyzing information, permit organizations to reduce agency costs while increasing size because it became easier for managers to oversee a greater number of employees (Kenneth & Jane, 2009).

Theory of Organizational behavior

According to this theory information technology facilitates flattening of hierarchies by broadening the distribution of information to empower lower level employees make a decision and increase management efficiency. IT pushes decision making rights lower in the organization because lower level employees receive the information they need to make decision without supervision. Second, because managers can now receive so much more accurate information on time, they become much faster at making decision which decline management cost as a percentage of revenues and make the organization more efficient.

Moreover information technology create networked organization in which groups of professionals come together electronically and accomplish a specific task. Hence firms operate as virtual organizations in which work no longer is tied to geographic location. Virtual

organization link use networks to link people, asset and ideas. They can ally with suppliers, customers, competitors and other stockholders to create and distribute new products and services without being limited by traditional organizational boundaries or physical locations. IT helps companies organize in more flexible ways, increasing their ability to sense and respond to changes in the marketplace and to take advantage of new opportunities (Robert & Dorothy, 2003).

According to Kenneth & Jane (2009) there are six important strategic benefits that business will realize as a result of using Information technology and associated technologies make so essential. These are operational excellence; new products, services, and business models, customer and supplier intimacy, improved decision making, competitive advantage and survival.

Businesses continuously seek to improve the efficiency of their operations in order to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behavior. Hence IT has power coupled with brilliant business practices and supportive management to achieve world-class operational efficiency (Kenneth & Jane, 2009).

IT is also a major enabling tool for firms to create new products and services. When a business really knows its customers and serves them well, the way they want to be served, the customers generally respond by returning and purchasing more. This raises revenues and profits. Likewise with suppliers: the more a business engages its suppliers, the better the suppliers can provide vital inputs and this lowers costs. Moreover, many business managers need having the right information at the right time to make an informed decision. Prior to the development of IT and IS, managers rely on forecasts, best guesses, and luck. The result is over or underproduction of goods and services, misallocation of resources, and poor response times. These poor outcomes rise costs and lose customers. IT makes possible for managers to use real-time data from the marketplace when making decisions. This all will make the firms to achieve competitive advantage. Doing things better than competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits (Kenneth & Jane, 2009).

2.1.3. INFORMATION TECHNOLOGY AND THE BANKING INDUSTRY

The impact of Information Technology (IT) investments in a banking industry is an important issue as this type of investment constitutes a substantial component of costs and exerts a strong influence on bank operations and strategy. Most financial products and services use IT at some point in the production and delivery process, and a bank's information system places strong constraints on the type of products offered, the degree of customization possible, and the speed at which banks can respond to competitive opportunities or threats. (Ellena Becalli 2005).

The interest in IT investments in the banking industry comes from the intrinsic nature of banking activities: to process, manage, and strategically use information. Several consequences arise. First, IT has facilitated the development of new, more sophisticated financial products as well as the introduction of alternative delivery channels to the traditional branch network (White, 1998). Second, IT shapes the ways in which banks carry out their business, with the application of new and improved technologies expected to reduce bank costs over time. Third, in the EU, the development of cost- saving technology, together with deregulation, has intensified financial sector competition. As a result, rationalization and cost management are salient bank strategic objectives (De Bandt and Davis, 2000), and IT investments are perceived as a “necessity” to pursue this strategy. Fourth, banks are increasingly recognizing the need to focus strategically on the improvement of quality (through customer information management, multiple-products and multiple-channels approaches), and again IT investment is viewed as a “necessity/opportunity” to pursue this strategy. Finally, technological progress has been cited widely as one of the major sources of change in the financial services industry (European Central Bank, 1999).

The competitive strategy theory aims to answer to the question of whether firms will gain a competitive advantage from IT investment, and therefore higher profits or firm values. If a bank has unique access to IT, then such a bank may be in a position to earn higher profits from that access, and gain a competitive advantage. Conversely, an alternative argument is that IT investment will not confer supernormal profits to any bank in the industry if it is freely available to all participants. In this case, there is no reason to expect, *a priori*, that a bank spending more (or less) on IT than its competitors will have higher (lower) profits. Instead, all banks will use the

amount of IT they consider optimal in equilibrium, but none will gain a competitive advantage from such spending. It follows that IT may be viewed as a strategic necessity, and not as a source of competitive advantage. When IT becomes ubiquitous (availability increased, and costs decreased), it becomes a commodity input. From a strategic standpoint, IT becomes invisible: it becomes essential to competition but inconsequential to strategy. (Carr, 2003).

2.1.4. INFORMATION TECHNOLOGY INVESTMENTS

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 for good performance.

There are studies which obtain a positive relationship between investment on Information technology 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 IT 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. (Menachemi, Burkhardt, Schewchuk, Burke, & Brooks, 2006).

Increasing investment on IT will be the leverage for achieving a stronger, more flexible corporate culture to face persistent changes in the environment achieving a stronger, more flexible corporate culture, this can be done by increasing IT investment. . (Urquia Grande, 2010). According to economical view, IT is an input in the production process and there is an interaction between IT and other inputs. Thus, IT provides benefit to the organizations more than

capital and labor. IT's benefits can be evaluated at the organizational, industrial and nation level (Hu & Quan, 2004). For providing performance, organizations should invest and coordinate IT effectively.

The information and communication technology infrastructure of an organization comprises of its physical ICT asset stock. The business functionality of an organization depends on the reach and range of the stock of this resource. It is a major business resource and a key source for attaining long-term competitive position (McKenney, 1995). However, that physical assets, in and of themselves, can only serve as sources of competitive advantage if and only if they outperform equivalent assets of competitors. Barney (1991)

This notion arises out of the fact that considering the fact that physical asset can be easily duplicated by competitors and as such may not be regarded as sources of competitive advantage in themselves. They can however, become sources of competitive advantage when their synergetic benefits are exploited to enhance the organizational competitiveness.

The relationship between ICT investment and firm performance has been studied by several researchers over the years. Bitler (2001) investigated the relationship between information and communication technology investments and small firms' performance. His study reveals that there was a significant performance difference between firms that adopt ICT and those that do not adopt the technology.

In their study conducted to examine technological progress and its effects in the banking industry using relevant data, Berger et al. (2003) find that IT investment leads to improvements in costs. The improvement was hinged on productivity increase in form of improved "back-office" technologies which is in form of organization related benefits such as reduced costs of operation as well as improved "front-office" technologies which is in form of benefits to customers such as improved quality and variety of banking services.

Evidence from other empirical studies conducted on the contribution of automated teller machines (ATMs) to banks' profitability reveal that investment in ATMs increases both the

volume and value of deposit accounts, reduces banking transaction costs, reduces the number of staff and the number of branches and consequently improves banks' profitability (Abdullah, 1985).

2.1.5. BANK PERFORMANCE

There are several definitions of firm performance in the literature but the simplest definition is to measure productivity. Performance is generally stated as a doing business, implementing successfully. Performance, the main criteria of measuring success, could be defined as quite a wide concept that evaluates the ability to achieve the organization's targets successfully.

Performance can be evaluated with qualitative criteria such as job satisfaction, organizational Commitment, perception of justice and quantitative criteriasuch as profitability, investment return ratio, sales growth in the studies. In this study, quantitative financial performance measure is used. Financial performance measure the organization's basic economical targets and these targets are important for practitioners and researchers; therefore in the studies, financial performance is used commonly. Profitability, revenue, investments' return ratio are used commonly in the studies and they are called financial performance evaluation criteria.

In addition to financial performance, market performance is important, too. Market growth and sales growth are important for practitioners and researchers, too. Customer satisfaction and commitment, change in market share, communication with customers by advertising or sales are used commonly in studies as market performance criteria. Because of the rapid change in the demands and needs of customers, the product life get shorter. To handle this problem, firms must make radical innovations (Hunt, Morgan, 1996).

Essentially banks could be viewed as the heart of any economy as the malfunction of banks to operate efficiently and effectively causes the economy to suffer a lot. The financial crisis that the world has experienced over the last three decades, such as the financial crises of USA in 2008, of Russia in 1998 and Asia in 1997, substantiate this more than anything else. Thus, the performance of the banking system has been widely recognized as an important precondition for

economic growth and for enhancing the economic and financial system buoyancy in facing financial crisis.

Performance is deemed to be the fulfillment 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. 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.

2.1.6. DETERMINANTS OF BANK PERFORMANCE

2.1.6.1 INTERNAL DETERMINANTS

✓ SIZE: LEVEL OF DEPOSIT

Bank size as measured by total deposits (Civelic and Al-Alami (1991) or assets (Smirlock (1985) is one of the control variables used in analyzing performance of the bank system. This is included to control for the possibility that large banks are likely to have greater product and loan diversification. The impact of bank size on profitability is uncertain a priori for the fact that on the one hand, increased diversification implies less risk and hence a lower required return, and on the other hand, bank size takes into account differences brought about by size such as economies of scale. For large firms their size permits them to bargain more effectively, administer prices and in the end realize significant higher prices for the particular product, Agu (1992).

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 et al. 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, 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 (NONINTEREST 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, 2011) finds a positive effect of diversification on performance. More diversified banks are less likely to be successful and more likely to provide a poor performance. They find 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 many researchers 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**

(Stulz. R, 2003) 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.

2.1.6.2 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 concludes 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. He 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 (Demirguc-Kunt et.al 1999) lead to precisely the opposite result, which would tend to support the second theory.

➤ **MATURITY OF THE BANKING SECTOR**

The (Demirguc-Kunt et.al 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.

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. In most of the studies IT investment is not included in determinants of performance. Even though a cursory look at the financial statements of banks discloses a significant outlay of its resources in information technology (IT) investments. (Molyneux, 1995). Taking into consideration the different performance determinant variables, this paper aim to investigate the impact of IT investment variables on performance of commercial banks in Ethiopia.

2.1.7. MEASURES 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.

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 In cashing 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. For this study return on asset is taken as a measure of performance of banks.

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. For this study ROA is taken as a measure of performance of commercial banks in Ethiopia. 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.

2.1.8. INVESTMETN IN IT AND BANK PERFORMANCE

Firms are making considerable amounts of investments in IT resources presuming that these investments result in payoff. In many firms, IT expenditures and spending are approximately 3% of the total sales and roughly 40% of the firm's total capital expenditures (Ranganathan & Brown, 2006). According to literature related to IT, there are many researches that have sought to illustrate the returns from these investments at the levels of firm, industry, or economy. Most of these researches have been either conceptual or empirical. Researchers who investigated IT investments under the IT strategy rubric have examined the IT deployments, for example, Supply Chain Management (SCM), Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM) and their relationships with firm performance (Subramani, 2004) or new IT-enabled strategies that result in improved business processes.

In studying the influence IT investments, based on e-commerce, on the market value of the firm, there is an event study methodology to inspect the reactions of market to announcements of 251 e-commerce initiatives by firms in 1998 (Subramani & Walden, 2001). In their study, IT

investment was defined as an announcement of a new initiative related to electronic commerce or the expansion or extension of an already existing initiative and reported that the market reacts positively (i.e. stock price increases) to firms that invested in e-commerce. Lastly, IT management/capability researches are established on the differences between firms' laying stress on the employment of IT or IT ability levels in the firm. Therefore, firms that emphasize the employment of IT are categorized as successful customers of IT and levels of ability is rooted in the accessibility of top IT officials including Chief Information Officers plus the roles they play in top management teams. IT investments account for almost 3% of many firms' total sales and roughly 40% of many firms' capital expenditures. Another study (P. Weill, 1992) suggested that IT investments results in great triumph and pay-off when the firm enjoys a quality management team committed to IT initiatives, whereas attributed the superior firm performance to the superior number of information workers.

Information technology is 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 IT 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 Commercial 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 IT have fastened tax management. Thus, and in accordance with several authors, it is of great interest to analyze the impact of IT investment on performance indicator (Return on Assets (ROA) of commercial Banks in Ethiopia.

2.1.9. IT INVESTMENT IN ETHIOPIAN COMMERCIAL BANKS

Due to globalization's technological factors, the banking practice in Ethiopia started to change from and old conventional bricks and mortar retail banking practice to modern and more opened technological driven electronic banking services. Currently the majority of banks have started the implementation and up grading of Core-Banking systems (CBS) as part of the directive emanated from the regulatory body and to modernize their customers services practice and management information system (MIS) from self protective to customer responsive(Abebe,2014).

Application of ICT and Electronic Banking in Ethiopia goes back to the late 2001, when CBE introduced eight ATMs located in Addis Ababa. However because of infrastructural setback it was not functional. Next to CBE, Dashen Bank implements ATM services in 2007 and POS terminals and Master card technologies in 2009. By the end of 2008 United Bank introduce the first telephone, Internet banking systems and text messages (SMS) (Gardachew, 2010). Some studies shows that Ethiopian banking industry is one of the most underdeveloped compared to the rest of the world (Tewdros, 2011). Even though development level is lower than the rest of the world, with a double digit growth and internal stability unlike most economies in the African continent, Ethiopia is surging ahead to be a leader in the horn of Africa in the financial sector (Mohammed, 2014).

Core banking technology is applications responsible for processing and posting transactions in the domain of payments, current and saving accounts, loans, securities and international banking operations. It automates and performs current and deposit accounting, maintaining loan accounts, holding securities positions and clearing payments.

It is the foundation for computerized operations, e-banking products and support modern payment facilities such as internet banking, Electronic Funds Transfers (EFT), Automated Teller Machines (ATM), Funds Transfer at Point of Sales (EFTPOS) and internet banking, interface with inter-bank clearing and settlement systems outside the bank.

The next move which we are observing currently are the implementation of payment Card system in terms of issuing cards to their account holders and deployment of ATM & POS terminals to serve from the existing 8/7 to 24/7 services hours. In this case the customers have the ability to access their account via plastic card on ATMs for withdrawal of money and make payment for goods and services rendered by the merchant using the POS terminals. Third move of these banks are implementation of internet, mobile banking, SMS, Agent banking and etc in which the customer can get more freedom to do transactions at any place and time even while on the move.

2.2 EMPIRICAL REVIEW

In this section prior empirical literatures about the relation of IT investment and bank performance, those studies in Ethiopian context and conclusion and knowledge gap are presented.

2.2.1. IT INVESTMENT AND BANK PERFORMANCE

Gideon .T (2010) seeks to ascertain and document the extent to which investment in IT by banks in Ghana can impact on their profitability using the Balanced Scorecard (BSC) framework. The study uses the extensive panel dataset of 15 banks sampled from the Ghanaian banking industry over a 10-year period (1998-2007). The study finds that banks which maintain high levels of investments in IT increased return on assets (ROA) and return on equity (ROE).

Bilkisu . K (2015) investigates the impact of investment in Information Technology (IT) on the financial performance of banks in Nigeria covering 10 banks in a period of 5 years. The data obtained were analyzed using panel data regression model where investment in IT (hardware, software and Automated Teller Machine [ATM]), total earnings (TR) and total cost (TC) of the 10 sampled banks were used as the independent variables while financial performance is the dependent variable, proxied by return on assets (ROA), return on equity (ROE), net profit margin (NPM) and earnings per share (EPS). The result from the panel regression revealed that there is a significant relationship between the independent variables and the dependent variables, but the t-test revealed that the impact of IT investment on the financial performance of Nigeria banks is significant for ROA, ROE and EPS at 5% significance level but not significant for NPM at 5% and 10% significance level. The effect of TR is positive and that of TC is negative on all the four financial performance measures, but the effect of IT investment on all the four financial performance variables is negative, which is not an expected sign. This means that an increase on IT spending leads to a decrease in the financial performance of Nigerian banks, that is to say heavy IT investment does not increase banks profitability, hence there is existence of IT productivity paradox in the Nigeria banking industry.

Beccalli (2007) found a positive relationship between total IT investment and performance in a study of the European banking sector (a sample of 737 banks) during the period 1994–2000. The author used the SFA to estimate the efficiencies of costs and benefits for European banks. His main objective was to determine whether IT investments improved the profitability of banks, and whether banks could gain a competitive advantage by investing in IT and therefore obtain higher short- and long-term profits. The empirical results of the study showed that the impact of IT investment on banks was negative on short-term profitability as measured by ROA and ROE ratios. However, IT had a positive contribution to the long-term costs (technological changes) for all European banks, thus reducing the actual annual costs of production by approximately 3.1%. In addition, the impact of technological changes on cost reductions consistently increased over the studied period. A final result of the study showed that the impact of different types of IT (hardware, software and services) on the performance of European banks was heterogeneous.

While investment in services was positively related to bank profitability, acquisitions of hardware and software had a negative impact on performance.

(Osei and Harvey, 2011 cited in Adenkunle, 2014) in their study (covering fifteen banks over a period of ten years) on investments in ICT and bank business performance in Ghana found that investment in ICT increased profitability (ROA and ROE) for high ICT level banks than for lower ICT level banks.

Similarly, Adekunle, (2014) try to investigate the impact of ICT on commercial bank performance in South African Banks. The study assessed the impact of ICT on performance of S. African banking industry using annual data over the period of 1990-2012 of four big banks operate in South Africa using descriptive and regression analysis. The paper concludes that the performance of banks is influenced both by ICT investment as well as ICT cost efficiency (a measure of effective ICT investment) on banks performance (measured by ROA). However, the study stress that cost effective ICT investment has impact on performance of banks more than that of ICT investment. The implication of these findings underscores the need for policy makers to emphasize policies that enhance optimal utilization of ICT resources rather than embark on additional investments.

In his study on analysis of the values of return on asset (ROA) arising from ICT investment in the US, Kozak (2005) finds that the value of the return on asset for the US banking sector has increased by 51% thereby suggesting that improvement in ICT investment, associated with extensive office networks and range of offered services have helped to generate additional revenues for banks thus pointing to the fact that a huge number of diverse operations require higher ICT investment.

Studies by Abdullah (1985); Katagiri (1989) and Shawkey (1995) investigated on the contribution of automated teller machines (ATMs) on banks' profitability. It was revealed that investment in ATMs increases both the volume and value of deposit accounts, reduces banking transaction costs, reduces the number of staff and the number of branches and consequently improves banks' profitability.

2.2.2 EMPIRICAL STUDIES IN ETHIOPIAN BANKS

In the context of Ethiopia, there are few studies that examine impact of IT investment on financial performance of commercial banks. To the knowledge of the researcher there are three studies conducted on impact of it investment. These studies are the work of Tadesse (2015), Rahel (2015), and Eyob (2010). This particular section provides a detailed review of those related studies conducted in the context of Ethiopia.

Taddesse. K (2015) examines impact of Investment made on Accounting Information System and its effect on Banks performance in the case of private commercial Banks in Ethiopia. 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. And suggests a further investigation including all commercial banks in Ethiopia.

Rahel. A (2015) studied on capital investment decisions on information technology and its impact on the performance of private commercial banks in Ethiopia. Mixed research approach with qualitative and quantitative methods is used on panel data of 6 private commercial banks for period of ten years starting from 2005 to 2014. The relation between dependent and independent variables is analyzed using multiple regression model by taking banks profitability measure ROA

as dependent variable and IT capital, labor, capitalization, market concentration, and inflation as independent variables using OLS random effect model on Eviews 8. From the study result, except for IT capital the rest of explanatory variables show statistically significant impact on the ROA. The main variable shows there is positive relation between banks IT investment and profitability but the degree of impact measured as statistically insignificant. Commercial banks manage to generate positive return from capital investments on technological products the benefit they are getting is not significant. On the other hand positive relation between technological investments and profitability reverses the “**productivity paradox**” theory for commercial banks in Ethiopia.

On the other hand Eyob. D (2010) studied on Capital Investment Decisions on IT and Its Impact on Corporate value maximization the case of Ethiopian Financial Institutions and revealed that there was no significant difference between banks with high IT capital and banks with relatively low IT capital in Ethiopian commercial banks. Despite the fact that, in three of the four financial performance measures the banks with high IT capital have shown a slightly better financial performance, the difference when it is statistically measured was not significant. As a result the study concluded that high IT capital did not produce a superlative rate of return and did not help the banks with high IT capital to have a significant cost advantage over their counter parts with a relatively lower IT capital.

Yohannes.G (2015) researched on effect of information technology and adoption of electronic banking on Ethiopian commercial banks performance. The study used panel data of nine commercial banks for the past ten years beginning from the year 2005. For analyze the research used secondary financial data by employing multiple linear regression models. The empirical result shows that Information technology has statistically significant positive effect on ROA indicating strategic significance.

2.2.3 CONCLUSIONS AND KNOWLEDGE GAP

The empirical literatures that are discussed so far showed that, IT investment has both negative and positive impact on financial performance. However, Most of the literatures that are discussed so far appeared to have focused on studies that were conducted in the banking sector of different countries outside Ethiopia. This is because only few studies have assessed the impact of IT

investment, despite the fact that the studies conducted by the researchers on the Ethiopian Banking sector. In most of the studies the IT investment is considered as a single independent variable called IT capital. Consequently, the Banking sectors in Ethiopia have so far received inadequate attention in the literature review IT investment.

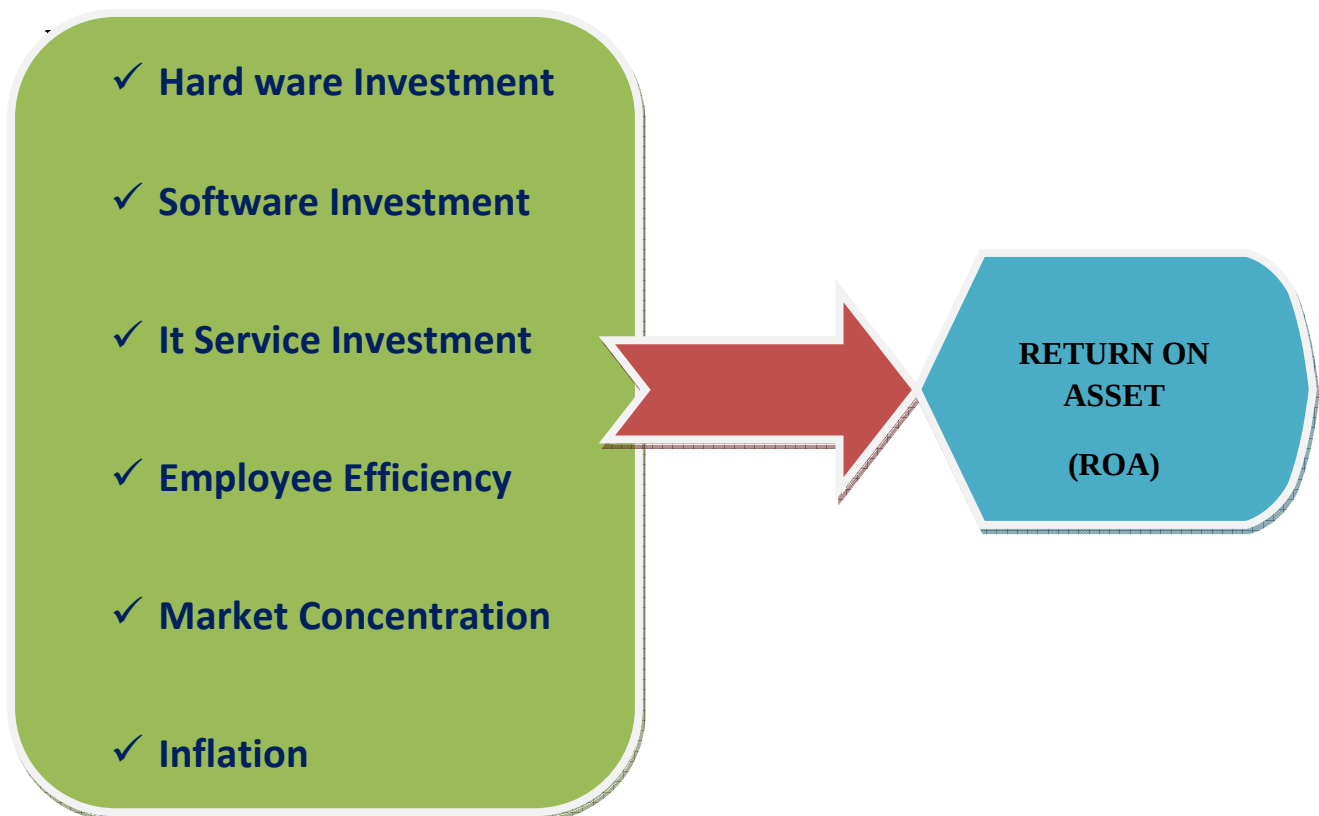
In the context of Ethiopia, the related studies conducted by Tadesse (2015), Rahel (2015), and Eyob (2010) assessed the impact of capital investment decision and accounting information system investment. Accordingly, as per the knowledge of the researcher, all the studies conducted in Ethiopian banking sector clearly failed to identify bank IT investment.

In general, the lack of sufficient research on the impact of IT investment on performance of commercial banks and the focus of the existing studies being only on the private commercial banks initiates this study. Hence, the purpose of this study is to investigate the impact of IT investment in Ethiopian commercial banking sector by utilizing an econometrics model so as to estimate both the IT investment variable and bank specific variables impact on financial performance of commercial banks in Ethiopia which is proposed to fill the existing knowledge gap.

2.3 CONCEPTUAL FRAMEWORK

Empirical evidences point out that IT investment variables of commercial banks are HW, SW, ITS. The study selected ROA as performance measure for the commercial banks in Ethiopia. On the other hand there are bank, specific control variables that determines of performance of commercial banks among them the researcher used two of them they are asset quality and level of deposit. Based on this the following relation is expected on the study.

Fig .1- Conceptual frame work-Relation between variables



Source: Developed for the research

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 INTRODUCTION

In chapter three, the Research Design, Sampling Design, Data Collection Methods, model specification and Data Analysis are discussed in details. All the elements in this chapter are constructed based upon the purpose of the research which is identifying the impact of IT investment on financial performance of commercial banks in Ethiopia. Both primary and secondary data is used for this research. Data is gathered from the accounting and finance head of the banks under study, financial statements of the banks and notes to the financial statements covering the time period of 2006 to year 2015..

3.2 RESEARCH DESIGN

The main objective of this study is to examine the impact of IT investment on financial performance of commercial banks in Ethiopia for the period of year 2006 to year 2015. This is a mixed approach that adapts explanatory research design by using both primary and secondary data.

Schindler and Cooper (2003) discussed that explanatory studies unlike descriptive studies, go beyond observing and describing the condition and tries to explain the reasons of the phenomenon. Explanatory research is devoted to finding causal relationships among dependent and independent variables. It does so from theory-based expectations on how and why variables should be related. Hypotheses could be basic (i.e., relationships exist) or could be directional (i.e., positive or negative). The quantitative data gathering methods are useful especially when a study needs to measure the cause and effect relationships evident between pre-selected and discrete variables (Addisu, 2011). The justification for this method is that it will assist the researcher to explain the reasons behind the phenomenon of IT investment in Ethiopian Commercial Banks . This explanatory method will allow the researcher to use theory-based expectations on how and why variables should be related.

3.3 POPULATION AND SAMPLING DESIGN

3.3.1 TARGET POPULATION

The collection of all possible observations of a specified characteristic of interest is called a population while a collection of observations representing only a portion of the population is called a sample. In this study, the target population is the banking sector in Ethiopia. The target population for this study is all commercial banks that were registered by NBE and operational in the country. Currently, the country has eighteen commercial banks licensed and registered by the NBE, (2016).

TABLE -1 LISTS OF COMMERCIAL BANKS IN ETHIOPIA

	Name of the bank	Year of establishment
1	Abay Bank S.C.	2010
2	Addis International Bank	2011
3	Awash International Bank....	1992
4	Bank of Abyssinia.....	1996
5	Berhan International Bank	2010
6	Bunna International Bank	2009
7	Commercial Bank of Ethiopia.....	1963
8	Cooperative Bank of Oromia (s.c.).....	2005
9	Dashen Bank.....	1996
10	Debub Global Bank	2012
12	Enat Bank	2013
13	Lion International Bank.....	2006
14	Nib International Bank.....	1999
15	Oromia International Bank.....	2008
16	United Bank.....	1998
17	Wegagaen Bank....	1997
18	Zemen Bank	2009

Source: NBE, 2016

3.3.2 SAMPLING DESIGN AND SIZE

The sampling technique selected for this research is purposive sampling. Particularly, the researcher used criterion sampling in which the banks service year is set as a criteria and all commercial banks that meet this criterion are selected as a sample. From all commercial banks listed by NBE, sample of the below listed eight banks that has been in business for the last ten years are drawn based on the above criterion. The major limitation of purposive sampling is making description rather than generalization (Dawson 2002). The researcher considers that the sample size is sufficient to make sound conclusion about the population as far as it covers more than 60% of the total population based on the total IT investment level . Moreover, the big portion of IT investment of commercial banks is found in the banks selected as sample i.e. banks that has been in business for the last ten years.

Table 2: List of banks selected for this research (Sample Banks)

	Name of the bank	Year of establishment
1	Awash International Bank	1992
2	Bank of Abyssinia	1996
3	Commercial Bank of Ethiopia	1963
4	Cooperative Bank of Oromia (s.c.)	2005
5	Dashen Bank	1996
6	Nib International Bank	1999
7	United Bank	1998
8	Wegagaen Bank	1997

Source: Developed for the Research.

3.4 MODEL SPECIFICATION

The aim of this research is investigate the relationship between IT investment and financial performance of commercial banks in Ethiopia. The variables are taken from different papers discussed in the empirical literatures that defines IT investment. The variables are hardware investment (HW), Software investment (SW), and IT service investment (ITS). The regression model of this study is estimated in the following form:

$$ROA = \beta_0 + \beta_1 HW + \beta_2 SW + \beta_3 ITS + \varepsilon$$

To control the effect of bank specific, industry specific and macroeconomic factors the researcher add employee efficiency (EMP), market concentration (MC) and inflation (INF) as a control variable. Thus the model is,

$$ROA = \beta_0 + \beta_1 HW + \beta_2 SW + \beta_3 ITS + \beta_4 EMP + \beta_5 MC + \beta_6 INF + \varepsilon$$

Source: Developed for the research

3.5 VARIABLES DEFINITION

In the model we adopt, performance is regressed on the use of information technology investment variables (the variable of interest) and on other variables (control variables).

3.5.1 DEPENDENT VARIABLE

RETURN ON ASSETS (ROA)- which measures how effectively a bank has utilized its existing physical capital to earn income. It is measured by the ratio of Net Income to Total Asset. ROA is a useful measure of how well a bank manager is doing on the job because it indicates how well a bank's assets are being used to generate profits.

3.5.2 INDEPENDENT VARIABLE

Independent variables are those variables that describe investment on Information technology characterized by the following components:

HARDWARE INVESTMENT – which includes spending on commercial systems (including central processing unit and basic peripherals, such as data storage devices, terminals, memory, and peripherals), single-user systems (workstations and personal computers), data communications (local area network hardware, wide area network hardware, analog Modems, digital access).

SOFTWARE INVESTMENT- which includes spending on packaged software, application solutions software like core banking solution, application tools, systems infrastructure software.

IT SERVICE INVESTMENT- spending on consulting services, implementation services, operational services, training and education, support and maintenance services.

EMPLOYEE EFFICIENCY- it is bank specific determinant performance of commercial banks measured as the ratio of annual labor cost to net income.

MARKET CONCENTRATION - market concentration is one of industry level determinants of performance of commercial banks. It is measured as individual banks loan share of total loan of the banking industry.

INFLATION- inflation is one of macro-economic determinants of performance of commercial banks. In bad economic situation such as high level of inflation banks performance is likely to be affected negatively

From the model developed the following relation is expected between dependent and explanatory variables. The following table summarize the expected result of regression analysis.

Table 3. Summary of Variables to be tested measurement, expected sign and significance

Variable	Explanation	Notation	Expected Sign
Hardware	It includes hardware used to operate the banking system	HW	+
Software	Computer programs used to process data, and Data which is information pertinent to the banks' business practices,	SW	+
IT Service	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	ITS	+
Employee Efficiency	Annual Sal & Ben Exp/Net Income	EFF	-
Market Concentration	Banks Share of Total Loans	MC	+
Inflation	Consumer price index	INF	-
Return on Asset	Net Income/Total Asset	ROA	

Source: Developed for the research

3.6 DATA COLLECTION METHODS

Data collection plays an important role in a research as it is the most essential information for a study. Besides, the accuracy of a result is based on the precision of the data and this study used

the data collected for analyzing purpose. Basically, data can be categorized into two which are primary data and secondary data. Data can be presented in term of words, numbers, figures or diagrams.

Primary data are information that has not been published. In other words, it is the first-hand-data. The methods for collecting primary data are surveying, experiment, testing or observations. Most of the researchers choose to use primary data instead of secondary data due to its more credibility as it is based on the target population. On the other hand, secondary data are information that has been published or available to public. Secondary data can be collected from books, newspapers, journals, and electronic sources such as website, e-journals and etc. Secondary data are less time consuming and costly compared to primary data.

The objective of the study is to investigate the impact of three IT investment variables and control variables that affect return on asset. The IT investment variable consists of hardware investment, software investment and IT service investment while the control variables consist of employee efficiency, market concentration and inflation. For the study purpose both primary and secondary data are used in the study in order to determine the impact of IT investment on financial performance of commercial banks in Ethiopia. Primary data collected through unstructured interview made with selected banks finance and IT department heads and concerned staffs. The secondary data on IT investment is collected from the note in the annual report of the sample commercial banks and from head of accounting and finance particularly designated accounting clerk to review fixed asset ledger of each bank at the head office level in order to get the separated ledger cost of hardware, software and IT service. For the control variable the data is collected from the financial statement of the sampled commercial banks and Ministry of finance and development economics.

3.7 DATA ANALYSIS METHOD

First, the researcher collected the needed data from financial statements, notes to the financial statements, and head office cost ledger of sampled commercial banks as discussed above. After that, collected data was rearranged, edited and calculated in order to become complete data that is needed for this study. Next, the collected panel data was analyzed using descriptive statistics,

and multiple linear regression analysis. The descriptive statistics (Mean, maximum and minimum values and standard deviations) was used to analyze the general trends of the data from 2006 to 2015. A multiple linear regression model was used to determine the relative importance of each independent variable in explaining the impact on ROA of Ethiopian commercial banks. The multiple linear regressions model was conducted by the ordinary listing square (OLS) method using EVIEWS8 econometric software package.

3.7.1. ORDINARY LEAST SQUARE

According to Brooks (2008), ordinary least squares (OLS) or linear least squares is a method to estimate the slope and intercept in a linear regression model. This study used an ordinary least squares (OLS) regression to estimate the linear equation. The rational for choosing OLS is that, if the Classical Linear Regression Model (CLRM) assumptions hold true, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators (Brooks, 2008). In addition, as noted in Petra (2007) OLS outperforms the other estimation methods when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it is rational to use OLS. Thus, the following section discussed the CLRM assumptions.

According to Brooks (2008), the assumptions of ordinary least squares are:

- 1) The errors have zero mean.
- 2) The variance of the errors is constant and finite over all values.
- 3) The errors are linearly independent of one another.
- 4) There is no relationship between the error and corresponding x variate.
- 5) The error term is normally distributed

3.7.2. DIAGNOSTIC ANALYSIS

Diagnostic checking is done to test whether the sample is consistent with the following assumptions:

- 1) The model is correctly specified
- 2) There is no relationship between independent variables (No multicollinearity).

- 3) There is no relationship among the error term at the period t and the error term at period before t (No autocorrelation problem)
- 4) The error term is constant across the number of observations (Homoscedasticity).
- 5) The error term is normally distributed.

If all the above assumptions are consistent with the sample, E-view result will be accurate and reliable. The following tests are done in this research to test the above assumptions.

3.7.2.1. HETEROSCEDASTICITY

According to Brooks (2008), Heteroscedasticity means that error terms do not have a constant variance. If heteroscedasticity occur, the estimators of the ordinary least square method are inefficient and hypothesis testing is no longer reliable or valid as it will underestimate the variances and standard errors. There are several tests to detect the Heteroscedasticity problem, which are Park Test, Glesjer Test, Breusch-Pagan-Goldfrey Test, White's Test and Autoregressive Conditional Heteroscedasticity (ARCH) test. In this study, the popular white test is employed to test for the presence of heteroscedasticity. The hypothesis for the Heteroscedasticity test was formulated as follow:

H_0 : There is no Heteroscedasticity problem in the model.

H_1 : There is Heteroscedasticity problem in the model.

$\alpha = 0.05$

Decision Rule: Reject H_0 if p-value is less than significance level. Otherwise, do not reject H_0 .

3.7.2.2. AUTOCORRELATION

According to Brooks (2008), when the error term for any observation is related to the error term of other observation, it indicates that autocorrelation problem exist in this model. In the case of autocorrelation problem, the estimated parameters can still remain unbiased and consistent, but it is inefficient. The result of T-test, F-test or the confidence interval will become invalid due to the variances of estimators tend to be underestimated or overestimated. Due to the invalid hypothesis testing, it may lead to misleading results on the significance of parameters in the model. In this study to test for the existence of autocorrelation, the popular Breusch-Godfrey Serial Correlation LM Test was employed.

H_0 : There is no autocorrelation problem in the model.

H_1 : There is autocorrelation problem in the model.

$$\alpha = 0.05$$

Decision Rule: Reject H_0 if p-value less than significance level. Otherwise, do not reject H_0 .

3.7.2.3. MULTICOLLINEARITY

According to Brooks (2008), Multicollinearity will occur when some or all of the independent variables are highly correlated with one another. If the multicollinearity occurs, the regression model is unable to tell which independent variables are influencing the dependent variable. The consequences of Multicollinearity are large variances and covariance of OLS estimators, wider confidence interval, insignificant t ratio, high R^2 but few significant t ratio, sensitivity of OLS estimators and their standard errors to small changes in data. There is no one unique method to detect the multicollinearity problem, it only have some rules of thumb, which are high R^2 but few significant t ratio, high pair wise correlation coefficient and Variance Inflation Factor (VIF) or Tolerance (TOL). This study used high pair-wise correlation coefficients method to test the presence of multicollinearity problem in a regression model. Because it can see the correlation of independent variables between each other one by one. If the correlation coefficient was higher than 0.8, the model would be considered as it consists of serious Multicollinearity problem Gujarati (2004).

3.7.2.4. NORMALITY

Normality tests are used to determine if a data set is well-modeled by a normal distribution. With the normality assumption, ordinary least square estimation can be easily derived and would be much more valid and straight forward. This study used JarqueBera Test (JB test) to find out whether the error term is normally distributed or not. The hypothesis for the normality test was formulated as follow:

H_0 : Error term is normally distributed

H_1 : Error term is not normally distributed

$$\alpha = 0.05$$

Decision Rule: Reject H_0 if p-value of JB test less than significance level. Otherwise, do not reject H_0 .

3.7.2.5. MODEL SPECIFICATION

According to Brooks (2008), Specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form, so that regression model will be wrongly predicted. If the omitted variable is correlated with the included variable, the estimators are biased and inconsistent. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent. Ramsey RESET test was used to see whether the developed model is correctly regressing.

H₀: the model is correctly specified

H₁: the model is not correctly specified

$\alpha = 0.05$

Decision Rule: Reject H₀ if p-value is greater than significance level. Otherwise, do not reject H₀.

3.8. CONCLUSION

Chapter three included the methodology used to perform data analysis in Chapter four. This study employed both primary and quantitative secondary data and Ordinary least square method to test the relationship between IT investment variables and the control variables with ROA in commercial banks of Ethiopia. Besides that, diagnostic tests were conducted to confirm the reliability of the results. Chapter four will show out in details regarding the hypothesis testing and diagnostic tests carried out for the collected data.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATIONS

In the preceding chapter the research design employed in this study is presented and discussed in detail. The purpose of this chapter is to present results and analysis of data involved in this study. It is organized in two parts, the first part presents results from interview analysis and the second part discusses quantitative analysis and results. In the quantitative analysis the descriptive statistics of all the variables used in this study and the results of hypothesis testing i.e. the estimated parameters of the regression equation, their significance, the connection between the independent variables and dependent variable according to the sign and the value of the parameters for the regression model are presented and discussed in detail.

4.1 INTERVIEW RESULTS

Under this section of the chapter the researcher addresses the research questions using results obtained from interview questions supported with data obtained from financial statements of those sample banks in order to capture the type of IT investments they made, how these investment affect their performance, and what are the challenges in relation to the IT investments they made in Ethiopian commercial banks.

4.1.1 TYPES OF IT INVESTMENT FOR THE BANKING SECTOR IN ETHIOPIA

The first question raised for interview participants was what information technology investment means for your bank. IT investment in commercial banks is capital spend by banks on the combination of banking software and hardware infrastructures such as personal computers, ATM and POS machines, network servers core banking software , mobile banking , internet banking IT related security systems and infrastructures.

The hardware investments personal computers, ATM machines, POS machines and infrastructures constitute the higher amount of investment. From the software investments, Core

banking system is the biggest investment banks have made so far on IT. Core banking is a system that enables banks to deliver better quality customer service by allowing customers to access their account from all branches of a specific bank. Prior to the introduction of core banking, customers were only allowed to access their account from the branch their account is registered. In addition to core banking, most banks now days are investing on mobile and internet banking services which allows their customers to access their account and get different banking services without coming physically to banks using their phones and computers via internet. Moreover, banks are applying various software either internally developed or purchased from suppliers to facilitate day to day activities.

4.1.2 IMPACT OF IT INVESTMENT ON FINANCIAL PERFORMANCE

So, why do banks invest huge amount of money on IT? There are a number of motivational factors for banks to invest millions of birrs on IT and related products. The major ones are discussed below:

- **Customer service** - improving the quality of Customer services is one of the main reason bank managers emphasize on the interview for aggressive investments on IT. Banks are determined more to invest large amount of capital on IT in order to serve their customers with improved service quality by bringing different banking services to customers instead of forcing their customers to come to them. For example, if we look at core banking service, as it is stated above it helps banks to deliver better customer service by creating service accessibility through enabling customers to use any branch of a specific bank to access their account and get different banking services. The same is true for mobile and internet banking, since it avoids the physical presence of customers at bank branches to get a specific service.
- **Efficiency and effectiveness** - along with improving customer service delivery, commercial banks are motivated to invest on information technology in order to achieve efficiency and effectiveness on their day to day activity.

- **Competition** – the other major factor for IT investment for commercial banks is to stay competitive in the highly growing banking industry. Each bank tries to differ its service from the rest of its competition by trying to provide new and better banking experience for customers using different IT related services.

Since it is difficult to achieve all the above stated factors with manual banking system, investing in IT is a survival strategy for banks. And currently NBE restrict no banking license without core banking operation. Which are the motives for the investment, but its impact on financial performance needs quantitative investigation.

4.1.3.IT INVESTMENT AND CHALLENGES

While trying to improve the banking industry with technological products banks are faced with various challenges on the way. Sometimes due to lack of good management and evaluation millions of birrs investment on IT is being underutilized. Both financial and IT managers of commercial banks point out the following challenges they are facing in relation to using IT products:

- Poor infrastructural developments like electricity power and network interruptions of the country affects the day to day utilization of IT infrastructures
- Resistance from both customers and employees as result of knowledge gap and low level of awareness
- Low quality of technological products and high consultancy and maintenance costs
- Poor management and control on installation, operation and follow-up phases

The above listed and other observed problems are mentioned during the interview as problems for banks not to fully utilize the benefits of investments made on information technology. In general during interview bank managers' point out that investments made on IT are critical for their organization to survive and to be competitive in the market and they are making effort so that they can benefit from IT advancements.

4.2 QUANTITATIVE ANALYSIS RESULTS

This section presents the impact of IT investment on the financial performance of commercial banks in Ethiopia. The analysis is made using annual balanced panel data, where all the variables are observed for each cross-section and each time period. The study has a time series segment spanning from the period of 2006 up to 2015 and a cross section segment which considered eight commercial Banks. I.e. AIB, BOA,CBE,CBO, DB,NIB,UB, and WB.

4.2.1 IT INVESTMENT OF THE BANKS UNDER STUDY

The following table presents annual IT investment of the eight sample banks for the last ten years. As we can see from the table, banks' capital investment on information technology products has been growing over the years.

Table 4: IT Investments of the sampled commercial banks

TOTAL IT INVESTMENT IN BIRR (MILLION)											
BANKS	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	AVERAGE
AIB	34.9	39.15	42.35	42.35	46.44	53.37	61.51	121.3	173.3	248	86.3
BOA	5.98	7.52	10.27	12.19	12.88	15.88	20.52	128.2	141.2	159	51.4
CBE	72.6	93.3	108.1	120.9	142.8	181.8	231.6	418.9	649.2	856.4	287.6
CBO	3.5	5.4	8.2	9.3	10.4	12.7	36.3	49.9	65.8	89.5	29.1
DB	57.26	66.26	74.83	97.45	111.2	136.4	212.3	245.6	291.7	351.5	164.4
NIB	2.68	12.16	14.03	24.7	30.11	33.34	38.09	50.71	126	196.5	52.8
UB	3.6	19.25	23.77	30.52	34.45	48.34	62.9	71.49	137.9	187.5	61.9
WB	10.91	9.06	16.63	18.79	34.67	60.86	72.9	91.65	116.9	172.5	60.5

Source: Computation from banks financial Statements

Commercial bank is the leading bank on IT investment by followed by Dashen, Awash and United bank respectively. Bank of Abyssinia and Cooperative bank of Oromia are the two least IT investing commercial banks under the study.

The table below shows the trend of average IT investment and financial performance (ROA) of the sampled commercial banks in Ethiopia for the last ten years. The IT investment is increasing from year to year, but the return on asset is fluctuating, this signifies there is undecided

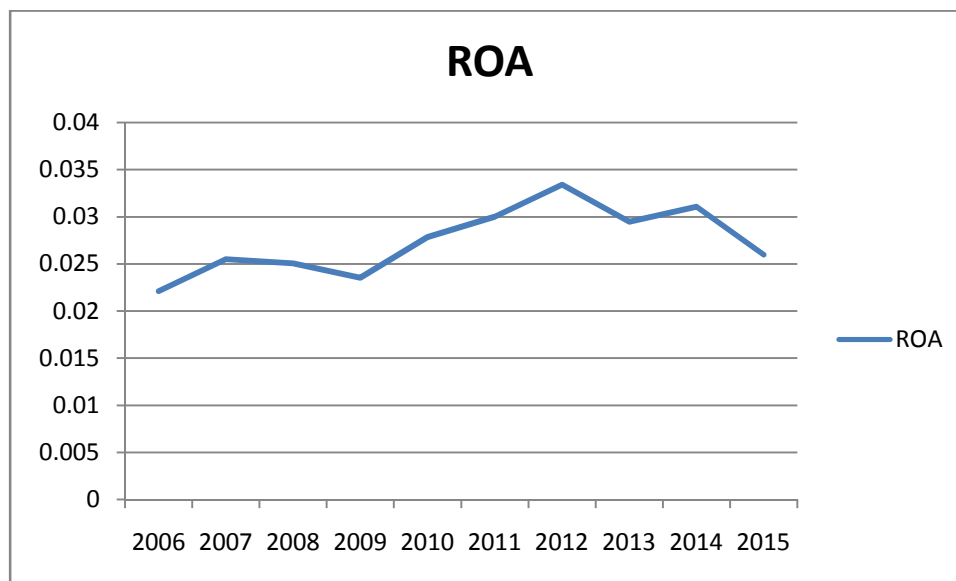
relationship between IT investment and financial performance of the sampled commercial banks in Ethiopia, which needs quantitative investigation.

Table 5: Trend of ROA and IT Investment

	ROA	IT INV
2006	0.02211	23.93
2007	0.02552	31.51
2008	0.02506	37.27
2009	0.02354	44.53
2010	0.02783	52.87
2011	0.03000	67.84
2012	0.03341	90.02
2013	0.02946	147.22
2014	0.03106	212.75
2015	0.02599	282.61

Source: Computation from the banks financial statment

Fig .2: Trend of ROA

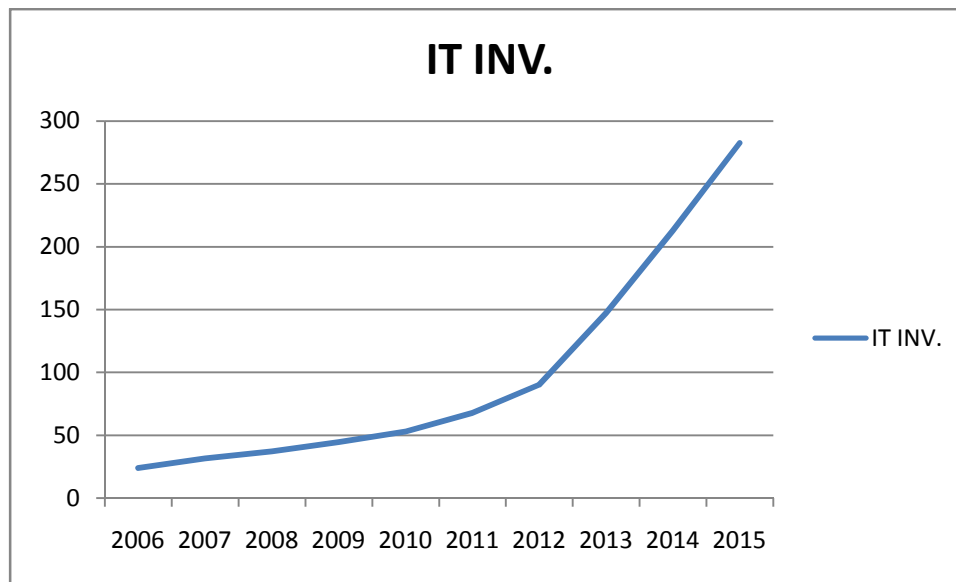


Source: Computation from the banks financial statment

The graph below shows the average investment on information technology of Ethiopian commercial banks for the last ten years, as it was explained earlier IT investment has been

growing continuously for the last ten years, and looking forward to grow even more with technological advancements and competitive environment.

Fig .3: Growth of IT investment



Source: Computation from the banks financial statment

4.2.2 DESCRIPTIVE STATISTICS

The summary of descriptive statistics that was intended to give general descriptions about the data (both dependent and independent variables) is presented in Table 6. The total number of observation for each variable was 80 (i.e., data for 8 banks for the period from the year 2006 to 2015). Accordingly, mean, median, standard deviation, minimum and maximum values of each variable were used so as to show the overall trend of the data over the period under consideration.

Table 6: Summary of descriptive statistics for dependent and independent variables

	ROA	HW	SW	ITS	EMP	MC	INF
Mean	0.027372	7.567147	7.09868	6.367341	0.012918	0.015147	17.21
Median	0.029292	7.616449	7.122761	6.413129	0.01277	0.005295	14.65
Maximum	0.046681	9.12141	8.214121	7.42154	0.02361	0.14856	36.4
Minimum	-0.01871	6.121541	5.74202	5.12321	0.00491	0.000104	2.8
Std. Dev.	0.009259	0.645004	0.532698	0.524117	0.004327	0.029417	10.79263
Observation	80	80	80	80	80	80	80

Note: Hardware investment (HW), Software investment (SW), IT service investment (ITS), Employee efficiency (EMP), Market concentration(MC), inflation(INF).

Source: Financial statements of banks, NBE reports, MoFED reports and own computation

The mean ROA of selected Commercial Banks was 2.7 percent with the standard deviation of 0.92 percent. It shows that the selected Commercial Banks have reached a performance rate of 2.5 percent for the period taken and the standard deviation shows that there is small variation on the reported performance. Even if there were Commercial Banks that reported a ROA which was as high as 4.67 percent, there were also Commercial Banks with low performance reported at - 1.87 percent.

Performance for the sample period has ranged from -1.87 percent to 4.67 percent with a standard deviation of 0.97 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 commercial Banks in Ethiopia.

Regarding the IT investment variables hardware investment, software investment, and IT service investment they have a standard deviation of 0.64, 0.531 and 0.52 respectively which is greater than the standard deviation of ROA, which shows there is more variability in IT investment than ROA as a result IT investment and ROA do not vary together.

4.2.3 TEST RESULTS FOR THE CLASSICAL LINEAR REGRESSION

MODEL ASSUMPTIONS

As mentioned in the methodology part of this study, as far as the assumptions of classical linear regression model hold true, the coefficient estimators of both α (constant term) and β

(independent variables) that are determined by ordinary least square (OLS) will have a number of desirable properties, and usually known as Best Linear Unbiased Estimators (BLUE). Hence, the following sections discuss results of the diagnostic tests (i.e., heteroscedasticity, autocorrelation, multicollinearity, normality and model specification test) that ensure whether the data fits the basic assumptions of classical linear regression model or not.

4.2.3.1. Model Selection (Random Effect versus Fixed Effect Models)

The econometrics model used to examine the impact of bank specific and macro-economic factors on nonperforming loans of commercial banks in Ethiopia is a panel data regression model which should be either fixed-effects or random-effect model. To determine whether the fixed effects are necessary or not this study refers Brooks (2008) and Gujaraty (2004). The hypothesis for the model selection test was formulated as follow;

H0: Random effects model is appropriate.

H1: Fixed effects model is appropriate.

According to (Gujarati, 2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model/FEM and random effect model/REM. Hence the choice here is based on computational convenience. On this score, FEM may be preferable. Since the number of time series (i.e. 10 year) is greater than the number of cross-sectional units (i.e. 8 commercial banks), FEM is preferable in this case. According to Brooks(2008); Verbeek (2004); Wooldridge (2006), it is often said that the REM is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a FEM is more plausible when the entities in the sample effectively constitute the entire population/sample frame. Hence, this study chose to use FEM since the sample for this study was not selected randomly. Thus this research rejects Ho.

4.2.3.2. Heteroskedasticity

When the scatter of the errors is different, varying depending on the value of one or more of the independent variables, the error terms are heteroskedastic Brooks (2008). Heteroscedasticity test is very important because if the model consists of heteroskedasticity problem, the OLS estimators are no longer BEST and error variances are incorrect, therefore the hypothesis testing,

standard error and confident level will be invalid. . A white' test has been made, to ensure that this assumption is no longer violated. The hypothesis for the heteroskedasticity test was formulated as follow;

H0: There is no heteroskedasticity problem.

H1: There is heteroskedasticity problem.

$\alpha = 0.05$

Decision Rule: Reject H0 if P value is less than significant level 0.05. Otherwise, do not reject H0.

Table 7: Result of Heteroskedasticity Test: white

White Test	P-value	Decision Rule
F-statistic	0.6614	Do not Reject the H0
Obs*R-squared	0.6375	Do not Reject the H0
Scaled explained SS	0.6328	Do not Reject the H0

Source: Own computation (Developed for the research)

As shown in table 7, all versions of the white test statistic (F-statistic, Chi-Square and Scaled explained SS) gave the same conclusion that there was no evidence for the presence of heteroscedasticity in this particular study. Since the p-values of 0.6614, 0.6375 and 0.6328 for F-statistic, Chi-Square and Scaled explained SS respectively were in excess of 0.05, the null hypothesis should not be rejected.

4.2.3.3. Autocorrelation

It is assumed that the distribution errors are uncorrelated with one another and that the errors are linearly independent of one another. Autocorrelation error occurs when there is a serial correlations between residuals and their own past values. In this study, Breusch Godfrey Serial Correlation LM Test is used to carry out the autocorrelation test. The p-value is obtained to examine whether the autocorrelation problem occurs in the model. If the p-value is more than 5% significant level, it implies that there is no autocorrelation problem in the model. The hypothesis for the model specification test was formulated as follow;

H0: There is no autocorrelation problem.

H1: There is autocorrelation problem.

$\alpha = 0.05$

Decision Rule: Reject H0 if P value is less than significant level 0.05. Otherwise, do not reject H0.

Table 8: Result of Autocorrelation Test: BreuschGodfrey Serial Correlation LM Test

	P-value	Decision Rule
Breusch-Godfrey Serial Correlation LM Test	0.2406	Do not Reject the H0

Source: Own Computation (Developed for the research)

From table 8, it can be concluded that this research do not reject null hypothesis (H0), since the p value is 0.2406, which is greater than significance level of 0.05. Thus, it can be concluded that the model does not consists of autocorrelation problem.

4.2.3.4. Multicollinearity

According to Brooks (2008), multicollinearity will occur if some or all of the independent variables are highly correlated with one another. It shows the regression model has difficulty in explaining which independent variables are affecting the dependent variable. If multicollinearity problem is too serious in a model, either additional important variable should be added or unimportant independent variable should be dropped. This study uses high pair-wise correlation coefficients method to detect the existence of multicollinearity high pair-wise correlation coefficients method see the correlation of independent variables between each other one by one. According to Gujarati (2004), if the correlation coefficient is higher than 0.8, it is considered as the model consists of serious multicollinearity problem.

Table 9: Results of multicollinearity Test: High Pair-Wise Correlation Coefficients

	HW	SW	ITS	EMP	MC	INF
HW	1	0.594590	0.6103288	-0.005871	0.384935	-0.064004
SW	0.594590	1	0.81206722	-0.022358	0.443424	-0.017422
ITS	0.610329	0.812067	1	0.077401	0.460114	-0.179144
EMP	-0.005871	-0.022358	0.077401	1	-0.255861	-0.273585
MC	0.384935	0.443424	0.460114	-0.255861	1	-0.126387
INF	-0.064004	-0.017422	-0.179144	-0.273585	-0.126387	1

Source: Own computation (Developed for the research)

Table 9 showed that there is no strong pair-wise correlation between the explanatory variables (HW,SW,ITS,EMP,MC and INF). As a rule of thumb, inter-correlation among the independent variables above 0.80 signals a possible multicollinearity problem. In this study all the correlation coefficients are less than 0.8 which shows that there is no multicollinearity problem.

4.2.3.5. Normality

Normality test is used to determine whether the error term is normally distributed. Brooks (2008) noted that the Jarque-Bera statistic would not be significant for disturbance to be normally distributed around the mean. The purpose of the Jarque-Bera test is to make sure that the data set is well-modeled by a normal distribution. The hypothesis for the normality test was formulated as follow:

H0: Error term is normally distributed

H1: Error term is not normally distributed

$\alpha = 0.05$

Decision Rule: Reject H0 if P value of JB less than significant level 0.05. Otherwise, do not reject H0.

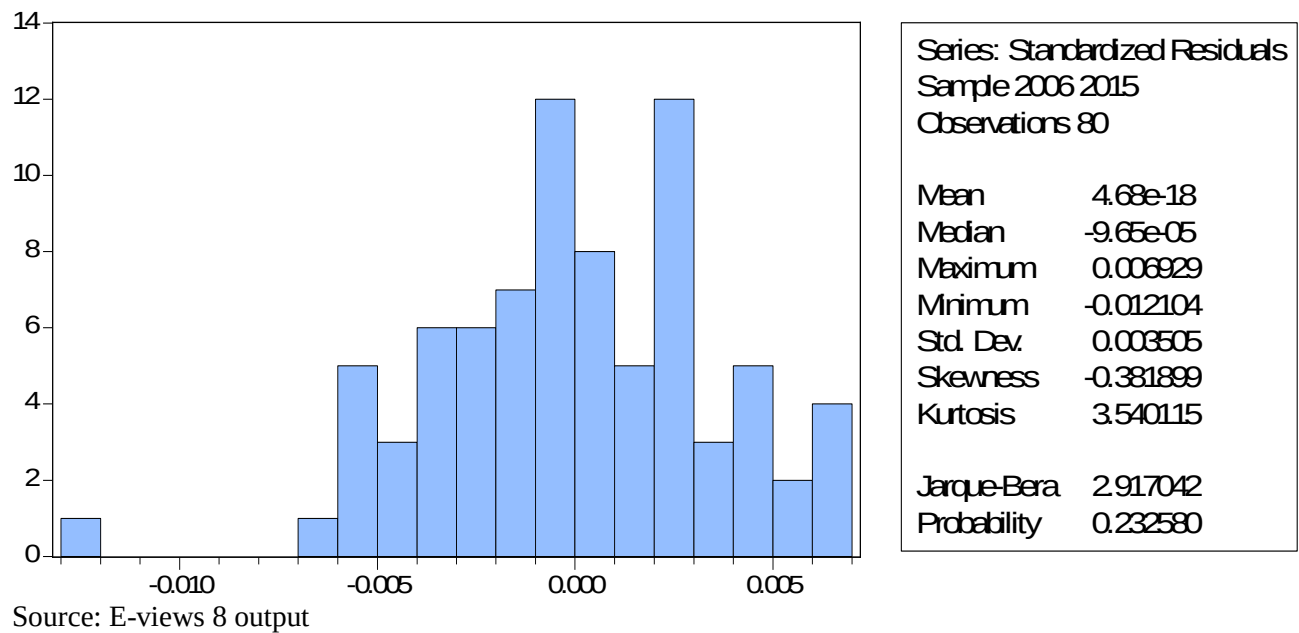
Table 10: Result of Normality Test: Bera-Jarque test

	Probability (P-value)	Decision Rule
JarqueBera Test	0.2325	Do not Reject H0.

Source: Own computation (Developed for the research)

Table 10 indicated that distribution of the panel observation is symmetric about its mean. The Jarque-Bera statistic has a P-value of 0.2325 implies that the p-value for the Jarque-Bera test is greater than 0.05 which indicates that there was no evidence for the presence of abnormality in the data. Thus, the null hypothesis that the data is normally distributed should not be rejected since the p-value was considerably in excess of 0.05.

Fig.4-Normality Graph



4.2.3.6. Model Specification

Model specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form. When the omitted variable is correlated with the variable which included, the estimators will be biased and inconsistent and model specification error will tends to occur. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent and model specification error will not occur. Therefore, in order to select a correct estimated model, the researcher had carry out the Ramsey-RESET Test to check on the model specification. The hypothesis for the model specification test was formulated as follow;

H0: The model specification is correct.

H1: The model specification is incorrect.

$\alpha = 0.05$

Decision Rule: Reject H0 if P value is less than significant level 0.05. Otherwise, do not reject H0.

Table 11: Result of model specification Test: Ramsey-RESET test

	Test statistic value	Decision
Ramsey-RESET test	Prob. F test = 0.1085	Rule Do not Reject the H0

Source: Eviews 8 Output

From table 11, it can be concluded that this research do not reject null hypothesis (H0), since the p value is 0.1085, which is greater than significance level of 0.05. Thus, it can be concluded that the model specification is correct from year 2006 to 2015.

4.2.4. DISCUSSION OF REGRESSION RESULTS

The empirical evidence on the impact of IT investment on performance of commercial banks in Ethiopia is studied based on balanced panel data, where all the variables are observed for each cross-section and each time period. The study has a time series segment spanning from the period 2006 up to 2015 and a cross section segment which considered Eight commercial banks, namely, Awash International Bank, Bank of Abyssinia, Commercial Bank of Ethiopia, Cooperative Bank of Oromia, Dashen Bank, Nib International Bank, United Bank and Wogagen Bank. To test the relationship between these commercial banks IT investment and financial performance the following regression analysis is done.

$$ROA = \beta_0 + \beta_1 HW + \beta_2 SW + \beta_3 ITS + \beta_4 EMP + \beta_5 MC + \beta_6 INF + \varepsilon$$

The definition of all individual variables included in the above equation is discussed in the methodology part of the study.

Table 12: Result of Ordinary Least Square (OLS) Model

Independent variable	Coefficient value	P-value	Sign
Hardware Investment (HW)	-0.002563	0.0121	-
Software Investment (SW)	-0.018823	0.0000	-
IT Service Investment (ITS)	0.024034	0.0000	+
Employee efficiency (EMP)	-0.012387	0.9094	-
Market Concentration (MC)	0.014936	0.3962	+
Inflation (INF)	0.000176	0.0001	+
R-Squared	0.856704		
Adjusted R-Squared	0.840558		

Source: Eview-8 results

The model developed by Ordinary Least Square (OLS) model:

$$\text{ROA} = 0.024671 - 0.002563\text{HW} - 0.018823\text{SW} + 0.024034\text{ITS} - 0.012387\text{EMP} + 0.014936\text{MC} + 0.000176\text{INF}$$

Table 12 showed the empirical result tested by Ordinary Least Square (OLS) from E-views software. The R-squared of this model is 0.856704, which means that 86% of the total variation of Ethiopian commercial banks return on asset is explained by the total variation of hardware investment, software investment, IT service investment, employee efficiency, market concentration and inflation. Whereas, the adjusted R-squared is 0.840558, which means that 84% of the total variation of Ethiopian commercial banks return on asset is explained by the hardware investment, software investment, IT service investment, employee efficiency, market concentration, and inflation, by taking into account the number of independent variables and sample size. Although, the remaining 14% and 16% of the change is explained by other factors which are not included in this study model, both the R-squared and the Adjusted R-squared values in this study are found to be sufficient enough to infer that the fitted regression line is very close to all of the data points taken together (has more explanatory power). For panel data, R-Squared greater than 20% is still large enough for reliable conclusions (Cameron Trivedi, 2009; Hsiao, 2007, cited in Nyamsogoro, 2010).

The dependent variable being regressed is financial performance of commercial banks which is measured by return on asset. The IT investment variable (hardware investment, software investment and IT service investment), the control variable (inflation) found to be a significant repressors' of financial performance of commercial banks of Ethiopia. On the other hand the findings revealed that, there was no significant association among employee efficiency and market concentration with financial performance of commercial banks in Ethiopia. The following section demonstrates the impact of each IT investment variables and the bank specific, industry specific and macroeconomic variables on Ethiopian commercial banks financial performance.

4.2.4.1. HARDWARE INVESTMENT

Hypothesis testing of the relationship between hardware investment (HW) and financial performance of Ethiopian commercial banks :

H0: Hardware investment (HW) does not have significant impact on financial performance of commercial banks in Ethiopia.

H1: Hardware investment (HW) has significant impact on financial performance of commercial banks in Ethiopia.

Conclusion: Reject H0 since there is significant relationship between Hardware investment (HW) and financial performance of commercial banks in Ethiopia (ROA). According to the regression result, beta is -0.002563 and P-value of 0.0121, which is considerably less than the acceptable 0.05 level of significance showed that the relationship is statistically significant.

This negative coefficient of estimate of hardware investment is inconsistent with Adekunle (2014), Gedion (2010), Beccalli (2007), shawkey (1995). The justification provided in the empirical literature for the positive association between HW and ROA is that, the hardware investment increases both the volume and value of deposit accounts, reduces banking transaction costs, reduces the number of staff and the number of branches and consequently improves banks' profitability. However, this research result is also consistent with the research of Bilkisu (2015) and Brown (2006). According to these papers hardware investment have negative impact on short term profitability, and banks with higher IT investments are not able to apply a premium to the price given the higher quality of their outputs. The negative relationship between HW and ROA in Ethiopian commercial banks indicates that the hardware resources is not utilized properly and the investment is made as a strategic necessity and to stay competitive in the industry.

4.2.4.2. SOFTWARE INVESTMENT

Hypothesis testing of the relationship between software investment (SW) and financial performance of Ethiopian commercial banks :

H0: Software investment (HW) does not have significant impact on financial performance of commercial banks in Ethiopia.

H1: Software investment (HW) has significant impact on financial performance of commercial banks in Ethiopia.

Conclusion: Reject H0 since there is a negative significant relationship between software investment (SW) and financial performance (ROA). The E-view result on the above table, table 12, showed that the coefficient of software investment (SW) is negative. According to the regression result beta is -0.018823 and is significant at 100%. This means that an increase by 1% of SW growth will result in 1.8% decrease of ROA ratio, holding other variables constant.

This negative coefficient of estimate of software investment is inconsistent Berger et al). The justification provided in the empirical literature for the positive association between SW and ROA is that, IT investment leads to improvements in costs. The improvement was hinged on productivity increase in form of improved “back-office” technologies which is in form of organization related benefits such as reduced costs of operation as well as improved “front-office” technologies which is in form of benefits to customers such as improved quality and variety of banking services. The negative relationship between SW and ROA in Ethiopian commercial banks indicates that the software investment particularly the core banking software is not a source of competitive advantage because all the banks have equivalent software asset as their competitors and it is a requirement by the NBE to operate the banking business.

4.2.4.3. IT SERVICE INVESTMENT

Hypothesis testing of the relationship between IT service investment (ITS) and financial performance of Ethiopian commercial banks :

H0: IT service investment (ITS) does not have significant impact on financial performance of commercial banks in Ethiopia.

H1: IT service investment (ITS) has significant impact on financial performance of commercial banks in Ethiopia.

Conclusion: Reject H_0 since there is significant relationship between IT service investment (ITS) and financial performance of commercial banks in Ethiopia (ROA). According to the regression result, beta is 0.024034. The P-value of 0.0000, which is considerably less than the acceptable 0.05 level of significance showed that the relationship is statistically significant.

This positive coefficient of estimate of IT service investment is consistent with (Menachemi, Burkhardt, Schewchuk, Burke, & Brooks, 2006) and Beccalli (2007) . The justification provided in the empirical literature for the positive association between SW and ROA is that investing in staff training, improving the quality of products and internal processes and increasing IT 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. The positive relationship between ITS and ROA in Ethiopian commercial banks indicates that for a service giving company in the banking industry the competency of the labor force and the IT support given by the concerning department is a crucial point for the financial performance of the company.

4.2.4.4. EMPLOYEE EFFICIENCY

Hypothesis testing of the relationship between employee efficiency (EMP) and financial performance of Ethiopian commercial banks :

H₀: Employee efficiency (EMP) does not have significant impact on financial performance of commercial banks in Ethiopia.

H₁: Employee efficiency (HW) has significant impact on financial performance of commercial banks in Ethiopia.

Conclusion: Accept H_0 since there is a negative insignificant relationship between employee efficiency (EMP) and financial performance (ROA). The E-view result on the above table, table 12, showed that the coefficient of employee efficiency (SW) is negative. According to the

regression result beta is -0.012387. This means that an increase by 1% of EMP growth will result in 1.2% decrease of ROA ratio, holding other variables constant.

This negative coefficient of estimate of employee efficiency which is measured by the ratio of labor cost to income is consistent with (Molyneux, 1995) and (Liu, 2010). The justification provided in the empirical literature for the negative association between EMP and ROA is that inefficient utilization of the labor force leads to low financial performance. The negative relationship between EMP and ROA in Ethiopian commercial banks indicates that as the labor cost increases without increasing the net income the performance (ROA) will decrease.

4.2.4.5. MARKET CONCENTRATION

Hypothesis testing of the relationship between market concentration (MC) and financial performance of Ethiopian commercial banks :

H0: Market concentration (MC) does not have significant impact on financial performance of commercial banks in Ethiopia.

H1: Market concentration (MC) has significant impact on financial performance of commercial banks in Ethiopia.

Conclusion: Do not reject H0 since there is no significant relationship between market concentration (MC) and financial performance of commercial banks in Ethiopia (ROA). According to the regression result, beta is 0.014936. The P-value of 0.3962, which is considerably in excess of the acceptable 0.05 level of significance showed that the relationship is not statistically significant.

This positive coefficient of estimate of market concentration is consistent with (Molyneux, 1995) and (Demirguc-Kunt et al. 1999). The justification provided in the empirical literature for the positive association between MC and ROA is that an increase in market share and market concentration leads to monopoly powers. Banks with high market share perceived to have better chance of profitability in relation to those banks with low market share. In non-competitive market larger banks with high market concentration can increase their profitability by increasing their mobilized deposits. Coefficient of banks market concentration is positive and insignificant

means larger banks are benefited from their highest market share of the industry but do not have significant impact on performance. The positive relationship between MC and ROA in Ethiopian commercial banks indicates that the more deposit is mobilized the more lending capacity of the bank.

4.2.4.6. INFLATION

Hypothesis testing of the relationship between inflation (INF) and financial performance of Ethiopian commercial banks :

H0: Inflation (INF) does not have significant impact on financial performance of commercial banks in Ethiopia.

H1: Inflation (INF) has significant impact on financial performance of commercial banks in Ethiopia.

Conclusion: Accept H0 since there is a positive significant relationship between inflation (INF) and financial performance (ROA). The E-view result on the above table, table 12, showed that the coefficient of inflation (INF) is positive. According to the regression result beta is 0.000176 and the P-value is 0.0001, which is considerably less than of the acceptable 0.05 level of significance showed that the relationship is statistically significant.

This positive coefficient of estimate of inflation is consistent with (Lui 2010) The justification provided in the empirical literature for the positive association between INF and ROA is that banks are able to anticipate inflation, it will give them chance to adjust interest rates accordingly as a result they will be able to increase revenues faster than increase in costs which will result in increase in profitability. However, this research result is also inconsistent with the research of (Molyneux,1995). According to these paper 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.

CHAPTER FIVE

5. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The previous chapter presented the analysis of the findings and discussions of the study. The purpose of this chapter is to discuss the summary of findings, conclusions and recommendations. Accordingly, the chapter is organized in three sections, the first section presents the summary of findings, the second section presents the conclusions and the third section presents the recommendations provided based on the findings of the study.

5.1.SUMMARY OF FINDINGS

In the context of the study the researcher examines the relationship between IT investments and performance of commercial banks in Ethiopia. Using panel data from 8 commercial banks for 10 years period covering from 2006 to 2015 fiscal year. Applying qualitative and quantitative research approaches the researcher addresses both general and specific objectives of the study. The following section provides summary of results obtained from the analysis made on both qualitative and quantitative research method used.

- ✓ It is observed that capital investments on Information technology has been increasing from time to time with more technological advancements in commercial banks in Ethiopia. Banks are investing on IT related products and services such as: software, hardware, infrastructure and networks, consultancy and maintenance services.
- ✓ Main motivational factors for banks to invest huge amount of money on IT include delivering quality customer services, increasing efficiency and effectiveness and to be competitive and leading in the fast growing banking industry.
- ✓ From the regression output the IT investment variables under study have significant relationship with performance measure ROA of commercial banks. Looking at coefficient of these IT investment variables from the regression result, it is confirmed

that they have negative impact on the performance of commercial banks in Ethiopia and the degree of relation is significant when measured statistically.

The negative return on IT investment variables such as hardware investment and software investment depicts that, there are a lot of factors restricting them from being advantageous as expected. There are many justifications stated on the study can be mentioned as a causes for the above results.

- ✓ At the beginning it is observed that in most commercial banks investments on IT is at the early stage and made mainly for survival strategy. Most of the time banks are intended to serve customers with low service charges in order to mobilize deposits and to attract customers. On the other hand, the new technological futures banks are introducing such as internet banking are at early stage of implementation on which returns are not yet captured.
- ✓ Low performance of major infrastructural facilities like electricity and network coverage prohibits banks from fully utilizing IT infrastructures.
- ✓ In addition, banks poor management and lack of control over technology contributes for the low outcome. Employees' resistance to technology and lack of adequate knowledge to the system implemented significantly affected the function of IT related investment. Poor quality of IT infrastructure installation and implementation can also be mentioned as problems.
- ✓ On the other hand, among the control variables employee efficiency was found to have a significant and positive impact on the performance of 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.

5.2. CONCLUSIONS

The main aim of this study is to assess the impact of Investment in Information technology on performance of commercial Banks in Ethiopia. The two big IT investments in Ethiopian Commercial banks are hardware investment and software investment, these investments have a negative and significant impact on the ROA of the commercial Banks in Ethiopia. Thus, the

researcher conclude that, the negative sign indicate commercial banks were not utilize infrastructure resources properly due to the above mentioned challenges. This lead to report low IT investment performance relative to the huge amount of investment they made. It is why higher hardware investments and software investments are not associated with higher profit efficiency. This confirms the presence of productivity paradox in Ethiopian Commercial banks. Banks with higher hardware investments are not able to apply a premium to the price given the higher quality of their outputs as these investments are a survival strategy for the banks. IT investment is predominantly used for strategic reasons particularly in order to lower or increase entry barriers and to stay competitive in the market. Thus the impact of financial performance is not as expected.

IT Services investment resulted in positive change on Return on Asset, of the selected the commercial Banks in Ethiopia this includes consulting services, implementation services, training and education, support services. The IT investment 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 IT services that means effective implementation of the information technology in order to improve banks performance.

In general from the study result, the researcher concluded that information technology is becoming integral part of the banking business in Ethiopia and even though the degree of impact is negative and significant, commercial banks are not generating additional profit from capital investment made on IT. Because the commercial banks are not working on full capacity in order to utilize those investments to the maximum limit.

The finding indentified there is negative relationship between total IT investment and banks profitability measured by ROA indicating no tendency of Ethiopian commercial banks utilizing IT to increase profitability in the short run. This due to central body regulation and the commercial banks are aiming to achieve important strategic benefits of IT like operational excellence, new product development, establishing intimacy with their customers, improved decision making but in the long run these IT investments will bring competitive advantages as this all increase the earning power of banks.

The hardware investments particularly made on ATM, POS, Mobile banking, internet banking etc don't have positive effect on the financial performance measures in Ethiopian banking industry indicates that such services only increase customers' intimacy rather than earning. However they would probably have the desired effect in the long-run when all bank share electronic resources one another and recover their cost as currently such services are at earliest stage.

All in all there is a negative correlation between IT investment and financial performance of commercial banks in Ethiopia. Hence IT is important part of the banking operation that plays strategic role for commercial banks earning power in Ethiopia.

5.3 RECOMMENDATIONS

Based on the study findings, the researcher provided the following recommendations:

- ✓ The investments on information technology (IT) should be managed wisely in order to improve organizational performance. It is recommended that relating banks keep on technological advancements as well as utilize their IT investment 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). However quality of service to customers should have to under consideration to be better competition and effective in performance.
- ✓ Customer's awareness creation must be carried out more often in order to fill knowledge gap so that resistance from customers can be avoided and it will attract the unbanked population to the technology as a result banks can fully utilized their IT capacity.
- ✓ The commercial banks 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. Because the training increases the acceptance of the technology by the customers.

- ✓ Progress of IT profoundly contributes to the development of banking industry, and this tendency is expected to keep on. Ethiopian commercial banks should continue to exploit the merit of information technology as a tool to increase their earning power as well as to improve their day to day activities. It may be too early to evaluate the impact of IT investment on the performance of Ethiopian banking industry, whose business behavior and attitude are changing rapidly now a days following stiff competition.
- ✓ IT 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 IT services. So the commercial banks should reinforce their IT service department.
- ✓ Finally banks must widen scope of technological investments to latest technology advanced products and services both for their customers and for internal work units in order generate more profits beyond the issue of survival.

Future Research Recommendations

This study examined the impact of IT investment on financial performance of commercial banks in Ethiopia by using selected IT investment variables. However, there are so many specific variables not included in this study like core banking investment, E-banking investment etc. Thus, it is recommended for future researchers to further assess impact of IT investment by incorporating these specific variables. It is also recommended for future researchers to study the impact of It investment in different economic sector

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Appendices:

Appendix –I: Tests for the Heteroskedasticity Test: White

Heteroskedasticity Test: White

F-statistic	0.712668	Prob. F(7,72)	0.6614
Obs*R-squared	5.183801	Prob. Chi-Square(7)	0.6375
Scaled explained SS	5.223035	Prob. Chi-Square(7)	0.6328

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 01/15/17 Time: 22:53

Sample: 1 80

Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.54E-05	1.91E-05	2.370671	0.0204
HW^2	1.12E-07	3.93E-07	0.286078	0.7756
SW^2	-3.92E-07	6.16E-07	-0.636693	0.5263
ITS^2	-3.34E-07	6.98E-07	-0.478921	0.6334
EMP^2	-0.010597	0.022168	-0.478023	0.6341
MC^2	-0.000391	0.000731	-0.535490	0.5940
INF^2	-5.53E-09	5.82E-09	-0.951505	0.3445
D31^2	-2.74E-05	2.68E-05	-1.021571	0.3104
R-squared	0.064798	Mean dependent var	1.33E-05	
Adjusted R-squared	-0.026125	S.D. dependent var	2.12E-05	
S.E. of regression	2.15E-05	Akaike info criterion	-18.56609	
Sum squared resid	3.32E-08	Schwarz criterion	-18.32789	
Log likelihood	750.6436	Hannan-Quinn criter.	-18.47059	
F-statistic	0.712668	Durbin-Watson stat	1.990682	
Prob(F-statistic)	0.661391			

Appendix-II: Tests for Autocorellation: Breusch-Goldfrey

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.328402	Prob. F(9,63)	0.2406
Obs*R-squared	12.76021	Prob. Chi-Square(9)	0.1738

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 01/15/17 Time: 23:00

Sample: 1 80

Included observations: 80

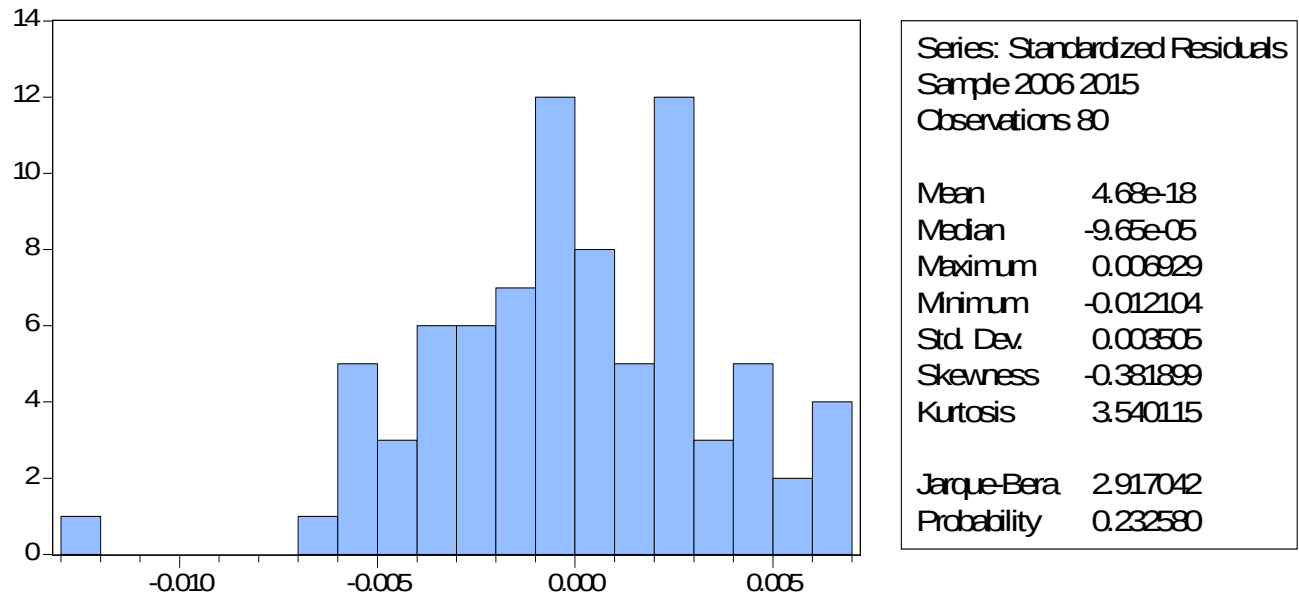
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002315	0.007093	0.326419	0.7452
HW	0.001021	0.001087	0.939109	0.3513
SW	0.000280	0.001638	0.170731	0.8650
ITS	-0.001943	0.001828	-1.063182	0.2918
EMP	0.034563	0.139689	0.247427	0.8054
MC	-0.004839	0.018319	-0.264134	0.7925
INF	-3.19E-06	4.80E-05	-0.066475	0.9472
D31	-0.002980	0.004977	-0.598721	0.5515
RESID(-1)	0.141601	0.136590	1.036683	0.3038
RESID(-2)	0.084883	0.135363	0.627080	0.5329
RESID(-3)	0.012358	0.126309	0.097841	0.9224
RESID(-4)	0.045450	0.131909	0.344559	0.7316
RESID(-5)	0.154311	0.127029	1.214775	0.2290
RESID(-6)	0.011386	0.133771	0.085113	0.9324
RESID(-7)	-0.360822	0.137440	-2.625301	0.0109
RESID(-8)	-0.057841	0.136868	-0.422604	0.6740
RESID(-9)	-0.147558	0.154099	-0.957554	0.3419
R-squared	0.159503	Mean dependent var		-9.15E-18
Adjusted R-squared	-0.053957	S.D. dependent var		0.003676
S.E. of regression	0.003774	Akaike info criterion		-8.135076
Sum squared resid	0.000897	Schwarz criterion		-7.628896
Log likelihood	342.4031	Hannan-Quinn criter.		-7.932134
F-statistic	0.747226	Durbin-Watson stat		1.879171
Prob(F-statistic)	0.735710			

Appendix-III: Tests for multicollinearity: pair-wise correlation coefficients

	HW	SW	ITS	EMP	MC	INF
HW	1	0.594590	0.6103288	-0.005871	0.384935	-0.064004
SW	0.594590	1	0.8120672	-0.022358	0.443424	-0.017422
ITS	0.610329	0.812067	1	0.077401	0.460114	-0.179144
EMP	-0.005871	-0.022358	0.077401	1	-0.255861	-0.273585
MC	0.384935	0.443424	0.460114	-0.255861	1	-0.126387
INF	-0.064004	-0.017422	-0.179144	-0.273585	-0.126387	1

Appendix –IV: Tests for Normality: Bera-Jarque test



Appendix – V: Tests for Model Specification: Ramsey Reset Tests

Ramsey RESET Test

Equation: HETRO

Specification: ROA C HW SW ITS EMP MC INF D31

Omitted Variables: Powers of fitted values from 2 to 4

	Value	df	Probability
F-statistic	2.097126	(3, 69)	0.1085
Likelihood ratio	6.980729	3	0.0725

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	8.92E-05	3	2.97E-05
Restricted SSR	0.001068	72	1.48E-05
Unrestricted SSR	0.000979	69	1.42E-05
Unrestricted SSR	0.000979	69	1.42E-05

LR test summary:

	Value	df
Restricted LogL	335.4526	72
Unrestricted LogL	338.9430	69

Unrestricted Test Equation:

Dependent Variable: ROA

Method: Least Squares

Date: 01/15/17 Time: 23:22

Sample: 1 80
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.039395	0.043333	0.909131	0.3664
HW	-0.006043	0.005672	-1.065343	0.2904
SW	-0.034636	0.042407	-0.816743	0.4169
ITS	0.045749	0.054799	0.834846	0.4067
EMP	-0.063981	0.166805	-0.383568	0.7025
MC	0.023219	0.028347	0.819115	0.4155
INF	0.000324	0.000377	0.860549	0.3925
D31	-0.046853	0.034047	-1.376136	0.1732
FITTED^2	-22.38700	149.0201	-0.150228	0.8810
FITTED^3	36.21470	3799.692	0.009531	0.9924
FITTED^4	1494.187	33388.60	0.044751	0.9644
R-squared	0.855506	Mean dependent var		0.027372
Adjusted R-squared	0.834565	S.D. dependent var		0.009259
S.E. of regression	0.003766	Akaike info criterion		-8.198574
Sum squared resid	0.000979	Schwarz criterion		-7.871045
Log likelihood	338.9430	Hannan-Quinn criter.		-8.067258
F-statistic	40.85293	Durbin-Watson stat		1.852314
Prob(F-statistic)	0.000000			

Appendix – VI: Descriptive Analysis of dependent and independent variables

	ROA	HW	SW	ITS	EMP	MC	INF
Mean	0.027372	7.567147	7.09868	6.367341	0.012918	0.015147	17.21
Median	0.029292	7.616449	7.122761	6.413129	0.01277	0.005295	14.65
Maximum	0.046681	9.12141	8.214121	7.42154	0.02361	0.14856	36.4
Minimum	-0.01871	6.121541	5.74202	5.12321	0.00491	0.000104	2.8
Std. Dev.	0.009259	0.645004	0.532698	0.524117	0.004327	0.029417	10.79263
Skewness	2.001841	0.309272	-0.38033	-0.38149	0.276184	3.215801	0.584614
Kurtosis	10.15766	2.715019	2.928626	2.780337	2.850336	12.72631	2.085557
Jarque-Bera	224.2052	1.546039	1.945664	2.101328	1.091697	453.2223	7.344336
Probability	0	0.461617	0.378011	0.349706	0.57935	0	0.025421
Sum	2.189775	605.3718	567.8944	509.3873	1.033473	1.211794	1376.8
Sum Sq. Dev.	0.006772	32.86635	22.41763	21.70118	0.001479	0.068364	9201.992
Observations	80	80	80	80	80	80	80

Appendix – VII: Regression Results

Dependent Variable: ROA
Method: Panel Least Squares
Date: 01/15/17 Time: 23:39
Sample: 2006 2015
Periods included: 10
Cross-sections included: 8
Total panel (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.024671	0.006719	3.671760	0.0005
HW	-0.002563	0.000995	-2.576798	0.0121
SW	-0.018823	0.001495	-12.58700	0.0000
ITS	0.024034	0.001525	15.76237	0.0000
EMP	-0.012387	0.108452	-0.114213	0.9094
MC	0.014936	0.017500	0.853525	0.3962
INF	0.000176	4.28E-05	4.119677	0.0001
D406	-0.043764	0.004535	-9.651280	0.0000
D706	0.010291	0.003856	2.668623	0.0094
R-squared	0.856704	Mean dependent var		0.027372
Adjusted R-squared	0.840558	S.D. dependent var		0.009259
S.E. of regression	0.003697	Akaike info criterion		-8.256901
Sum squared resid	0.000970	Schwarz criterion		-7.988923
Log likelihood	339.2760	Hannan-Quinn criter.		-8.149461
F-statistic	53.05993	Durbin-Watson stat		1.734490
Prob(F-statistic)	0.000000			

APPENDIX VIII- RAW DATA

YEAR	BANK	ROA	HW	SW	ITS	EMP	MC	INF
2006	1	0.02640	7.39039	5.97492	5.28089	0.01020	0.00282	10.6
2007	1	0.03730	7.12154	5.89585	6.00881	0.00990	0.00381	15.8
2008	1	0.02960	7.47447	6.79426	6.10024	0.01000	0.00414	25.3
2009	1	0.02230	8.12141	7.25141	6.20883	0.01040	0.00406	36.4
2010	1	0.03116	7.51445	6.95545	6.26143	0.01178	0.00475	2.8
2011	1	0.03565	7.57483	7.10258	6.40856	0.01198	0.00609	18.1
2012	1	0.03304	7.63652	7.21699	6.52296	0.01259	0.00849	33.8
2013	1	0.03416	7.93148	7.27256	6.57854	0.01675	0.01194	13.5
2014	1	0.03086	8.08644	7.55775	6.86373	0.01705	0.01422	8.1
2015	1	0.02704	8.24268	7.69136	6.99734	0.01956	0.01944	7.7
2006	2	0.02999	6.87738	6.13478	5.46615	0.01059	0.00301	10.6
2007	2	0.01973	6.23251	6.02121	5.56566	0.01031	0.00348	15.8
2008	2	0.00341	6.45126	6.84513	5.12462	0.01060	0.00407	25.3
2009	2	0.01834	7.12151	6.85241	5.77527	0.01203	0.00387	36.4
2010	2	0.02239	7.37941	6.46790	5.79927	0.01263	0.00463	2.8
2011	2	0.02486	7.62382	6.55889	5.89026	0.01248	0.00508	18.1
2012	2	0.02625	7.70220	6.67012	6.00150	0.01290	0.00602	33.8
2013	2	0.02136	7.89584	7.65847	6.79715	0.01049	0.00730	13.5
2014	2	0.03968	6.45212	7.12514	6.83920	0.01536	0.00802	8.1
2015	2	0.02135	6.89585	7.25141	6.23201	0.01748	0.00936	7.7
2006	3	0.02237	7.71753	7.25234	6.41770	0.00522	0.01213	10.6
2007	3	0.01988	7.82605	7.36086	6.52623	0.00502	0.01327	15.8
2008	3	0.02699	7.88989	7.42470	6.59006	0.00565	0.02580	25.3
2009	3	0.03233	7.93855	7.47336	6.63873	0.00547	0.03211	36.4
2010	3	0.02653	8.01090	7.54571	6.71107	0.00581	0.03736	2.8
2011	3	0.02505	8.11588	7.65069	6.81606	0.00491	0.05564	18.1
2012	3	0.03421	8.22094	7.75575	6.92112	0.00550	0.09660	33.8
2013	3	0.03098	8.47832	8.01313	7.17850	0.00677	0.11044	13.5
2014	3	0.02753	8.66849	8.20330	7.36866	0.00991	0.13832	8.1
2015	3	0.02985	8.26514	7.65200	6.87510	0.00996	0.14856	7.7
2006	4	-0.0187	9.12141	6.02010	5.63252	0.01339	0.00020	10.6
2007	4	0.00566	6.58474	8.21412	6.25149	0.01415	0.00037	15.8
2008	4	0.01734	7.12141	6.85214	5.61180	0.01382	0.00050	25.3
2009	4	0.00230	7.12154	6.85214	5.12321	0.01510	0.00930	36.4
2010	4	0.01419	6.12154	6.85474	5.71481	0.01394	0.00112	2.8
2011	4	0.01891	7.32514	6.85474	5.80236	0.01315	0.00125	18.1
2012	4	0.02779	7.41810	6.92000	6.25740	0.01154	0.00216	33.8
2013	4	0.03127	7.55679	7.05869	6.39608	0.01328	0.00330	13.5
2014	4	0.04668	7.52414	7.12141	7.42154	0.01629	0.05780	8.1
2015	4	0.02726	7.80998	7.31188	6.64928	0.01410	0.10410	7.7

2006	5	0.02926	7.60908	7.11955	6.47383	0.00902	0.00488	10.6
2007	5	0.03096	7.67252	7.18299	6.53726	0.00877	0.00616	15.8
2008	5	0.03054	7.72534	7.23581	6.59008	0.00936	0.00678	25.3
2009	5	0.02567	8.21411	7.89585	6.70480	0.01020	0.00689	36.4
2010	5	0.02623	7.89731	7.40778	6.76206	0.00934	0.00783	2.8
2011	5	0.03074	7.98617	7.49664	6.85091	0.00987	0.00966	18.1
2012	5	0.03722	8.17813	7.68860	7.04287	0.01084	0.01260	33.8
2013	5	0.03073	8.24144	7.75191	7.10619	0.01293	0.01373	13.5
2014	5	0.03244	8.31621	7.82668	7.18096	0.01428	0.01495	8.1
2015	5	0.02944	8.39713	7.90760	7.26188	0.02023	0.01796	7.7
2006	6	0.02861	6.29739	5.74202	5.16055	0.01429	0.00225	10.6
2007	6	0.02915	6.95414	6.39878	5.81730	0.01346	0.00278	15.8
2008	6	0.03097	7.01639	6.46103	5.87955	0.01521	0.00322	25.3
2009	6	0.03197	7.26185	6.70649	6.12501	0.00592	0.00018	36.4
2010	6	0.03365	7.34790	6.79254	6.21107	0.01792	0.00058	2.8
2011	6	0.03465	7.39222	6.83685	6.25538	0.01533	0.00010	18.1
2012	6	0.03459	7.45000	6.89464	6.31317	0.01806	0.00160	33.8
2013	6	0.03274	7.57429	7.01893	6.43745	0.02081	0.00253	13.5
2014	6	0.02767	7.96966	7.41429	6.83282	0.02030	0.00401	8.1
2015	6	0.02543	8.16265	7.60728	7.02581	0.02242	0.00746	7.7
2006	7	0.02752	7.85654	7.42154	6.26627	0.00876	0.00155	10.6
2007	7	0.02932	7.12023	7.12141	6.31617	0.01054	0.00217	15.8
2008	7	0.02800	7.21165	7.01250	6.35035	0.01100	0.00287	25.3
2009	7	0.02010	7.85641	7.42514	6.35035	0.01180	0.00331	36.4
2010	7	0.02959	7.37284	7.05249	6.39034	0.01149	0.00339	2.8
2011	7	0.03001	7.51997	7.11286	6.45071	0.01078	0.00505	18.1
2012	7	0.03390	7.63438	7.17455	6.51240	0.01342	0.00632	33.8
2013	7	0.02142	8.52422	7.46951	6.80736	0.01518	0.00733	13.5
2014	7	0.01670	8.52124	7.12142	6.12410	0.01667	0.00792	8.1
2015	7	0.01959	8.63251	7.12410	6.45210	0.02200	0.01074	7.7
2006	8	0.03143	6.63598	6.44274	5.77669	0.01372	0.00240	10.6
2007	8	0.03218	6.73549	6.36196	5.69590	0.01264	0.00327	15.8
2008	8	0.03366	6.87069	6.62572	5.95967	0.01333	0.00350	25.3
2009	8	0.03529	6.94510	6.67870	6.01265	0.01452	0.00314	36.4
2010	8	0.03890	6.23214	6.32514	6.27871	0.01582	0.00377	2.8
2011	8	0.04010	6.23251	6.75847	6.52312	0.01495	0.00440	18.1
2012	8	0.04028	7.17133	7.26756	6.60150	0.01729	0.00551	33.8
2013	8	0.03303	7.96698	7.36694	6.70089	0.01769	0.00727	13.5
2014	8	0.02712	8.00902	7.47267	6.80662	0.02165	0.00718	8.1
2015	8	0.02570	8.09603	7.48236	6.81631	0.02361	0.00962	7.7

APPENDIX IX – INTERVIEW QUESTIONS

1. What are the types of IT investments for your bank?
2. What impact do the IT investment have on performance of your bank?
3. What challenges do you have on your IT investment?
4. What are the motives for your organization to invest on information technology?

INTERVIEWEE’S PROFILE

The interview is conducted on the following individuals of the sampled banks:

POSITION- Head of accounting and finance and IT department heads.

ACCADAMIC STATUS- BA and above in their respective area.

YEAR OF SERVICE- Working more than 10 year in the banking sector.

