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

**Effect of Investment on Electronic Banking on Financial
Performance of Commercial Banks in Ethiopia**

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in Partial Fulfillment of the Requirements for the Degree of Master of Science
in Accounting and Finance.**

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Statement of Declaration

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of **Ato Gebremedhin Gebrehiwot**. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

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Statement of Certification

This is to certify that Teka Mekuannt has carried out his research work on the topic entitled “the Effect of Investment on Electronic Banking on Financial Performance of Commercial Banks in Ethiopia” under my supervision. This work is original in nature and it is sufficient for submission for the partial fulfillment for the award of MSc in Accounting and Finance.

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Declaration

This is to certify that the thesis prepared by **Teka Mekuannt**, entitled: “**the Effect of Investment on Electronic Banking on Financial Performance of Commercial Banks in Ethiopia**” and 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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Abstract

The main aim of the study is to investigate the effect of Investment on electronic banking on financial performance of commercial Banks in Ethiopia. In order to fulfill the stated objective quantitative research approach with explanatory type of research were used. The research was conducted by consecutive six years Annual Audited Financial Report of selected seven Commercial Banks in Ethiopia using a purposive sampling method for the period 2013 – 2018. The study also employed a multivariate regression model using Return on Asset and Return on Equity, as a dependent variable for measuring the financial performance of the selected Banks and four independent explanatory variables of electronic banking products investment on ATM, investment on mobile banking, investment on internet banking and investment on POS. The fixed and random effect regression technique and correlation analysis was used to analyze the data using the econometric statistical package eview 8 software. The sampled data was also presented and analyzed by using descriptive statistic by mean, standard deviation, maximum and minimum. The effect of the investment on electronic banking in this research is statistically significant in explaining the ROA and ROE of commercial banks in Ethiopia however the statistical significance is different for each electronic banking product. The study finds that bank performance measurement has a strong and significant relationship with investment on ATM. In addition investment on POS has a positive and significant effect on ROA and negative and statistically insignificant effect on ROE. On the other hand investment on mobile banking facilities has a positive and insignificant effect with ROA but it has a significant positive effect on ROE. However investment on internet banking infrastructure have a negative and significant effect with ROA but for ROE it has a negative and insignificant effect. According to the result some variables influences negatively but, it is clear that investment on e-banking is promising activity to increase the performance of Ethiopian Commercial Banks. So the study recommended commercial banks are advised to increase the adaptability and accessibility of electronic banking products specifically internet banking and POS terminal service in order to enhance the financial performances.

Key words: *Investment on Electronic banking, Return on asset, Return on equity, Ethiopia*

Abbreviations and Acronyms

AIS	Accounting Information System
ATM	Automated Teller Machine
CEO	Chief Executive Officer
E-BANKING	Electronic Banking
E-channels	Electronic Channels
EP	Economic Profit
EPS	Earning Per Share
ICT	Information and Communication Technology
IT	Information Technology
PC	Personal Computer
OM	Operational Management
PIN	Personal Identification Number
POS	Point Of Sales
M-Banking	Mobile Banking
MIS	Management Information System
NBE	National Bank of Ethiopia
NPM	Net Profit Margin
NIM	Net Interest Margin
ROA	Return on Asset
ROE	Return on Equity
ROI	Return On Investment
SMS	Short Message Service
SST	Self-Service Systems
TC	Total Cost
TR	Total Revenue
TV	Television
UK	United Kingdom
USA	United States of America
WAP	Wireless Application Protocol

Table of Content

Contents	Page No
Acknowledgment -----	I
Abstract-----	II
Abbreviation and Acronym -----	III
Table of Content -----	IV
List of Figures -----	VII
List of Tables -----	VII
CHAPTER ONE: INTRODUCTION -----	1
1.1 Background of the study	1
1.2 statement of the problem	4
1.3 Objectives of the study	6
1.3 .1 General objective of the study-----	6
1.3.2 Specific objective of the study -----	6
1.4 Hypothesis	6
1.6 Scope of the study	7
1.7 Limitation of the Study	8
1.8 organization of the study	8
2. Theoretical and Conceptual Review -----	9
2.1 Electronic banking.....	9
2.2 Products of E-banking.....	11
2.2.1 ATM-----	11
2.2.2 Mobile banking-----	12
2.2.3 Internet banking-----	12
2.2.4 POS-----	13
2.3 Investment on electronic banking.....	13
2.4 Theory of Profit and Profitability.....	16
2.6 Financial performance	18
2.7 Bank financial performance	19
2.8 Empirical review	20

2.9 Research Gab.....	28
2.10 Conceptual framework	28
3.1 Research Design	30
3.2 Types of data and source	30
3.3 Data collection techniques.....	31
3.4 Target Population	31
3.5 Sampling Design	31
3.6 Sample size.....	32
3.7 Data processing, analyzing and presentation	32
3.8 Definition of variable and model specification	33
A. Independent Variables	33
B. Dependent Variable.....	34
CHAPTER FOUR: RESULTS AND DISCUSSION.....	38
4.1 Descriptive statistics result.....	38
4.2 Correlation Analysis.....	40
4.3 Testing assumptions of classical linear regression model (CLRM).....	41
4.3.1 Test for average value of the error term is zero ($E(u_t) = 0$) assumption.....	41
4.3.2 Test for Heteroscedasticity	41
4.3.3 Autocorrelation Test	42
4.3.4 Normality Test	43
4.3.5 Multicollinearity test	45
4.4 Choosing Random Effect (RE) versus Fixed Effect (FE) Models	46
4.5 Result of the Regression analysis.....	47
4.6.1 Investment on ATM and ROA	51
4.6.2 Investment on ATM and ROE	51
4.6.3 Investment on POS and ROA	53
4.6.4 Investment on POS and ROE.....	53
4.6.5 Investment on Internet banking infrastructure and ROA.....	54
4.6.6 Investment on Internet banking infrastructure and ROE.....	55
4.6.7 Investment on mobile banking facilities and ROA.....	56
4.6.8 Investment on mobile banking facilities and ROE	56

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS	58
5.1 Finding of the study.....	58
5.2 Conclusion of the study.....	59
5.3 Recommendation.....	60
5.4 Suggestions for further studies	61
Appendix	68
Appendix I: Diagnostic tests results for OLS Assumptions.....	68
Appendix II: - <i>Regression Result</i>	71

List of Figures

Fig 2.1: Conceptual Framework	29
Fig. 4.1 Normality Test Result of ROA.....	44
Fig. 4.2 Normality Test Result of ROE.....	45

List of Tables

Table 4.1 Descriptive statistics result	38
Table 4.2 Correlation matrix among dependent and independent variable.....	40
Table 4.3 Heteroskedasticity Test: White ROA.....	42
Table 4.4 Heteroskedasticity Test: White ROE.....	42
Table 4.5 Autocorrelation test for ROA and ROE.....	43
Table 4.6 Multicollinearity test	46
Table 4.7 Correlated Random Effects - Hausman Test	47
Table 4.8 Regression result- fixed Effect Model.....	48
Table 4.8 Regression result- random Effect Model	49
Table 5.1 Comparison of test results with explanations	59

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The banking industry of the 21st century operates in a complex and competitive environment characterized by lot of changing conditions and highly unpredictable economic climate. Information and communication technology (ICT) is at the center of this global change curve of electronic banking system today (Juddy, 2009).

Electronic banking is referred to as using of the internet as delivery mode for the provision of services like opening a deposit account, electronic bill payments, and online transfers. These services can either be provided by the banks having physical offices and by creating a website and providing services through that or services can be provisioned through a virtual bank as well. Internet is used as a strategic and differentiating channel to offer high valued financial services complex products at same or improved quality at lower costs without physical boundaries and to cross sell products like credit cards and loans. E-banking includes internet banking, mobile banking, card banking and Pos machine (Vikram, 2015).

Now a day's banking service is provided by the use of electronic banking that facilitate the service without the involvement of customer service representative. Electronic banking enable bank customer to get banking service without visiting the bank's branch. For instance client can withdraw cash; transfer funds to other by using ATM card from ATM machines. In addition to these client can transfer money from their account to other, payment for utilities, buy air time either by using mobile banking, internet banking and ATM. Electronic banking in Ethiopia dated back to 15 years ago with the introduction of ATM banking followed by core banking technologies. The advanced banking technologies and payment platforms like mobile payment and internet banking is a recent phenomena. In addition to the recentness the progress of the technologies are stagnating. Many of the customers always use the traditional branch for their day to day banking need. To solve this problem the national bank of Ethiopia made mandatory for commercial banks operate in the country to use electronic banking which include card payment, mobile banking, internet banking, POS and agent banking, by June 2011 after the issuance of National Payment System Proclamation No.718/2011. Currently, there are seventeen Commercial banks operating in Ethiopia .from these Commercial Banks, commercial bank of

Ethiopia is owned by the government. Even if the others are very small in capacity sixteen of them are private owned Commercial banks. All of these banks are providing electronic banking services, like ATM, POS, mobile banking, and some of them provides internet banking service.(National bank of Ethiopia, 2011)

Eze & Egoro (2016) study the impact of electronic banking on the profitability of commercial banks in Nigeria. They conclude that the over impact of electronic banking on the profitability of commercial banks is significant; whereas, the impact of the individual channels is varied. Siam (2006) examined the effect of electronic banking on bank's profitability in Jordan. The population of the study included all working banks in Jordan which have sites on the internet for the periods of 1999-2004. The result from the data analysis that were gathered from the study instrument (questionnaire) showed that there is a correlation with statistical significance between electronic banking and banks profitability; showing a negative effect in profitability in the short run and a positive effect in profitability in the long run. Thus, managers and banks employees in the area prefer their banks to expand their electronic operation in servicing customer but not converting all banks to total electronic banks. Bilkisu & Kabiru (2015) investigates the impact of investment in Information Technology (IT) on the financial performance of banks in Nigeria, is there a productivity paradox? They conclude 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. Zipporah and Margret (2015) studied that the Relationship between Bank Innovations and Financial Performance of Commercial Banks in Kenya. The researchers conclude that mobile phone banking, online banking, agency banking and ATM banking had positively impacted on the financial performance of commercial banks in Kenya over the 5 year period between 2009 and 2013. Whereas Bilkisu (2015) investigate the Impact of Investment in Information Technology on Financial Performance of Nigerian Banks. He states that 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. He reveal that Increase on IT spending leads to a decrease in the financial performance of Nigerian banks. Ogare (2013) studies the effect of electronic banking on financial performance on Kenya banks. He concludes that there is positive relationship between e-banking and bank performance.

Saifullahi and Abubakar (2012) studied Information and Communication Technology and Bank Performance in Nigeria. The study concludes that cautious application of ICT apparatus will continue to enhance commercial banks performance in the country unless otherwise disrupted by externalities. Elena (2005) investigates whether investment in Information Technology (IT) hardware, software and other IT services influence banks performance in Europe from the period 1993-2000 and conclude that Investment in IT services from external providers (consulting services, implementation services, training and education, support services) appears to have a positive influence on accounting profit and profit efficiency, while the acquisition of hardware and software seems to reduce banks' performance.

Several authors study the adoption of electronic banking, challenges and opportunities of electronic banking in Ethiopia. Few authors studied the effect of electronic banking on financial performance of commercial banks in Ethiopia. Most of these studies include Ayana (2012), Tadesse (2015) and Tilahun (2016). However these papers investigate the effect of investment on electronic banking on financial performance of Commercial Banks in Ethiopia. Tilahun (2016) study the effect of electronic banking on commercial banks financial performance by developing two hypotheses. The first hypothesis is E-banking has a significant positive relationship with profitability of commercial banks in Ethiopia and the second hypothesis is E-banking has significant positive relationship with return on total assets of commercial banks in Ethiopia. He verified the hypothesis by collecting secondary data from the banks and concludes POS, ATM, and debit card are statistically significant and has positive influence on ROA.

The total cost of electronic banking in the Ethiopian banking sector is a very big investment in relation to the total capital and assets of the banks. But its effect on the performance and profit of the banks is not clear. Clearly, there is mixed evidence about the impact of investment on electronic banking on banks' performance. It is therefore, important for bankers, bank regulators, supervisors and researchers to understand how investment on e-banking affects the performance of banks. Hence, the researcher main purpose in this paper is to fill this significant gap by providing systematic analysis of the effect of investment on electronic banking on the performance of commercial banks in Ethiopia.

1.2 statement of the problem

In today's world the banking industry invest huge amount of capital on electronic banking to facilitate their operation, to attract customer, to get comparative advantage over their competitor, to stay in business, to be accessible in everywhere by the customer and other reasons. Electronic banking is founded on the employment of innovative tools to provide various banking products to customers. Over the years technology has had a significant impact on how banks operate and formed bedrock upon which banks individuate their products from competitors. The products are provided through electronic intermediaries such as automated teller machines, cellular devices and the internet. Banks regularly depend on modern technology for customer service to satisfy their banking needs (Kolodinsky, Hogarth & Hilgert, 2004).

In Ethiopia banks because of product similarity all the banks are found in perfectly same customer target. Within this same market and similar product they are in stiff competition to mobilize deposit, to get borrowers, to get foreign currency and other income sources .to becomes the leader in these stiff competitions improving the customer's service and making accessibility simple are the tools left. In this time it is difficult to improve customer service and accessibility without the use of banking technologies. To make it happen bank's invest a great deal of money for deploying of ATM machines, mobile banking infrastructures, internet banking facilities and point of sales terminals.

According to Tadesse (2015) effect of investment on AIS on banks financial performance , by identifying infrastructure, service and software on ROA,ROE and productivity conclude that, performance of infrastructure was not productive as expected and should have to be consistent with the quality of AIS's service and appropriate implementation of AIS's software. Another study by Tilahun (2016), electronic banking influences financial performance of commercial banks in Ethiopia positively. He investigated that the effect of ATM, debit card and POS terminal effect on private commercial banks profit before tax and return on asset. For his study he considers the number of ATM, POS transaction and number of debit card to study the relationship with financial performance. He concludes that both the three variable had appositve relationship with profit before tax of commercial banks in Ethiopia. But he is not including all of the electronic banking service provided by the banks like mobile banking and internet banking. These studies investigate the effect of investment on electronic banking on financial performance

by taking annual investment on each electronic banking product instead of number of transaction by electronic banking products. When we come to studies conducted in neighboring country in Kenya by Mugodo (2015) effect of electronic banking on the financial performance of commercial banks in the Kenyan banking industry conclude that ATM, mobile banking and internet banking have a direct relationship with banks financial performance in Kenya. Lucy (2015) study the relationship between banking technology and financial performance of commercial bank in Kenya, concludes that adoption of E-Banking technologies had a positive influence on the performance of commercial banks in Kenya. Ogare (2013) conducted a study about the effect of electronic banking on financial performance of Kenya banks and revealed that e-banking has a strong and significant effect on the profitability of commercial banks in the Kenyan banking industry.

Juddy (2013) investigated the effect of electronic banking on financial performance of commercial banks of Kenya. The study revealed that fees and commission from debit cards, credit cards and mobile banking has a significant effect on returns on asset whereas fees and commission from internet banking as well as the amount of money that commercial banks invest in electronic banking to install, train staff and maintain the platforms has no or minimal effect on return on assets. Syrine (2013) study the impact of information technology on financial performance in Tunisia banks and conclude that impact of IT investments on Tunisian banks' performance is positive.

Sundas, Qiang and Kaleem (2014) studied Electronic Debit Card Usage and their Impact on Profitability of Pakistan Banking Sector conclude that increased in debit card usage enhance the profitability of banking industry in form of ROA over the period of 2004 to 2013. In the contrary to these, another study done by Sharma (2012) does Technology Lead to Better Financial Performance? A Study of Indian Commercial Banks concludes that the correlation between Technology induction and financial productivity is negative though statistically insignificant and low.

Previous research in Ethiopian banking sectors were focus on adoption of electronic banking, challenges and opportunities of electronic banking, barriers of electronic banking from both

customer side and bank side. Very few studies in Ethiopia have been done to highlight these problems faced by the commercial banks and the relation between electronic banking and financial performance but have not been able to show clearly how costs or investment have contributed to the financial performance of these banks. This study therefore seeks to show how investment in electronic banking has impacted on the financial performance of commercial banks in Ethiopia.

1.3 Objectives of the study

1.3.1 General objective of the study

The main objective of the study is to investigate the effect of investment on electronic banking on Ethiopian commercial banks financial performance.

1.3.2 Specific objective of the study

- To analyze the effect of investment on ATM machine on financial Performance of commercial bank in Ethiopia.
- To examine the effect of investment on POS terminal on Financial Performance of commercial bank in Ethiopia.
- To evaluate the effect of investment on internet banking infrastructure on Financial Performance of commercial bank in Ethiopia.
- To investigate the effect of investment on mobile banking facilities on Financial Performance of commercial bank in Ethiopia.

1.4 Hypothesis

The broad objective of this study is to assess the effect of investing on electronic banking on the financial performance of commercial banks in Ethiopia, focusing on its impact on return on assets and return on equity. To achieve these objective four hypotheses were developed. The basis for this hypothesis is previous empirical evidences done by Elena (2005), Ogare (2013) , Syrine (2013) , Lucy (2015), Saifullahi and Abubakar (2015) , Sundas , Qiang and Kaleem (2014) et. al, which state that electronic banking has positive effect on bank performance.

- Investing on ATM has significant and positive effect on financial performance.
- Investing on POS terminals has significant and positive effect on financial performance.
- Investing on internet banking infrastructure has significant and positive effect on financial performance.
- Investing on mobile banking facilities has significant and positive effect on financial performance.

1.5 Significance of the Study

The paper will have a contribution practically and theoretically. practically the Ethiopian banking industry actors will use the findings from this study to enhance their knowledge on the electronic banking operation, investment and their effect on financial performance. This study also can assist the management team and employees in formulating different strategies and policies to invest on electronic banking .in addition this research will help Banks that do not offer fully electronic banking and will get the benefits from these by selecting the appropriate electronic banking products that will enhance their financial performance.

Theoretically the Research add to the pool of knowledge and as a basis for further research in the field of investment on electronic banking .

1.6 Scope of the study

The paper was bounded by both area coverage and problem addressed. There are many product and services provided by banks, and the researcher emphasized on investment on electronic banking and its impact on financial performance specifically on ROA and ROE.

In Ethiopia there are one state owned commercial bank and sixteen private commercial banks that provide banking services but from this banks, the study was conduct on seven commercial banks that provide all of the four electronic banking products i.e. internet banking, mobile banking, POS, and ATM and those banks are the former on providing these all services. These are Commercial bank of Ethiopia, United bank, Dashen bank, Wegagen bank, Nib International bank, Bank of Abyssinia and the Zemen bank. The study cover the audited annual financial statement of those banks from 2013-2018, these is because the selected banks are start investing

on the four electronic banking products and partially provide these electronic banking service starting from 2013.

1.7 Limitation of the Study

The study will subject to several shortcomings that limit interpretation of findings. When conducting the study the researcher gate only 6 year's data for seven banks. So the number of observation is only 42. In addition, due to the absence of pertinent and sufficient data and the institutional and regulatory factors are not addressed in the study. There is no control for the error in measuring and analyzing the collected data by econometric statistical package eview 8 software.

Despite the above probable limitations, the researcher made his maximum effort to design the research as properly as possible and to achieve the specified objectives.

1.8 organization of the study

The paper is organized in to five chapters. The first chapter is about introduction .The second chapter deals about literature review that includes theoretical concept and previous research that has been done on electronic banking of commercial bank within the country and abroad. Research on investment on information technology & electronic banking effect on financial performance of commercial banks in international arena is discussed. The third chapter is about methodology that includes research design, type and source of data, sample and sampling method is discussed. The fourth chapter deal presentation of result and analysis of data about the study. The final chapter presents finding, conclusion and recommendation of the study.

CHAPTER TWO: LITERATURE REVIEW

In this section theoretical and conceptual, empirical review & conceptual framework related to the effect of investment on electronic banking on financial performance of bank is presented.

2. Theoretical and Conceptual Review

2.1 Electronic banking

Technological innovations have been identified to contribute to the distribution channels of Banks. The electronic delivery channels are collectively referred to as Electronic Banking.

Electronic Banking is really not a technology, but an attempt to merge several different technologies. In recent years different groups of technologies and industries made to work together. The Electronic banking is a systematic use of several technological products to facilitate the service of banking (Tilahun, 2016)

There are different meanings of electronic banking by different authors; some of them are discussed below.

As per the RrezartaHalili (2014) electronic banking is online banking. Online banking first appeared in 1980 when it was understood as a terminal, keyboard and TV to access the banking system by using a phone line. Chase Manhattan, Chemical, Citibank, and Manufacturers Hanover were the four big banks that provided home banking service by a Videotext system. Even though that it did not take long time to adopt this system because of the commercial failure of Videotex all this went off. In France the use of Videotext or (Minitel) was given by the telecom provider, whereas in the UK, with the use of Prestel system. But the first home service online banking was implemented by Bank of Scotland for customers of the Nottingham Building Society (NBS) in 1983. They used the same system as UK Prestel with a computer, as the BBC Micro, keyboard (TANDATA Td1 400) that connected to a telephone system and television set the system named "HOMELINK". Customers were allowed to take a look at their statements, bank transfers and bill payments. This is just a brief history where all started, and not to forget that this was three decades before, and now Online Banking became very popular, important and mostly a substitute for customers everyday life.

The affection of technology in business the past left as an uncompleted puzzle. The lack of its consideration evolved to a deeper impact in nowadays. Developments in technology touched also

the bank department, giving birth to a new product called online banking or e-banking. What an online banking offers is an opportunity to perform different bank operations, where a customer can access his or her bank account via the Internet. Such operations can be performed at a variety of usage from personal computer to a mobile phone. Customers can check current account, saving account, transfer money and make their payments. Online banking usage is becoming very common due to the increase of usage of computers and mobiles which avail the transfers. Despite doubts at its first introduction, customers took time to adjust their activities to this technology. On the other hand, there were some uncertain thoughts whether online banking is seen more as a supplement rather than a substitute product. Nevertheless, the majority of banks nowadays are offering it and costumers most importantly find it useful. Online banking was initiated as a different way of banking and less expensive. In the customers' perspective, it meant less time to spend. The majority of costumers at the beginning were confronted with some difficulties but after a period it was very productive; whereas from the banks point of view at the beginning they had some expense and feared for a big loss (Halili, 2014)

E-banking is the use of electronic means to deliver banking services, mainly through the Internet. The term is also used to refer to ATMs, telephone banking, use of plastic money, mobile phone banking and electronic funds transfers. Electronic Banking offers different online services like balance enquiry, request for cheque books, recording stop payment instructions, balance transfer instructions, account opening and other form of transitional Banking services. With online banking, individuals can check their account balances and make payments without having to go to the banking halls. This is gradually creating a cashless society where consumers no longer have to pay for all their purchases with hard cash. For example: bank customers can pay for airline tickets and subscribe to initial public offerings by transferring the money directly from their accounts, or pay for various goods and services by electronic transfers of credit to the sellers account. (DeYoung, 2005)

According to Kiragu (2017) Electronic banking is an umbrella term for the process by which a customer may perform banking transactions electronically without visiting a brick-and mortar institution. The following terms all refer to one form or another of electronic banking: personal computer (PC) banking, Internet banking, virtual banking, online banking, home banking and mobile bank.

Electronic banking is gaining patronage where information from central server is made accessible to the account holder using a PIN or PASSWORD. Account statements, account transfer facilities, bulk payment facilities, list of cheques to be cleared, loan facilities in form of assets, vehicle and mortgage, international bank transfer are some of the facilities given by the banks to their customers. However, recent security threat to customers savings have made banks to be more careful in their online transactions, customers are alerted from time to time on the security of their password. All banks often communicate relevant information through electronic mail (e-mail) or short messages on phone to their customers. Banks also have their websites to promote their products and services as well as publicize information that is relevant to the public about the bank (Abubakar et. al.2015).

Many banks and other organizations are eager to use this channel to deliver their services because of its relatively lower delivery cost, higher sales and potential for offering greater convenience for customers. But this medium offers many more benefits. A large number of organizations from within and outside the financial sector are currently offering e-banking which include delivering services using Wireless Application Protocol (WAP) phones and Interactive Television (Mahmood and Clarke, 2009)

2.2 Products of E-banking

2.2.1 ATM

It is a machine where cash withdrawal can be made over the machine without going in to the banking hall. It also sells recharge cards and transfer funds; it can be accessed 24 hours/7 days with account balance enquiry (Fenuga, 2010). ATM is same as teller point but it run automatically through identity like card and password. It does not need any slip or Cheque but it is very much based on account holder's ATM card and it's Password. Generally, ATM machines provides the same services, such as money withdrawal, fund transfer, balance enquiry, mini statement, and money transfer from one account to the other. The basic form of non branch bank is the ATM (Automated teller machine) is a type of banking where customers can access with their card and pin and check their balances, withdraw money, and make payment. This type of banking is a small machine that can be found in banks, and all around the city depending from the usage rate (Halili, 2014).

2.2.2 Mobile banking

Categorized as two different types, phone banking and mobile banking belong to the classic and modern developments of the phone. Phone Banking was the first type of banking, customers used to call the banks and with some preliminary question of making sure that the caller was the owner of the account, they could ask for the current balance, make payment, and transfer. While nowadays the mobile phone is a more effective one, because it is the customer himself that makes the operations. It is getting very usable and applicable everywhere nowadays; also costumers seem to feel more secure with this type. It is similar to PC Banking but on a smaller machine, as well as it is a 24/7 operation through which the customer can pay, transfer and check balances everywhere, every time (Halili 2014).

Mobile banking also known as M-Banking is a term used for performing balance checks, account transactions, payments, credit applications and other banking transactions through a mobile device such as a mobile phone. The earliest mobile banking services were offered over Short Message Service (SMS), a service known as SMS banking. Mobile banking is used in many parts of the world with little or no infrastructure, especially remote and rural areas. This aspect of mobile commerce is also popular in countries where most of their population is un-banked. In most of these places, banks can only be found in big cities, and customers have to travel hundreds of miles to the nearest bank. The scope of offered services may include facilities to conduct bank and stock market transactions, to administer accounts and to access customized information (Tiwari et al., 2007).

2.2.3 Internet banking

Internet banking offer bank customers access to their bank accounts via a web site and to enable them to enact certain transactions on their account; by its nature internet banking put up more convenience and flexibility to customers coupled with a virtually absolute control over their banking. In other words, customers can have access to their accounts around the clock, from all over the world; access up to minute information on their accounts; perform their account transactions electronically with low cost. In the same relation banks profitability also developed by use of automated e-banking. Hence, banks will offer services at lower costs and with fewer staff that result in significant reduction in bank costs. Internet banking, however, has also down sides such as security concerns, insufficient knowledge of the technology and lack of personal computers by large customer populations (Tilahun, 2015).

2.2.4 POS

POS is the point at which a customer makes a payment to the merchant in exchange For goods (Tilahun, 2016).

2.3 Investment on electronic banking

The economic efficiency of investments represents a key indicator for the development of both companies and the economy as a whole. Only those investments are considered efficient, which generate profit; the overall cumulative profit obtained during the lifespan of an economic investment aims to recover full costs of investment and assure an additional profit whose maximization represents one of the company's objectives

Existing studies has looked the ICT and financial system holistically specifically looking on E-banking. The vast majority of the recent literature on electronic money and banking suffers from a general focus. It generally ignores electronic banking entirely and equates electronic money with the substitution of currency through electronic gadget such as smart cards and virtual currency (Mutri, 2011).

One objective of banks is to minimize the cost of their payment systems, which involves searching for economies of scale based on technical changes. Despite the difficulties of representing and incorporating technical changes in productivity analyses, an econometric approach can be used to measure the impact of technological changes on banking efficiency (Romdhane, 2013).

Many banks and other organizations have already implemented or are planning to implement e-banking because of the numerous potential benefits associated with it (Mahmood and Clarke, 2009). Some of them are listed below.

Customer Convenience

A 'customer first' approach is critical for success in e-banking. Customers hold the key to success and companies must find out what different customers want and provide it using the best available technology, ensuring that they are acting on the latest, most up-to-date information (Mahmoodsaha and Clarke, 2009). According to Avkiran (1999) stressed the importance of the human touch in the customer services. Politeness and neatness, recognition in terms of greeting, willingness to provide prompt service, ability to apologies and express concern for a mistake are all important for bank customer. Most of these aspects of customer service cannot be automated.

The adequacy of staff members serving customers can be expected to directly influence the customers' satisfaction. However, e-banking backed up by data mining technologies can help in better understanding customers' needs and customizing products/services according to those needs. As per Mahmood and Steven (2009) offering extra service delivery channels means wider choice and convenience for customers, which itself is an improvement in customer service. E-banking can be made available 24 hours a day throughout the year, and a widespread availability of the Internet, even on mobile phones, means that customers can conduct many of their financial tasks virtually anywhere and anytime. This is especially true of developed countries, but increasingly in developing countries, the spread of wireless communications means that services such as e-banking are becoming accessible. E-banking often attracts high profit customers with higher than average income and education levels, which helps to increase the size of revenue streams. For a retail bank, e-banking customers are therefore of particular interest, and such customers are likely to have a higher demand for banking products. Most of them are using online channels regularly for a variety of purposes, and for some there is no need for regular personal contacts with the bank's branch network, which is an expensive channel for banks to run (Berger & Gensler, 2007).most banks invest on electronic banking to get the following benefit.

Increased Revenues

According to DeYoung, (2007) Electronic bill payment is also on rapid rise which suggests that electronic bill payment and other related capabilities of e-banking have a real impact on retail banking practices and rapidly expanded revenue streams.

Increased revenues as a result of offering e-channels are often reported, because of possible increases in the number of customers, retention of existing customers, and cross selling opportunities. Whether these revenues are enough for reasonable return on investment (ROI) from these channels is an ongoing debate. It has also allowed banks to diversify their value creation activities. E-banking has changed the traditional retail banking business model in many ways, for example by making it possible for banks to allow the production and delivery of financial services to be separated into different businesses. This means that banks can sell and manage services offered by other banks (often foreign banks) to increase their revenues. This is an especially attractive possibility for smaller banks with a limited product range (Mahmood and Stev, 2009).

Provide branchless service

Traditionally, when a bank wanted to expand geographically it had to open new branches, thereby incurring high start up and maintenance costs. E-channels, such as the Internet, have made this unnecessary in many circumstances. Now banks with a traditional customer base in one part of the country or world can attract customers from other parts, as most of the financial transactions do not require a physical presence near customers living/working place. (Mahmood & Steven, 2009). In many countries banks share their resources such as ATMs or use point of sale their main interaction points, with customers for services such as cash and cheque deposits. As per Mahmood & Steven (2009) E-Channels are largely automatic, and most of the routine activity such as account checking or bill payment may be carried out using these channels. This usually results in load reduction on other delivery channels, such as branches or call centers.

This trend is likely to continue as more sophisticated services such as mortgages or asset finance are offered using e-Banking channels. In some countries, routine branch transactions such as cash/cheque deposit related activities are also being automated, further reducing the workload of branch staff, and enabling the time to be used for providing better quality customer services.

One of the benefits that banks experience when using e-banking is increased customer satisfaction. This is due to that customers may access their accounts whenever, from anywhere, and they get involved more, thus creating relationships with banks. Banks should provide their customers with convenience, meaning offering service through several distribution channels (ATM, Internet, physical branches) and have more functions available online. Other benefits are expanded product offerings and extended geographic reach. This means that banks can offer a wider range and newer services online to even more customers than possible before. The benefit which is driving most of the banks toward e-banking is the reduction of overall costs. With e-banking banks can reduce their overall costs in two ways: cost of processing transactions is minimized and the numbers of branches that are required to service an equivalent number of customers are reduced. With all these benefits banks can obtain success on the financial market. But e-banking is a difficult business and banks face a lot of challenges. (Ciolacu Beatrice & Pavel Florentina, 2010).

2.4 Theory of Profit and Profitability

Profit in its general form or sense, is regarded as income accruing to equity holders, in the same sense as wages accrue to the workers, rent accrues to owners of rentable assets, and interest accrues to the money lenders. The term profit means different things to different people and school of thought. The tax collector, employees, accountants, economist, businessmen and women, etc, have their individual view to the meaning of profit. We will restrict to two schools of thought that is the accountants and economist. Accountants' defined profit as the excess of revenue over all paid out costs, such as manufacturing and overhead expenses. It is more like what is referred to a "net profit". In accounting sense business income refers to profit (Dwivedi, 2002).

According to Pyle and Kermit, profit in accounting is the difference between the purchase and the component costs of delivered goods and/or services and any operating or other expenses (Kermit, 1981).

To accountants, Economic Profit, or EP, is a single-period metric to determine the value created by a company in one period—usually a year. It is Earnings after Tax less the Equity Charge, a risk-weighted cost of capital. This is almost identical to the economists' definition of economic profit (Virtanen, 1997). Business or accounting profit is often measured as a percentage of sales revenue, called profit margin. The economist's concept of a normal rate of profit is typically assessed in terms of the realized rate of return on stockholders' equity (ROE). ROE is defined as accounting net income divided by the book value of the firm.

Hirschey (2008) stated that many firms earn significant economic profits or experience meaningful losses. This varying form of profit could be attributed to the type of theory adopted and applied. One explanation of economic profits or losses is frictional profit theory. It states that markets are sometimes in disequilibrium because of unanticipated changes in demand or cost conditions. Unanticipated shocks produce positive or negative economic profits for some firms. Similarly, new user-friendly software increases demand for high-powered personal computers (PCs) and boosts returns for efficient PC manufacturers and software vendors. A rise in the use of plastics and aluminum in automobiles drives down the profits of steel manufacturers. Over

time, barring impassable barriers to entry and exit, resources flow into or out of financial institutions, computer manufacturers, and steel manufacturers, thus driving rates of return back to normal levels. During interim periods, profits might be above or below normal because of frictional factors that prevent instantaneous adjustment to new market conditions (Pyle 2008).

Innovation profit theory describes above-normal profits that arise following successful invention or modernization. This theory is due to Joseph A. Schumpeter. Schumpeter was of the opinion that factors such as emergence of interest and profits, recurrence of trade circles are only incidental to a distinct process of economic development, and certain principles which could explain the process of economic development would also explain these economic variables or factors. Schumpeter's theory of profit is thus embedded in his theory of economic growth .

According to Salmi (2002) Schumpeter's explanation of the process of economic growth, he began with the state of stationary equilibrium, characterized by equilibrium in all spheres. Under conditions of stationary equilibrium, total receipts from the business are exactly equal to the total cost outlay, and there is no profit. According to the Schumpeter's theory, profit can be made only by introducing innovations in manufacturing technique, as well as in the methods of supplying the goods. Based on Schumpeter's postulation stated that innovation theory suggest that Microsoft Corporation has earned superior rates of return because it successfully introduced and marketed the graphical user interface, a superior image-based rather than command-based approach to computer software instructions. Microsoft has continued to earn above-normal returns as other firms scramble to offer a wide variety of "user friendly" software for personal and business applications. Only after competitors have introduced and successfully saturated the market for user-friendly software will Microsoft profits be driven down to normal levels.

Similarly, Apple Corporation has earned above-normal rates of return as an early innovator with iPod line of portable digital music and video players. With increased competition from Microsoft's line of Zune devices, among others, it remains to be seen if Apple can maintain its position in the portable digital device market, or will instead see its market dominance and above-normal returns decline. As in the case of frictional or disequilibrium profits, profits that

are due to innovation are susceptible to the onslaught of competition from new and established competitors (Hirschey, 2008).

The innovation theory can be seen to be in line with Clark's dynamic theory, J. B. Clark's theory is of the opinion that profits arises in a dynamic economy, not in a static economy. A static economy is defined as the one in which there is absolute freedom of competition; population and capital are stationary; production process remains unchanged over time; goods continue to remain homogeneous; there is freedom of factor mobility; there is no uncertainty and no risk; and if risk exists, it is insurable. In a static economy therefore, firms make only the normal profit or the wages of management. A dynamic economy on the other hand, is characterized by the following generic changes; population increase; increase in capital; improvement in production technique; changes in the forms of business organizations; and multiplication of consumer wants stated that the major functions of entrepreneurs or managers in a dynamic environment are in taking advantage of the generic changes and promoting their businesses, expanding sales, and reducing costs (Clark, 2000)

2.6 Financial performance

Financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation. Some useful measures of financial performance are coined into what is referred to as CAMEL. The acronym "CAMEL" refers to the five components of a bank's condition that are assessed: Capital adequacy, Asset quality, Management, Earnings, and Liquidity. A sixth component, a bank's Sensitivity to market risk was added in 1997; hence the acronym was changed to CAMELS. Gilbert, Meyer and Vaughan (2000) as cited by (Ogare, 2013)

1. Return on Asset (ROA), divide net profit by total Assets: It is the most common profitability ratio of Performance measure used by banks in order to evaluate performance comparing the efficiency of a number of different investments. Berger A.(1995) cited by Tadesse (2015)

2. Return on equity (ROE); divide net profit by total Shareholder's Equity. It measures how efficiently a bank can use the money from shareholders to generate profits and grow. It is a profitability ratio from the investor's point of view. This ratio calculates how much Investment is made based on the investors' investment in the bank, not the company's investment in assets or something else (Molyneux, 1995), Belayneh (2011) cited by Tadesse(2015)

3. Productivity measure using Investment on AIS (input activities that have substantial Investment or total assets) as a factor changes income or direct revenue that banks earn (outputs) over time; **Divide Annual income (sales) by total assets.** It is an average measure of the efficiency of Bank's service using asset investment. The objective is to be maximized in services process. Productivity is an average measure of the efficiency of Bank's service using deployed invested assets. Productivity is a required tool in evaluating and monitoring the performance of bank. When directed at specific issues and problems, productivity measures can be very powerful. In essence, productivity measures are the yardsticks of effective resource use. Managers are concerned with productivity as it relates to making improvements in the bank. Proper use of service delivery measures can give the manager an indication of how to improve it. Managers are also concerned with how productivity measures relate to competitiveness or trend of services. James Nguyen (2006), Angbazo (1997), Levine (2004), and Claeys et al. (2004) cited by Tadesse (2015)

2.7 Bank financial performance

Bank performance is represented mainly by quantitative financial indicators. Since banks are a multiproduct company, which operates in an uncertain and volatile environment probably affected by internal and external variables. Internal determinants are also sometimes called microeconomic determinants or inherent performance, while external determinants are variables that reflect economic and legal environment in which the bank operates. ROA shows the profit earned per dollar of assets and most importantly, it reflects the management's ability to utilize the banks financial and real investment resources to generate profits. Bank profitability is best measured by ROA in that ROA is not distorted by high equity multipliers and ROA represents a better measure of the ability of a firm to generate returns on its portfolio of assets. ROE on the other hand, reflects how effectively a bank management is in utilizing its shareholders funds.

Since ROA tend to be lower for financial intermediaries, most banks heavily utilize financial leverage heavily to increase their ROE to competitive levels (Tadese, 2016).

Revell (1980) used interest margin as a performance measure for U.S. commercial banks. He defined interest margin as the difference between interest income and expense divided by total assets. Arshadi and Lawrence (1987) measured bank performance using normal correlation analysis. Their multidimensional indexes include indexes of profitability, pricing of bank services and loan market share. Size affects the efficiency of banks. Previous research, especially in the United States, indicates that scale economies appear in small banks and not in large ones (Short, 1979; Miller and Noulas, 1996). More recent research shows that the levels of size for the existence of scale economies are higher due to economic development and market liberalization (Miller and Noulas, 1997). The profitability of commercial banks depends heavily on the net of income generating activities and the related activities expense. Due to the problem of profitability and stiff competition in the industry, commercial banks have changed their behavior of income sources, by increasingly diversifying into non-intermediation income generating activities as opposed to the traditional inter-mediation income generating activities. For a commercial bank to remain competitive in all of the above areas there is a need to develop and adopt new products and technology (Maiyo, 2013). Specific to banks' financial performance, measures such as profitability ratios, capital adequacy, liquidity ratio and asset quality are used as vital indicators of performance. Asset quality refers to the quality of the investment and loan portfolios. It points to the risk associated with the portfolios. A bank's financial statements are a key source of inputs for measuring performance (Mugodo, 2016)

2.8 Empirical review

The adoption of electronic self-service systems (SSTs), using information technology (IT) devices and channels, for the provision of banking services (also known as electronic banking or e-banking) has evolved in the last decade in emerging markets (David West, 2012). E-banking creates unprecedented opportunities for the banks in the ways they organize financial product development, delivery, and marketing via the Internet. While it offers new opportunities to banks, it also brings many challenges such as the innovation of IT applications, the blurring of

market boundaries, the breaching of industrial barriers, the entrance of new competitors, and the appearance of new business models (Ahmed, 2010)

The initial investments in e-channels IT and security solutions were high, also IT and product development require major investment at the beginning stage(Olga,2014).according to Halili (2014) adoption of Online Banking is negatively related with three bank performance indicators as: Return on Equity (ROE), Return on Asset (ROA) and Margin (MRG).

According to David West (2012) electronic banking services have been deployed to enhance retail strategies. The marginal performance scores show that electronic banking is not providing any bank a significant differentiation. Although retail electronic banking services only target a portion of bank customers, they have the propensity to significantly impact the entire organization and should thus be formulated as an organizational strategy. Internet is not merely a distribution channel for banks: adopting an Internet Web site can affect a bank's production function and alter its product mix, and these effects are likely to be strongest at Internet only banks (DeYoung R, 2005). The evidence of the impact of the adoption of electronic banking (the internet) as a delivery channel of bank products and services on bank profitability is mixed at both sides. However, the more recent studies seem to find a positive relationship between e-banking and profitability; our study cannot be concluded that adopting e-banking decision is the key factor in improving bank profitability (Peter & Egoro, 2016) Various challenges such as globalization, competition, and deregulation, significant cost of installing ICT (Information and Communication Technology) and its maintenance have been confronted by the banking sector which is considered as back bone of any economy. Each investment requires an optimal return, same as investing in ICT (Information and Communication Technology) in banking sector whether enhancing the profitability of the economy or not. banks who invested a lot of resources in developing e-payment system specially debit card in developing countries and also will be source of motivation for those who are on the way to introduce debit card and further advancements but along with the consideration that controlling the possibility of ICT influences which have been arisen as a consequence of continuous demand of skilled people, trustworthiness of the information system along with the competition in financial service sector (SundasRaufet.al.2014).

While the rapid development of information technology has made some banking tasks more efficient and cheaper, technological investments are taking a larger share of bank's resources. Currently, apart from personnel costs, technology is usually the biggest item in the budget of a bank, and the fastest growing one. Another problem associated with this financial innovation plastic card fraud, particularly on lost and stolen cards and counterfeit card fraud. Banks need to manage costs and risks associated with electronic banking. It is therefore important that e-banking innovations are made by sound analysis of risks and costs associated so that to avoid harms on the bank performance. On one hand the bank performance is directly related to efficiency and effectiveness of electronic banking, but on the other tight controls and standards are needed to prevent losses associated with electronic banking. The banks have to balance these two options in order not to impair its overall prosperity. This is only possible if overall effects of electronic banking on the banks and its customers are understood (Josiah & Nancy, 2012).

Ogare (2013) studied the effect of electronic banking on financial performance of commercial banks in Kenya conclude that Electronic banking has a strong positive relationship on the overall banking performance by making workers performance more effective and efficiency; The adoption of electronic banking has enhanced the fortune of the Kenyan commercial banks. This is especially achieved through charges on the use of debit cards and ATM withdrawal charges; the electronic banking has improved the bank customer relationship by rendering effective services throughout the day and night in every week. The finding also indicate that electronic banking has made banking transaction to be easier by bringing services closer to its customers hence improving banking industry performance.

According to Adekunle and Rafiu (2012) ICT investment and ICT cost efficiency have a significant relationship with performance of banks in South Africa. It is however worthy of note that the influence of ICT cost efficiency on firm performance is higher than that of ICT investment. The implication of these results underscores the need for policy makers to emphasize policies that enhance optimal utilization of ICT resources rather than embark on additional investments. Hussen (2017) study Effect of Automated Teller Machines Usage on Operational Performance of Commercial Banks in Nakuru County, Kenya. For the purpose of determining the effect of ATMs usage on operational performance, he uses correlation and regression

analysis. He concludes that ATM usage has a positive significant relationship with operational performance. Jegede (2014) study the Effects of Automated Teller Machine on the Performance of Nigerian Banks. The results indicate that less than the benefits, the deployment of ATMs terminals have averagely improved the performance of Nigerian banks because of the alarming rate of ATM fraud. Similarly, ATM service quality is less correlated to security and privacy of users and providers. he conclude that banks should strive to increase their security layers to subvert the tricks of web scammers, limit the amount which customers may be allowed to withdraw at a time and provide electronic alerts to customers' phone for all transactions carried out on their bank accounts through ATMs and the provisions of extra security layer that can prevent third party to make use someone else's ATM card for unauthorized withdrawals.

According to Charles (2016) investigate the Impact of ATM Banking Performance on Customer Satisfaction with the Bank in Malawi. To conduct the study he A self administered questionnaire containing multi-dimension and multi-attribute Liker measurement scales use where respondents rated the performance only and their satisfaction with Automated teller machine banking and satisfaction with their respective banks. The result of the study shows that despite influencing customer satisfaction with the bank, Automated teller machine banking has no capability to attract customers to switch banks. In contrary to the Charles study Mohammed and Richard (2014) conduct An Empirical Investigation on Automated Teller Machines (ATMs) and Customers' Satisfaction in Nigeria: A case study of Ilorin, Kwara State. The study reveals that there is a significant relationship between ATM usage and customers' satisfaction.

Clare Barasa¹, Prof Willis Obura², Francis A. Anyira (2017) examine the effect of internet banking on financial performance of commercial banks in Kenya. To analyze these they use quantitative data and conclude that there is a positive effect of internet banking on financial performance of commercial banks similar to these another finding by Gogo and Job (2016) concluded that the influence of internet banking on income has been occasioned by the ease that internet has offer to both retail and corporate customers and hence making it easy, convenient and faster to make transactions. Therefore internet banking is a key driver of cost management in banks. The study also concluded that internet banking is capable of growing the loan book of banks and even monitor how the loan accounts are behaving and be able to send electronic

reminders and advice to customers. The study further concluded that internet banking had positive influence on customer deposits especially mobilization. Hussein (2018) study effect of internet banking on operational performance in Nakuru. The objective of the study was to investigate the effect of internet banking on operational performance of commercial banks in Nakuru County. The study concluded that internet banking is highly related with operational performance. This shows that the adoption of internet banking has a positive influence on operational performance.

Bonface and Jagongo Ambrose study the mobile banking and financial performance of commercial banks of commercial banks in Kenya. From the findings and summary the study concludes that the prices of M-banking services had a high positive influence on the financial performance of commercial banks in Kenya. M-Banking helped to promote efficiency and confidence in the financial system thus winning public trust. The study also concludes that Security and Speed through M-banking had a positive impact on the financial performance of commercial banks in Kenya with many of the banking institution recording high amount of deposits and thus creation enough pool of for willing investors to borrow thus increased profits. Harelimana (2017) study Impact of Mobile Banking on Financial Performance of Unguka Microfinance Bank Ltd, Rwanda .Based on the findings, Unguka Ltd has to continue to improve mobile banking services in terms of the quality of services offered, to expand its services to all domains namely disbursement and collection of loans and increase client outreach for its performance in terms of profitability and sustainability. The study has also shown that there is positive correlation between financial performance indicators before and after the adoption of mobile banking system and shown the positive relationship between mobile banking transaction volume and products and financial performance of Unguka Bank Ltd.

Hauwan and Hakim(2017) study The Effect of Mobile Banking on the Performance of Commercial Banks in Nigeria by using random sampling they select 22 commercial banks and structured questioners was used concludes that mobile banking positively and significantly affects the financial performance of commercial banks in Nigeria.

Kiprop, Ayuma & Ambrose (2016) study Effects of Mobile Banking on the Financial Performance of Commercial Banks in Kapsabet (Kenya) A Case of Selected Banks in Kapsabet Town. The expected finding was that mobile banking improves the financial performance of commercial banks. The findings of the study revealed that there was a significant relationship between mobile banking and financial performance ($p < 0.005$). The study concluded that mobile banking would make it easier to send money to receiver instantly. It also concluded mobile banking ensures easy track of lenders and easy monitoring, it concluded mobile banking helps to ensure quick transfer of funds as it saves on time, that mobile banking ensures easy payment of bills and avoids cash payments and concluded mobile banking payment of bills affects productivity of banks within the area.

another study by Mageto, Muturi and Abuga (2017) indicate that transaction cost of mobile payment is cheap, mobile banking money can be sent any time of day; it saves time of travelling and that mobile banking transactions are processed in accordance with clients' expectations besides providing evident of payment to another person.

William (2015) On his study titled "Effect of bank innovation on banks financial performance in universal bank in Ghana" indicate that innovative products such as ATM, mobile banking, online banking have the potential to improve upon the revenue generation and profitability of the universal banks. He concludes that ATM, mobile and internet banking has favorable consequence on ROA. Beside these products enable the bank to attract and maintain new customers while helping to remove costly paper handling and teller interactions in an ever more competitive banking environment.

Siam (2006) investigated the role of electronic banking services on the profits of Jordanian banks. He investigated the reasons behind providing electronic banking services through the internet and their impact on banking services in general and banks profitability. He concluded that the effect of electronic banking services on banks profitability is negative in the short run because of costs and the investments the bank carry in order to have the technical and electronic infrastructure in place, training the employees to be skilled and competent but will be positive on the long run. In one process of analysis, mean scores of benefits and risks associated with electronic banking were computed and ranked. Bankers consider "Saves time", "Minimizes the risk of carrying cash", and "Minimizes the cost of transactions" to be important benefits and "Needs expertise and training", "Many legal and security issues" and "Chance of fraud "to

be very serious concerns of electronic banking. The bankers do not consider “Reduces HR requirements” and “Minimizes inconveniences” to be important benefits and “Less operational reliability” “High cost for services to be important risks associated with electronic banking (Mohammed, 2014).

For the banking industry, the correlation between financial productivity and the Technology index is low and negative and statistically insignificant. The co-efficient of determination indicates that the effect of other factors is more than the effect of Technology on financial productivity. These factors may be liberalization of interest rates, managerial effectiveness, risk management, internal and external policies of the banks and so on (Sharma, 2012) Banks have intensified their adoption and usage of ATMs as a major e-banking tool to generate substantial contributions to their operations and financial results. Bank should use ATMs deployment as a strategic tool for improved cost efficiency. Banks need however to also focus on other areas of IT for cost efficiency improvement (Adewoye, 2013). According to Rachael (2010) the relationship between mobile banking and financial performance of commercial banks in Kenya is weak positive. This could be attributed to the trends recorded in the two variables where the number of users and monthly transfers maintained a positive growth rate while financial performance of commercial banks was affected by many variables which have major impacts compared to the adoption of mobile banking. Rather Financial performance of commercial banks in Kenya was majorly affected by macro-economic variables like post election violence, inflation and foreign exchange rates fluctuations among other macro-economic variable. Syrine analyzed (2013) the performance of information technology (IT) investments in Tunisian banks and reveal that the impact of different IT components (hardware, software and services) on the cost efficiency of Tunisian banks provides an important conclusion: the productivity paradox does not affect the entire IT investment: opportunities associated with the acquisition of software are only effective in combination with hardware acquisitions and investments in services.

The impact of electronic banking service on the economic parameters of the Bank activity proves that information and communication technologies when they are embedded in the institutional system of the banking organizations have a systemic effect on it, expressed in the intensification of processes of convergence, innovation activity, and manifestation of the synergy effect almost at the level of all factors, which influence significantly the economic and functional parameters

of the banking organization activities in the whole (Sergey V. Kiselev et.al .2016). Looking electronic banking and profitability; Husni & Noor (2011) studied The Impact of E-Banking on Bank Profitability Evidence from Jordan. The result showed that there is no significant effect of e-banking services on the profitability of recent adopter's banks in terms of ROA, and ROE. It gives an indicator of high expenses and cost associated with applying these services. Unlike Margin, It is significantly affected by the e-banking services. For early adopters, the result were much better than those for the early adopters, but still not significant with the profitability of these bank. Internet banking is new and changing rapidly, and therefore results of empirical studies on Internet banking may vary considerably with different sample and methods of analysis. Similarly Pooja (2009) revealed that profitability and offering of Internet banking does not have any significant association, on the other hand, Internet banking has a significant and negative association with risk profile of the banks. On the other hand the study by Shaohua Yang *et.al*, in china revealed that e-banking could improve the Chinese bank performance in terms of ROA, ROE, and OM. Similar with these Oginni Simon Oyewole et.al, (2013) conclude that e-banking begins to contribute positively to bank performance in terms of ROA and NIM with a time lag of two years while a negative impact was observed in the first year of adoption. They also recommended that investment decision on electronic banking should be rational so as to justify cost and revenue implications on bank performance.

The finding by Al-Smadi,(2011) show that adopting of e-banking affects bank performance negatively. E-banking may eventually become a very important factor affecting bank performance for many banks. The degree and speed at which this may happen will depend on the growth in the use of e-banking and on the emphasis banks place in the future on e-banking. Therefore, banks should focus its work to promote the confidence of e-banking services, and develop marketing policies that encourage customers to use e banking services. Big banks are more profitable compared to small banks. A big bank has advantages to improve its performance which is not available for a small. the study conducted by Zipporah & Oloko (2015) conclude that ATM ,mobile banking and agency banking improve the financial performance of commercial banks in Kenya whereas internet banking had not expected positive impact on financial performance. In contrary to these Lucy (2015) concludes that internet banking had appositive impact on financial performance of commercial bank in Kenya. Electronic banking

system like ATM, Pay direct, electronic check conversion, mobile telephone banking and E transact has a great impact on bank performance because they increase profitability, reduce bank cost of operations, and increase bank asset and bank efficiency (Ngango, 2015).

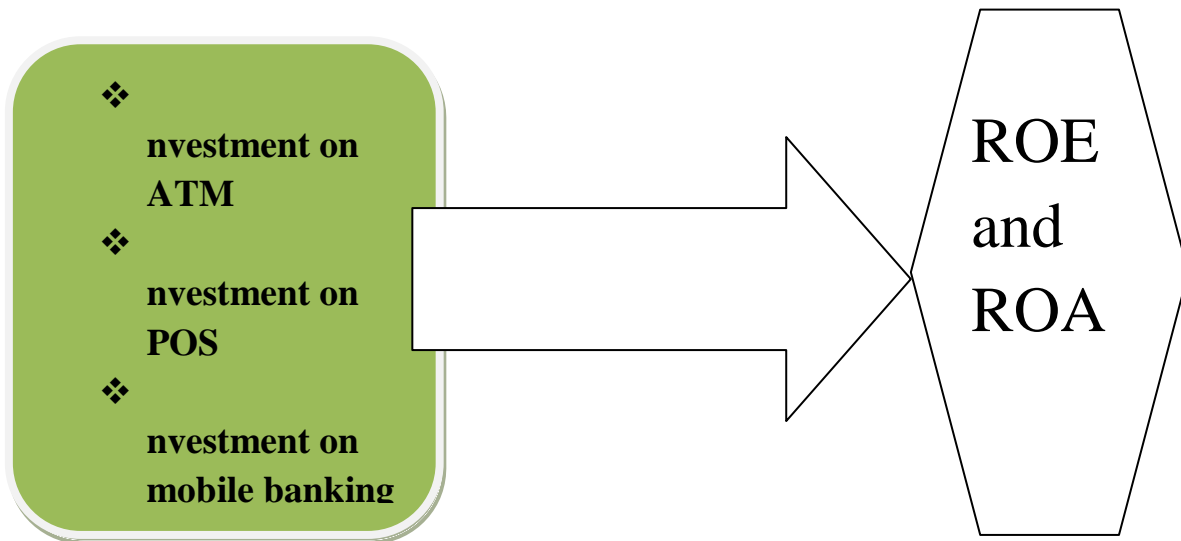
2.9 Research Gab

From the previous review of relevant literature it is very clear that not much research has been done on the impact of investment on electronic banking on the performance of commercial banks in Ethiopia. Previous research in Ethiopian are focus on adoption of electronic banking, challenges and opportunities of electronic banking, barriers of electronic banking from both customer side and bank side. Past researchers undertook these research activities on different areas and this left out various challenges of E-banking practices unaddressed. The difference between the previous studies left some major gaps unfilled; this research study is therefore concentrating its findings into these gaps. Very few studies in Ethiopia have been done to highlight these problems faced by the commercial banks and the relation between electronic banking and financial performance but have not been able to show clearly how costs or investment have contributed to the financial performance of these banks. This study therefore seeks to show how investment in electronic banking has impacted on the financial performance of private commercial banks in Ethiopia.

2.10 Conceptual framework

Different empirical evidences suggested that profitability of financial institutions specifically banks is affected by internal and external factors. This study will use ROA parts of measure of private commercial bank performance.

The study will show how these variables are affected due to investment made on electronic banking products. Accordingly, the following diagram shows the relationship between investment made on electronic banking products and private commercial Bank performance indicators ROA.



Source: Self extracted

Figure 1 shows the effect of investment on electronic banking on financial performance

CHAPTER THREE: RESEARCH METHODOLOGIES

3.1 Research Design

Research design is the blueprint for fulfilling research objectives and answering research questions. In other words, it is a master plan specifying the methods and procedures for collecting and analyzing the needed information. In addition, it must ensure that the information collected is appropriate for solving a problem (Adams et.al, 2007). Research design is important because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money. The objective of the study is to investigate the effect of investing in electronic banking on financial performance of commercial banks in Ethiopia. To achieve this objective quantitative research approach with explanatory type of research is used. Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity.

In quantitative analysis, here, First: The researcher used correlation to measure the degree of association between different variables under consideration. Second: Regression analysis has been conducted to estimate the causal relationships between the chosen dependent and independent variables. According to Kothari (2004) regression analysis is concerned with the study of how one or more variables affect changes in another variable.

In explanatory research the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material (Kothari, 1990). The researcher develops and employs mathematical models, theories and hypotheses pertaining to natural phenomena. In the study the researcher uses panel data from selected commercial banks in Ethiopia. Panel data is a set of observations on individuals, collected over time. Panel data have the dimensions of both time series and cross-sections (Brooks, 2014). The study was conducted by using secondary data from the annual financial report of banks.

3.2 Types of data and source

Data are the facts and figures collected for records or any statistical investigation. There are primarily two sources of information normally used for research purposes, primary and secondary sources of data. Secondary sources are those which are made available or have been collected for other research purposes (Adams et.al, 2007). Similarly as Kothari (1990) Secondary

data is data that are already available i.e., they refer to the data which have already been collected and analyzed by someone else. Secondary data may either be published data or unpublished data quantity. The study is conducted by using primary and secondary data type. The study uses the audited financial statement of selected commercial banks reported on their annual report and from national bank of Ethiopia, their respective website, magazines, and books. Panel data of six years audited financial statement of selected private banks from 2013-2018 will be analyzed using e view.

3.3 Data collection techniques

The study was employed quantitative research approach by using both primary and secondary data gathered from managers and financial statement of commercial banks respectively. Banks annual audited financial reports were collected from National Bank of Ethiopia, of the commercial banks annual reports, physically from head office of each bank for unavailable data from national bank of Ethiopia.

For primary data researcher were made interview between head of accounting and finance and electronic banking department particularly designated accounting clerk and official of each bank at the head office level in order to get the separated ledger cost of ATM ,POS terminal, internet banking infrastructure and mobile banking facilities.

3.4 Target Population

Population refers to the total of items about which information is desired. The attributes that are the object of study are referred to as characteristics and the units possessing them are called as elementary units. The aggregate of such units is generally described as population. The population or universe can be finite or infinite. The population is said to be finite if it consists of a fixed number of elements so that it is possible to enumerate it in its totality. An infinite population is that population in which it is theoretically impossible to observe all the elements (Kothari, 1990). So a finite target population of the study was 17 commercial banks.

3.5 Sampling Design

A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sample design may as well lay down the number of items to be included in the sample i.e., the size of the sample. Sample design is determined before data are collected (Kothari, 1990). Sampling is the process or technique of selecting a suitable sample for the purpose of determining parameters or

characteristics of the whole population. To carry out a study, one might bear in mind what size the sample should be, and whether the size is statistically justified and lastly, what method of sampling is to be used. As for all sampling, we need to think about the time and cost for the survey, whether it is small-scale or large-scale (John Adams et.al, 2007). The total population of the study was 17 commercial banks operate in Ethiopia. From these seven commercial banks was selected (Commercial bank of Ethiopia, United bank, Dashen bank, Wegagen bank, Nib international bank ,Bank of Abyssinia and Zemen bank). In addition to these the six year audited financial statement from 2013 -2018 of selected commercial banks was selected and analyzed. The selection criterion is purposive based on years of investing on the four electronic banking products and implementation of electronic banking service i.e. ATM, POS, mobile banking and internet banking.

3.6 Sample size

At this time there are 17 commercial banks operate in Ethiopia. These commercial banks are the total population of the study. Commercial bank of Ethiopia is the only state owned commercial bank in Ethiopia. The 16 private commercial banks are Abay Bank S.C., Addis International Bank S.C., Awash Bank S.C., Bank of Abyssinia S.C.,Berhan International Bank S.C., Bunna International Bank S.C., Cooperative Bank of Oromia S.C., Dashen Bank S.C., Dehub Global Bank S.C., Enat Bank S.C., Lion International Bank S.C., Nib International Bank S.C., Oromia International Bank S.C., United Bank S.C., Wegagaen Bank S.C. and Zemen Bank S.C. Of the total population 17 Commercial banks under study 7 (41%) commercial Banks were selected as a sample size for study. The selection criterion is purposive based on years of investing on the four electronic banking products and implementation of electronic banking service i.e. ATM, POS, mobile banking and internet banking.

3.7 Data processing, analyzing and presentation

The data that obtained from the selected commercial banks was both primary and secondary quantitative data, and these data analyzed using linear multiple regression to identify the effect of investment on electronic banking on commercial banks financial performance, its important & statistically significant on banks financial performance.

A collected audited financial report was analyzed by using E-views 8. The analysis included test of descriptive statistics, correlations, diagnostic test for and multiple linear regression analysis.

First, descriptive statistics was calculated over the sample period. This is in line with Malhotra (2007), which states using descriptive statistics methods helps the researcher in picturing the existing situation and allows relevant information. At this stage, mean, standard deviation, maximum and minimum values of the required variables have been computed. Then, correlation analyses between dependent and independent variables were made. Finally, Researcher used panel Least Squares methods for analysis. Panel data, where time-series and cross sectional observations were combined to estimate the regression output. Linear multiple regression analysis make a prediction about the dependent variable based on its covariance with all the concerned independent variables (Kotahri, 1990).

3.8 Definition of variable and model specification

Based on the study objective, the study will conduct primarily on panel data expected to obtain through structured document review (*annual Audited Financial Report*). Hausman and Siekpe (2008) emphasize that regression methods have become an integral component of any data analysis concerned with describing the relationship between a response variable and one or more explanatory variables. It is often the case that the outcome variable is discrete, taking on two or more possible values. It is important to understand that the goal of an analysis using this method is the same as that of any model building technique used in statistics; to find the best fitting and most parsimonious, yet reasonable model to describe the relationship between an outcome (dependent or response) variable and a set of independent (predictor or explanatory) variables. These independent variables are often called covariates.

The dependent variables in this research will be, Return on Asset and Return on Equity whiles the independent variables consisting of ATM machines, mobile banking, internet banking and POS Terminal.

A. Independent Variables

ATM: It is an electronic terminal which gives consumers the opportunity to get banking service at almost any time. To withdraw cash, make deposits or transfer funds between accounts, a consumer needs an ATM card and a personal identification number (PIN) (Ayana, 2012) measured by investment on ATM.

Mobile banking: Mobile banking is a service that enables customers to conduct some banking services such as account inquiry and funds transfer, by using of short text message (Ayana, 2012)

Internet banking: It is an electronic home banking system using web technology in which Bank customers are able to conduct their business transactions with the bank through personal computers (Ayana, 2012).

Point-of-Sale Transfer Terminals (POS): The system allows consumers to pay for retail purchase with a check card, a new name for debit card. This card looks like a credit card but with a significant difference. The money for the purchase is transferred immediately from account of debit card holder to the store's account (Malak 2007).

B. Dependent Variable

Return on Assets (ROA): is profit before tax divided by the total resources owned and controlled by a bank. The following multiple linear regression equation that will use to determine the effect of investment on e-banking on the return on assets of private commercial banks: Return on assets is measured by dividing the profit before taxation of the banks by their total assets and then multiplied by 100% to get a percentage return on assets.

Return on equity (ROE): Return on Equity (ROE) is the most important profitability indicator; it measures an MFI's ability to reward its shareholders' investment, build its equity base through retained earnings, and raise additional equity investment (Isabelle Barres et al, 2005).

The multiple linear regressions model will run using OLS through EViews econometric software package, to test the casual relationship between the banks' performance and Investment on electronic banking in order to determine the most significant and influential indicators and other control variables affecting the performance of Private commercial Banks in Ethiopia.

To test the effect of investment on electronic banking on banks performance the researcher estimates a linear regression model in the following form:

Performance of Private Commercial banks in Ethiopia = function of (Investment on electronic banking)

$$y_{it} = \alpha + \beta_{it}EB_{it} + u_{it} \dots \dots \dots (1)$$

For further investigation of investment on electronic banking products (ATM, mobile banking, internet banking and POS terminal) are considered as independent variable. Accordingly, the researcher re-writes the model as follows:

$$y_{it} = \alpha + \beta_{it}ATM_{it} + \beta_{it}MB_{it} + \beta_{it}IB_{it} + \beta_{it}POS_{it} + u_{it} \dots \dots \dots (2)$$

$$ROA = \alpha + \beta_{it}LN(IATM) + \beta_{it}LN(IPOS) + \beta_{it}LN(IIB) + \beta_{it}LN(IMB) + u_{it} \dots \dots \dots (3)$$

$$ROE = \alpha + \beta_{it}LN(IATM) + \beta_{it}LN(IPOS) + \beta_{it}LN(IIB) + \beta_{it}LN(IMB) + u_{it} \dots \dots \dots (4)$$

Whereas;

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

i = refers to individual private bank; t = refers to year;

α = refers to constant term; and β_{it} = refers to change in factors term;

EB_{it} = represents Investment on electronic banking;

$LNIATM_{it}$ = represents lan of Investment on ATM machines;

$LNIMB_{it}$ = represents lan Investment on mobile banking facilities;

$LNIB_{it}$ = represents lan of Investment on internet banking infrastructure;

$LNIPPOS_{it}$ = represents lan of Investment on POS terminals and

u_{it} = refers is a normally distributed random variable disturbance term.

Beside this Classical linear regression model assumptions and diagnostic tests were conducted to decide whether the model used in the study is appropriate and fulfill the assumption of classical linear regression model

Heteroskedasticity Test

Heteroscedasticity test-consistent standard error estimates: Most standard econometrics software packages have an option (usually called something like ‘robust’) that allows the user to employ standard error estimates that have been modified to account for the heteroscedasticity following (White 1980). The effect of using the correction is that, if the variance of the errors is positively related to the square of an explanatory variable, the standard errors for the slope coefficients are increased relative to the usual OLS standard errors, which would make hypothesis testing more ‘conservative’, so that more evidence would be required against the null hypothesis before it would be rejected (Brooks 2008). Both the F- and χ^2 (‘LM’) versions of the test statistic give the same conclusion that there is no evidence for the presence of heteroscedasticity, since the p-values are considerably in excess of 0.05 (Brooks 2008).

Autocorrelation test

Autocorrelation, also known as serial correlation or cross-autocorrelation, is the cross-correlation of a signal with itself at different points in time (that is what the cross stands for). Informally, it is the similarity between observations as a function of the time lag between them. It is a mathematical tool for finding repeating patterns, such as the presence of a periodic signal

obscured by noise, or identifying the missing fundamental frequency in a signal implied by its harmonic frequencies. It is often used in signal processing for analyzing functions or series of values, such as time domain signals. Autocorrelation problem will occur when error term at the period t is correlated with the error term at period before t . Autocorrelation is most likely to happen in the time series data due to the importance of the sequence of the time period. In this research The Breusch–Godfrey serial correlation LM test is used to test autocorrelation. It is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that there is no serial correlation of any order up to p . The test is more general than the Durbin–Watson statistic (or Durbin's h statistic), which is only valid for non-stochastic regressors and for testing the possibility of a first-order autoregressive model for the regression errors. The BG test has none of these restrictions, and is statistically more powerful than Durbin's statistic.

Multicollinearity (also collinearity) is a phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a non-trivial degree of accuracy. In this situation the coefficient estimates of the multiple regressions may change erratically in response to small changes in the model or the data. multicollinearity does not reduce the predictive power or reliability of the model as a whole, at least within the sample data set; it only affects calculations regarding individual predictors. That is, a multiple regression model with correlated predictors can indicate how well the entire bundle of predictors predicts the outcome variable, but it may not give valid results about any individual predictor, or about which predictors are redundant with respect to others.

Multicollinearity test

There are various methods to detect multicollinearity. Firstly, by comparing the expected sign of independent variables obtained from the model with prior expectation. It is possible that multicollinearity problem exists in the model if the expected sign for independent variable is inconsistent with theory or prior expectation. Secondly, by examining the correlation matrix provided by Eviews 8. If the researchers found that there is any correlation between two variables to be more than 80%, automatically the suspicions for the existence of multicollinearity problem is derived. Besides, multicollinearity problem can be detected by viewing the estimated

model has high R-square but with only few or no independent variables found to have significant effect on the dependent variable besides there is high-pair wise correlation between two independent variables.

Normality Test

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

R-squared:

R-Squared, also known as coefficient of determination which is a statistical term saying how good one term is at predicting another. The higher the value of R-Square, the better is the prediction of one term from another said by Cameron, &Windmeijer (1996).

CHAPTER FOUR: RESULTS AND DISCUSSION

So far important literatures relating to the topic were reviewed and that gives enough understanding about the topic and used to identify knowledge gap on the area. To meet the broad research objective and to answer research questions and to test research hypotheses under it the research design used for this study also discussed in the preceding chapter. In this chapter the data collected were presented and important correlation and regression analysis findings were discussed.

4.1 Descriptive statistics result

The descriptive statistics of the dependent and explanatory variables of selected Banks is summarized in Table 4.1; the table presents mean, standard deviation, maximum, minimum and median values for the dependent and independent variables for the total observation of 42. The researcher described the result as follows based on the indicated figures of Eviews output.

Table 4.1 Descriptive statistics

	ROE	ROA	LNIPOS	LNIMB	LNIB	LNIATM
Mean	0.233988	0.032119	14.48258	15.54983	15.40694	16.46502
Median	0.180500	0.031000	14.65275	15.64881	15.30835	16.37274
Maximum	0.650000	0.056000	16.58810	16.48966	16.41077	17.94184
Minimum	0.138000	0.018000	11.60824	13.45167	13.76632	15.06827
Std. Dev.	0.135218	0.007900	1.048101	0.565259	0.579758	0.697755
Skewness	2.224117	0.412969	-1.069132	-1.098378	-0.420308	0.384440
Kurtosis	6.772366	3.487427	4.175923	5.887019	3.713540	2.709500
Jarque-Bera	59.53066	1.609576	10.42119	23.03107	2.127608	1.182240
Probability	0.000000	0.447183	0.005458	0.000010	0.345140	0.553707
Sum	9.827500	1.349000	608.2683	653.0928	647.0916	691.5309
Sum Sq. Dev.	0.749635	0.002559	45.03910	13.10023	13.78091	19.96137
Observations	42	42	42	42	42	42

Source: The Researcher computation through Eviews 8

ROA measured by total profit before tax divided by total asset. Even if there were commercial Banks that reported a ROA which was as high as 5.6 %, there were also commercial Banks with low performance reported at 1.8%.it has a mean value of 3.2% with a standard deviation of 0.7%. 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. This indicates that commercial banks in Ethiopia earn 3.2 % return on average from the total asset per year.

According to Richard (2015), Return on equity between 15% and 20% are considered desirable, the average industry mean value of 23.3 % return on equity tells that the banking industry is the area where it makes good profit. Nevertheless, literature of Navapan and Tripe (2003) doubts that getting this much return on equity may not always send a good message, but it may also result from having small, inefficient and less competitive markets. As we see from table 4.1 there were commercial Banks that reported a ROE which was as high as 65 %, there were also commercial Banks with low performance reported at 13.8 %. It has a mean value of 23.3% with a standard deviation of 13.5%. Even if the standard deviation shows the existence of high level of variation in the group performance; the range shows the existence of great variation in performance among the selected commercial Banks in Ethiopia.

The above table also shows that the descriptive statistics results of explanatory variables. LNIATM has 16.4 mean and 0.69 of standard deviation. These indicate that commercial bank in Ethiopia on average invest 16.4 % for ATM. It's maximum and minimum is 17.94 and 15.0607 respectively. The second independent variable is LNIPOS measures the annual investment on POS. It is found that with a mean of 14.48 and standard deviation of 1.04. It has a maximum and minimum value of 16.5 and 11.6 respectively. The next explanatory variable is LNIMB. This variable has 15.54 values of mean and 0.56of standard deviation; with 16.4 and 13.4 values of maximum and minimum respectively. These indicate that commercial bank in Ethiopia on average invest 15.54 % for mobile banking facilities. The last independent variable is LNIIB, it has a mean value of 15.4 but these values have maximum value of 16.4 and minimum 13.76 for commercial bank in Ethiopia. It also has a standard deviation of 0.57. These indicate that commercial bank in Ethiopia on average invest 16.4 % for internet banking facilities. As the

standard deviation shows the existence of low level of variation in the group investment on electronic banking products; the range shows the existence of low variation in electronic banking investment among the selected commercial Banks in Ethiopia.

4.2 Correlation Analysis

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

Table 4.2 Correlation matrix among dependent and independent variables

	ROA	ROE	LNIATM	LNIPOS	LNIIB	LNIMB
ROA	1.000000	0.129161	-0.094165	-0.167777	-0.303801	-0.081531
ROE	0.129161	1.000000	0.669121	0.408510	0.435120	0.485943
LNIATM	-0.094165	0.669121	1.000000	0.698948	0.513289	0.512149
LNIPOS	-0.167777	0.408510	0.698948	1.000000	0.348739	0.302859
LNIIB	-0.303801	0.435120	0.513289	0.348739	1.000000	0.690218
LNIMB	-0.081531	0.485943	0.512149	0.302859	0.690218	1.000000

Source: The Researcher computation through Eviews 8

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

From the above table 4.2 one can see that all the independent variables were negatively correlated with ROA. But all the independent variables were positively correlated with ROE. In addition LNIPOS and LNIMB have a value between 69-66%, so they are the medium correlated to the dependant variable. On the other hand side LNIATM and LNIIB have less than 51% value and this indicates that they are weekly correlated to the dependent variable.

4.3 Testing assumptions of classical linear regression model (CLRM)

In this section of the study, the linearity of the parameter is assumed since the model applies linear ordinary least square (OLS). The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Thus, in order to maintain the validity and robustness of the regression result of the research in CLRM, it is better to satisfy basic assumption CLRM. When these assumptions are satisfied, it is considered as all available information is used in the model. However, if these assumptions are violated, there will be data that left out of the model (Brooks, 2008). Accordingly, before applying the model for testing the significance of the slopes and analyzing the regressed result, normality, multicollinearity, autocorrelation and heteroscedasticity tests are made for identifying misspecification of data if any so as to fulfill research quality.

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

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

$$\text{var}(ut) = \sigma^2 < \infty$$

4.3.2 Test for Heteroscedasticity

Heteroscedasticity test-consistent standard error estimates: Most standard econometrics software packages have an option (usually called something like ‘robust’) that allows the user to employ standard error estimates that have been modified to account for the heteroscedasticity following (White 1980). The effect of using the correction is that, if the variance of the errors is positively related to the square of an explanatory variable, the standard errors for the slope coefficients are increased relative to the usual OLS standard errors, which would make hypothesis testing more

‘conservative’, so that more evidence would be required against the null hypothesis before it would be rejected (Brooks 2008).

Both the F- and χ^2 (‘LM’) versions of the test statistic give the same conclusion that there is no evidence for the presence of heteroscedasticity, when the p-values are considerably in excess of 0.05 (Brooks 2008).

Accordingly, in order to detect the heteroscedasticity problems, white test was utilized in this study. As we can see in table 4.3 and 4.4 there is no heteroscedasticity problem for the two models hence the p- value is 85.28% and 16.8% respectively and showing insignificant value assumption of homoscedasticity.

Table 4.3 Heteroskedasticity Test: White ROA

Heteroskedasticity Test: White

F-statistic	0.334764	Prob. F(4,37)	0.8528
Obs*R-squared	1.466920	Prob. Chi-Square(4)	0.8325
Scaled explained SS	1.334500	Prob. Chi-Square(4)	0.8555

Source: The Researcher computation through Eviews 8

Table 4.4 Heteroskedasticity Test: White ROE

Heteroskedasticity Test: White

F-statistic	1.627423	Prob. F(6,35)	0.1688
Obs*R-squared	9.161508	Prob. Chi-Square(6)	0.1647
Scaled explained SS	7.455163	Prob. Chi-Square(6)	0.2808

Source: The Researcher computation through Eviews 8

4.3.3 Autocorrelation Test

For ROE model The Autocorrelation test was done after the inclusion of lagged variable

The other important diagnostic test which is performed in this research is autocorrelation test. This assumption of OLS theoretically expressed by the numbers of scholars like Brooks (2008) and Verbeek (2004). The test for autocorrelation was made by using Breusch–Godfrey serial

correlation LM and for according to table 4.5 the probability shows 0.118 for ROA 0.122 for ROE and which is above 5%.

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

Table 4.5 Autocorrelation test ROA

ROA: LM test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.096979	Prob. F(3,34)	0.1189
Obs*R-squared	6.557785	Prob. Chi-Square(3)	0.0874

ROE: LM test after inclusion of the lag variable of the independent variable

Breusch-Godfrey Serial Correlation LM Test: ROE

F-statistic	1.990045	Prob. F(4,29)	0.1224
Obs*R-squared	8.830244	Prob. Chi-Square(4)	0.0655

Source: The Researcher computation through Eviews 8

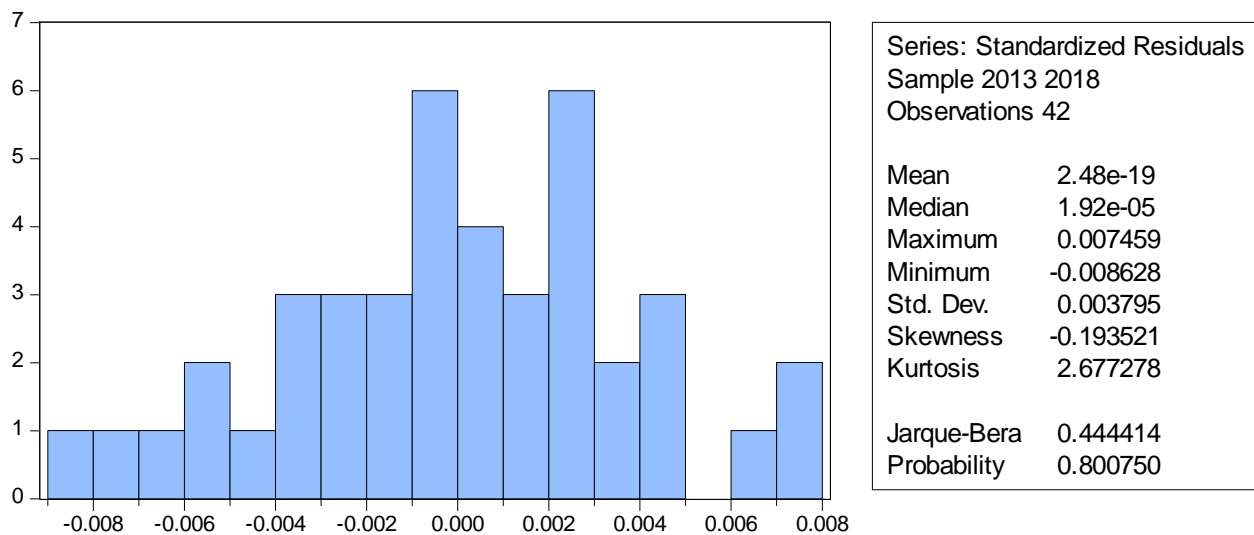
4.3.4 Normality Test

The other important diagnostic test conducted in this paper is the normality assumption (i.e the normally distributed errors). Brooks (2008) stated that the normality assumption ‘(ut~ N (0, σ^2))’ is required in order to conduct single or joint hypothesis tests about the model parameters.

One of the most commonly applied tests for normality is the Jarque-Bera(JB) test. JB uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments - the mean and the variance (Brooks, 2008, p.161).

A normal distribution is not skewed and is defined to have a coefficient of kurtosis ≈ 3 . Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis are ≈ 0 and ≈ 3 respectively. Normality assumption of the regression model can be tested with the Jarque- Bera measure. If the JarqueBera value is greater than 0.05, it's an indicator for the presence of normality (Brook, 2008). In case of this study, the researcher used JB normality test to test the null hypothesis of normally distributed errors assumptions. Hence, the null hypothesis is the error term is normally distributed should not be rejected and it seems that the error term in all cases follows the normality assumption.

Fig 4.1 Jarque-Bera Normality Test ROA



Source: The Researcher computation through Eviews 8

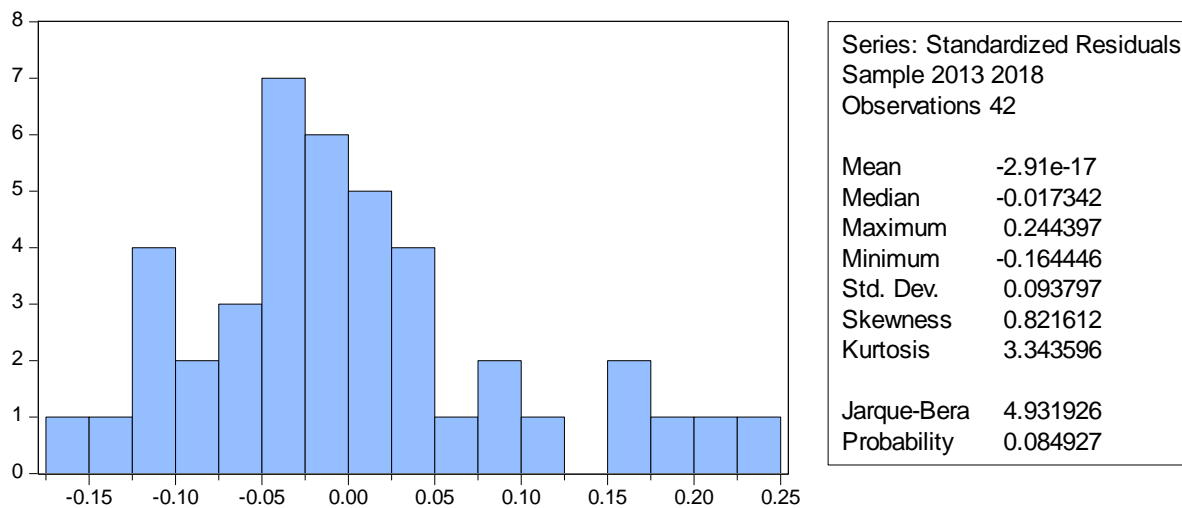
For ROE model before reaching to this result Jarque-Bera Normality Test, the researcher has faced the problem of non-normality.

In economic or financial modeling, it is quite often the case that one or two very extreme residuals cause a rejection of the normality assumption. Such observations would appear in the tails of the distribution, and would therefore lead u_4 , which enters into the definition of kurtosis, to be very large. Such observations that do not fit in with the pattern of the remainder of the data are known as *outliers*. If this is the case, one way to improve the chances of error normality is to use dummy variables or some other method to effectively remove those observations. The

dummy variable would be used just like any other. dummy variable that takes the value one for only a single observation has an effect exactly equivalent to knocking out that observation from the sample altogether, by forcing the residual for that observation to zero. The estimated coefficient on the dummy variable will be equal to the residual that the dummied observation would have taken if the dummy variable had not been included. (Brooks, 2008)

So the researcher introduce dummy variable. In the ROE model of the study the 2017 and 2018 ROE observation of commercial bank of Ethiopia is an outlier observation which is ROE of 0.37 and 0.22 respectively To avoid these the researcher introduced dummy variable called CBEROE2017DUM & CBEROE2018DUM. Hence, the null hypothesis is the error term is normally distributed should not be rejected and it seems that the error term in all cases follows the normality assumption.

Fig 4.2 Fig 4.1 Jarque-Bera Normality Test ROE



Source: The Researcher computation through Eviews 8

4.3.5 Multicollinearity test

Multicollinearity is concerned with the relationship which exists between explanatory variables. When there exists the problem of multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases and as a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. How much correlation causes multicollinearity? However, is not still clearly defined ((Churchill, 9th Edition. USA :) 2005) Many authors have suggested different level of correlation to judge the presence of multicollinearity While (Hair, 2006) argued that correlation coefficient below **0.9**

may not cause serious multicollinearity problem (Malhotra, 2007). Stated that multicollinearity problem exists when the correlation coefficient among variables is greater than **0.75**. This indicates that there is no consistent agreement on the level of correlation that causes multicollinearity. Correlation matrix for six of the independent variables is shown table below.

Table 4.6 Multicollinearity test

	LNIATM	LNIPOS	LNIIB	LNIMB
LNIATM	1.000000	0.698948	0.513289	0.512149
LNIPOS	0.698948	1.000000	0.348739	0.302859
LNIIB	0.513289	0.348739	1.000000	0.690218
LNIMB	0.512149	0.302859	0.690218	1.000000

Source: The Researcher computation through Eviews 8

The results of the estimated correlation matrix shows that the highest correlation of 0.69 which is between Lan of Investment on POS (LNIPOS) and Lan of investment on Mobile banking(LNIMB) So, the researcher concluded that, there is **no problem of multicollinearity** (Hair, 2006).

4.4 Choosing Random Effect (RE) versus Fixed Effect (FE) Models

The OLS model has been used to identify the factors that influence the financial performance of commercial banks. There are broadly two classes of panel estimator approaches that can be employed in a panel data financial research: fixed effects models (FEM) and random effects models (REM) (Brook, 2008). Even if this two approaches end up with nearly the same result, there are situations that they will deviate widely. To check which of the two (FEM or REM) models provide consistent estimates (is preferred) for this study; Hausman test was employed and the result is presented as follows.

Random Effects - Hausman Test

Table 4.7 Correlated Random Effects - Hausman Test

Test cross-section random effects(ROA)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random ROA	17.777403	4	0.0014

Source: The Researcher computation through Eviews 8

Correlated Random Effects - Hausman Test(ROE)

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random ROE	0.000000	6	1.0000

Source: The Researcher computation through Eviews 8

For the ROA model the null hypothesis of the Hausman test of Table 4.7 showed that, the p-value for the test is < 0.05 , which indicates that the null hypothesis was rejected. Thus, the relationship between ROA and the explanatory variables was examined by the fixed effects model in this study. But as we look from the above table For the ROE model the p-value for the test is > 0.05 , which indicates that the null hypothesis was not rejected so the relationship between ROE and the explanatory variables was examined by the random effects model in this study.

4.5 Result of the Regression analysis

According to the following table of result, The R-squared value measures how well the regression model explains the actual variations in the dependent variable (Brook, 2008). Thus, the adjusted R-squared value in Table 4.8 and 4.9 below indicates that 0.69, 0.43 percent

variation in performance (ROA, ROE) of the selected commercial banks in Ethiopia respectively is caused by the explanatory variable.

Table 4.8 ROA model

Dependent Variable: ROA

Method: Panel Least Squares

Date: 12/25/18 Time: 16:00

Sample: 2013 2018

Periods included: 6

Cross-sections included: 7

Total panel (balanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.113453	0.046432	-2.443439	0.0204**
LNIATM	0.008109	0.002113	3.838161	0.0006*
LNIPOS	0.007148	0.001869	3.823477	0.0006*
LNIIB	-0.008801	0.003416	-2.576607	0.0150**
LNIMB	0.002838	0.003618	0.784425	0.4387

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.769252	Mean dependent var	0.032119
Adjusted R-squared	0.694817	S.D. dependent var	0.007900
S.E. of regression	0.004364	Akaike info criterion	-7.810587
Sum squared resid	0.000590	Schwarz criterion	-7.355483
Log likelihood	175.0223	Hannan-Quinn criter.	-7.643773
F-statistic	10.33456	Durbin-Watson stat	1.834851
Prob(F-statistic)	0.000000		

Source: The Researcher computation through Eviews 8

Table 4.9 ROE model

Dependent Variable: ROE

Method: Panel EGLS (Cross-section random effects)

Date: 12/25/18 Time: 15:58

Sample: 2013 2018

Periods included: 6

Cross-sections included: 7

Total panel (balanced) observations: 42

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.649764	0.191876	-13.80978	0.0000
LNIATM	0.132862	0.013401	9.914553	0.0000
LNIPOS	-0.014105	0.007731	-1.824605	0.0766
LNIIB	0.021605	0.014683	1.471380	0.1501
LNIMB	0.036883	0.014659	2.516020	0.0166
CBEROE2017DUM	-0.075699	0.040146	-1.885595	0.0677
CBEROE2018DUM	-0.173133	0.039070	-4.431411	0.0001
Effects Specification				
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			0.036689	1.0000
Weighted Statistics				
R-squared	0.518812	Mean dependent var		0.233988
Adjusted R-squared	0.436322	S.D. dependent var		0.135218
S.E. of regression	0.101519	Sum squared resid		0.360716
F-statistic	6.289435	Durbin-Watson stat		0.757743
Prob(F-statistic)	0.000148			

Unweighted Statistics

R-squared	0.518812	Mean dependent var	0.233988
Sum squared resid	0.360716	Durbin-Watson stat	0.757743

Source: The Researcher computation through Eviews 8

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

Model1: $ROA = -0.11 + 0.008LN(IATM) + 0.007LN(IPOS) - 0.008LN(IIB) + 0.002LN(IMB) + \mu$

Model 2: $ROE = -2.64 + 0.13LN(IATM) - 0.014LN(IPOS) + 0.02LN(IIB) + 0.03LN(IIMB) + \mu$

The model above can be interpreted starting from the constant variable; it shows that if any commercial banks of Ethiopia will not invest on the four electronics banking products the ROA will be -0.11 and statically significance at 5 %significance level On average This value will go up or down by 0.046, also the constant(C) will far away from zero by -2.24.

For the constant of ROE model, it shows that if any commercial banks of Ethiopia will not invest on the four electronics banking products the ROE will be -2.64 and statically significance at 1 %significance level. On average this value will go up or down by 0.19, also the constant (C) will far away from zero by -13.

The coefficient of LN (IATM) are 0.008 and 0.13 for ROA & ROE respectively which measurements of Performance. Indicating that holding other thing remain constant when commercial banks in Ethiopia increase amount of investment on ATM by 1% ROA and ROE will be increase by 0.008 and 0.13 respectively and the relationship is also significant at 5% and 1% significance level with ROA and ROE Respectively.

The coefficients of LN (IPOS) are 0.007 and -0.014 for ROA and ROE respectively which measure of performance. the coefficient indicate that holding other thing remain constant when commercial banks in Ethiopia increase investment on POS by 1% , ROA will be increase by 0.007 but ROE will be decrease by 0.014 and the relationship is statically significant at 5% significant level.

The coefficients of LN (IIB) are -0.008 and 0.02 for ROA and ROE respectively. These indicate that holding other factor constant when commercial banks in Ethiopia increase amount of investment on Internet banking infrastructure by 1%, ROA will be decrease by 0.008 and the relationship is statically significant at 5% significant level but ROE will be increase by 0.02 and the relationship is statically insignificant at 5% significant level.

The coefficients for LN (IMB) are 0.002 and 0.03 for ROA and ROE respectively. The coefficient indicate that holding other variable remain constant when commercial banks in Ethiopia increase the amount of investment on mobile banking facilities by 1% ROA and ROE will be increase by 0.002 and 0.03 respectively. However the relationship is not significant for ROA but significant for ROE at 5% significant level.

4.6 Testing of Hypothesis

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

4.6.1 Investment on ATM and ROA

Hypothesis 1

H0: investment on ATM has positive and significant impact on ROA of commercial banks in Ethiopia!

H1: investment on ATM has no positive and significant impact on ROA of commercial banks in Ethiopia!

The regression result of a fixed effect model in the above table 4.8 is consistent with the hypothesis developed by the researcher. According to the result obtained from table 4.8 one of the independent variable which is investment on ATM has appositive and significant effect on ROA. The probability of 0.02 enables the researcher to NOT reject the null hypothesis of significant effect on bank performance and reject the alternate hypothesis.

4.6.2 Investment on ATM and ROE

Hypothesis 1

H0: investment on ATM has positive and significant impact on ROE of commercial banks in Ethiopia!

H1: investment on ATM has no positive and significant impact on ROE of commercial banks in Ethiopia!

The regression result of a Random effect model in the above table 4.9 is consistent with the hypothesis developed by the researcher. According to the result obtained from table 4.9 one of the independent variables which are investment on ATM has appositve and significant effect on ROE. The probability of 0.0000 enables the researcher to not reject the null hypothesis of significant effect on bank performance and reject the alternate hypothesis.

This result has similar outcome with the findings of Hussen (2017) study Effect of Automated Teller Machines Usage on Operational Performance of Commercial Banks in Nakuru County, Kenya. For the purpose of determining the effect of ATMs usage on operational performance, he uses correlation and regression analysis. He concludes that ATM usage has a positive significant relationship with operational performance. Jegede (2014) study the Effects of Automated Teller Machine on the Performance of Nigerian Banks. The results indicate that less than the benefits, the deployment of ATMs terminals have averagely improved the performance of Nigerian banks because of the alarming rate of ATM fraud. Similarly, ATM service quality is less correlated to security and privacy of users and providers. He conclude that banks should strive to increase their security layers to subvert the tricks of web scammers, limit the amount which customers may be allowed to withdraw at a time and provide electronic alerts to customers' phone for all transactions carried out on their bank accounts through ATMs and the provisions of extra security layer that can prevent third party to make use someone else's ATM card for unauthorized withdrawals electronically.

ATMs have potential to generate income for banks and hence the aggressive ATM network expansion by commercial banks in Ethiopia. Moreover, ATM machines are now located at non-traditional locations like at the petrol stations, supermarkets, universities and colleges and in the rural areas, indicating the importance that banks attach to ATM machines in reaching and maintaining customers and strategically earning fees for their use.(Tilahun,2016)

Banks have intensified their adoption and usage of ATMs as a major e-banking tool to generate substantial contributions to their operations and financial results. Bank should use ATMs deployment as a strategic tool for improved cost efficiency. Banks need however to also focus on other areas of IT for cost efficiency improvement (Adewoye, 2013).

4.6.3 Investment on POS and ROA

Hypothesis 2

H0: investment on POS has positive and significant impact on ROA of commercial banks in Ethiopia!

H1: investment on POS has no positive and significant impact on ROA of commercial banks in Ethiopia!

The results of the regressions model in Table 4.8 indicated that the level of investment on POS have a Positive relationship with Return on Assets of the selected Commercial Banks in Ethiopia this relationship was found to be significant for ROA measure of performance.(p-value =0.0006).so the null hypothesis is not rejected.

The finding of these research is consistence with that of Oginni ,Simon, Oyewole et.al, (2013) they conclude that e-banking products including POS begins to contribute positively to bank performance in terms of ROA and NIM with a time lag of two years while a negative impact was observed in the first year of adoption. They also recommended that investment decision on electronic banking should be rational so as to justify cost and revenue implications on bank performance.

4.6.4 Investment on POS and ROE

Hypothesis 2

H0: investment on POS has positive and significant impact on ROE of commercial banks in Ethiopia!

H1: investment on POS has no positive and significant impact on ROE of commercial banks in Ethiopia!

The results of the regressions model in Table 4.9 indicated that the level of investment on POS have a negative relationship with Return on Equity of the selected Commercial Banks in Ethiopia this relationship was found to be insignificant for ROE measure of performance since the p-value is 0.0766.so the null hypothesis is rejected. This implies that the increase or decrease in investment on POS terminal has not statistical significant effect ROE of commercial banks in Ethiopia.

The finding of this research is consistence with the study conducted by Zipporah & Oloko (2015) who conclude that ATM, mobile banking and agency banking improve the financial performance of commercial banks in Kenya whereas internet banking and POS had not expected positive

impact on financial performance. In contrary to these Lucy (2015) concludes that internet banking and POS had appositive impact on financial performance of commercial bank in Kenya.

4.6.5 Investment on Internet banking infrastructure and ROA

Hypothesis3

H0; investment on internet banking infrastructure has positive and significant impact on ROA of commercial banks in Ethiopia!

H1: investment on internet banking infrastructure has no and significant impact on ROA of commercial banks in Ethiopia!

The results of the regressions model in Table 4.8 indicated that the level of investment on internet banking infrastructures have a negative relationship with Return on Assets of the selected Commercial Banks in Ethiopia this relationship was found to be significant for ROA measure of performance because p-value 0.0150.so the null hypothesis is not rejected. This indicates that when investment on internet banking infrastructure increases ROA of commercial banks will decrease. Similarly Pooja (2009) revealed that profitability and offering of Internet banking does not have any significant association, on the other hand, Internet banking has a significant and negative association with risk profile of the banks.

The finding of the research is contradict with that of Margaret, Julius Gogo and Job (2016) study .their study concluded that the influence of internet banking on income has been occasioned by the ease that internet has offer to both retail and corporate customers and hence making it easy, convenient and faster to make transactions. Therefore internet banking is a key driver of cost management in banks. The study also concluded that internet banking is capable of growing the loan book of banks and even monitor how the loan accounts are behaving and be able to send electronic reminders and advice to customers. The study further concluded that internet banking had positive influence on customer deposits especially mobilization. However these research finding is similar with that of that of Halili(2014), according to Halili (2014) adoption of Online Banking is negatively related with three bank performance indicators as: Return on Equity (ROE), Return on Asset (ROA) and Margin (MRG). Similarly Pooja (2009) revealed that profitability and offering of Internet banking does not have any significant association, on the other hand, Internet banking has a significant and negative association with risk profile of the banks.

4.6.6 Investment on Internet banking infrastructure and ROE

Hypothesis3

H0; investment on internet banking infrastructure has positive and significant impact on ROA of commercial banks in Ethiopia!

H1: investment on internet banking infrastructure has no and significant impact on ROA of commercial banks in Ethiopia!

The results of the regressions model in Table 4.9 indicated that the level of investment on internet banking infrastructures have a positive relationship with Return on Equity of the selected Commercial Banks in Ethiopia this relationship was found to be insignificant for ROE measure of performance because p-value 0.1501.so the null hypothesis is rejected. This implies that the increase or decrease in investment on Internet banking infrastructure has not statistical significant effect ROE of commercial banks in Ethiopia.

The finding of these study is contradict with Lucy (2015) who concludes that internet banking and had appositive impact on financial performance of commercial bank in Kenya.

The finding of the research is similar with the following previous study. Clare Barasa¹, Obura, Francis A. Anyira (2017) examine the effect of internet banking on financial performance of commercial banks in Kenya. To analyze the study they use quantitative data and conclude that there is a positive effect of internet banking on financial performance of commercial banks. In addition to these the finding of the research is similar with that of these Lucy (2015) which concludes that internet banking had appositive impact on financial performance of commercial bank in Kenya. Hussein Mohamed (2018) study effect of internet banking on operational performance in Nakuru the objective of the study was to investigate the effect of internet banking on operational performance of commercial banks in Nakuru County. The study concluded that internet banking is highly related with operational performance. This shows that the adoption of internet banking has a positive influence on operational performance.

However the finding of this research is contradicted with that of Halili (2014), according to Halili (2014) adoption of Online Banking is negatively related with three bank performance indicators as: Return on Equity (ROE), Return on Asset (ROA) and Margin (MRG).

4.6.7 Investment on mobile banking facilities and ROA

Hypothesis 4

H0: investment on mobile banking facilities has positive and significant impact on ROA of commercial banks in Ethiopia!

H1: investment on mobile banking facilities has no and significant impact on ROA of commercial banks in Ethiopia!

The results of the regressions model in Table 4.8 revealed that the level of investment on mobile banking facilities have a positive relationship with Return on Assets of the selected Commercial Banks in Ethiopia this relationship was found to be insignificant for ROA measure of performance since the p-value is 0.43. So the null hypothesis is rejected. These indicate that Even if the relationship is positive the increase or decrease of investment on mobile banking facilities has not a significant influence on ROA.

4.6.8 Investment on mobile banking facilities and ROE

Hypothesis 4

H0: investment on mobile banking facilities has positive and significant impact on ROE of commercial banks in Ethiopia!

H1: investment on mobile banking facilities has no and significant impact on ROE of commercial banks in Ethiopia!

The results of the regressions model in Table 4.9 indicated that the level of investment on mobile banking facilities have a positive relationship with Return on Equity of the selected Commercial Banks in Ethiopia and this relationship was found to be significant for ROE measure of performance because p-value 0.0166. so the null hypothesis is not rejected. This implies that the increase or decrease in investment on mobile banking facilities has statistical significant effect ROE of commercial banks in Ethiopia.

The finding of this research is consistence with that of Bonface and Ambrose study the effect of mobile banking and financial performance of commercial banks of commercial banks in Kenya. From the findings and summary the study concludes that the prices of M-banking services had a high positive influence on the financial performance of commercial banks in Kenya. M-Banking helped to promote efficiency and confidence in the financial system thus winning public trust. The study also concludes that Security and Speed through M-banking had a positive impact on the financial performance of commercial banks in Kenya with many of the baking institution

recording high amount of deposits and thus creation enough pool of for willing investors to borrow thus increased profits. Harelimana (2017) study Impact of Mobile Banking on Financial Performance of Unguka Microfinance Bank Ltd, Rwanda .Based on the findings, Unguka Ltd has to continue to improve mobile banking services in terms of the quality of services offered, to expand its services to all domains namely disbursement and collection of loans and increase client outreach for its performance in terms of profitability and sustainability. The study has also shown that there is positive correlation between financial performance indicators before and after the adoption of mobile banking system and shown the positive relationship between mobile banking transaction volume and products and financial performance of Unguka Bank Ltd.

Hauwan and Abdul-Hakim(2017) study The Effect of Mobile Banking on the Performance of Commercial Banks in Nigeria by using random sampling they select 22 commercial banks and structured questioner was used concludes that mobile banking positively and significantly affects the financial performance of commercial banks in Nigeria. Kiprof, Ayuma& Ambrose (2016) study Effects of Mobile Banking on the Financial Performance of Commercial Banks in Kapsabet (Kenya) A Case of Selected Banks in Kapsabet Town. The expected finding was that mobile banking improves the financial performance of commercial banks. The findings of the study revealed that there was a significant relationship between mobile banking and financial performance ($p < 0.005$).The study concluded that mobile banking would make it easier to send money to receiver instantly. it also concluded mobile banking ensures easy track of lenders and easy monitoring, it concluded mobile banking helps to ensure quick transfer of funds as it saves on time, that mobile banking ensures easy payment of bills and avoids cash payments and concluded mobile banking payment of bills affects productivity of banks within the area. (IOSR Journal of Business and Management another study by Mageto, Muturi and Abuga (2017) indicate that transaction cost of mobile payment is cheap, mobile banking money can be sent any time of day; it saves time of travelling and that mobile banking transactions are processed in accordance with clients' expectations besides providing evident of payment to another person.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Finding of the study

This study originated from the researcher objective of examining how Investment on electronic banking products affects the performance of commercial Banks in Ethiopia. Using a 6 years data and 7 Selected commercial Banks in Ethiopia, the study was carried out by constructing a balanced panel regression model based on OLS and both fixed and random effects estimates of the secondary data obtained from the financial statements, mainly National bank of Ethiopia, Annual Audited report their respective finance and e banking department of commercial Banks in Ethiopia under the study. The researcher used a non-random sampling method or purposive sampling.

The analysis produced a coefficient of determination of 76 % and 51% which shows the percentage of variations in ROA and ROE which is explained by investment on electronic banking. The significant test showed that influence of investment on electronic banking on bank financial performance was statistically significant. This means that the combined effect of the investment on electronic banking in this research is statistically significant in explaining the ROA and ROE of commercial banks in Ethiopia However the statistical significance is different for each electronic banking product.

In general the research thoroughly examined the effect of investment on electronic banking product particularly, investment on ATM, POS terminal, internet banking infrastructures and mobile banking facilities of 7 selected commercial banks. Entirely the result collectively approves the hypotheses. Based on the analysis of the result of the study investment on ATM and investment on mobile banking facilities have apposite impact on both ROA and ROE. Investment on internet banking infrastructures has a negative impact on ROA but have apposite impact on ROE. In contrast investment on POS terminal has apposite impact on ROA but negative impact on ROE.

The independent variables (Electronic banking products) used in order to achieve the objectives stated were ATM, POS, internet banking & mobile banking) All of the above indicators was used in the study, Investment on ATM was appears to be adding the most significant weight relatively and followed by investment on POS and investment on Mobile banking facilities.

On the other hand, among the electronic banking products Investment on internet banking infrastructures is not significant in improving financial performance of commercial banks in Ethiopia.

Table 5.1 Comparison of test results with expectation

Inde Variable	Expected relation		Actual result		Statistical Signif. Test	
	ROA	ROE	ROA	ROE	ROA	ROE
IATM	+	+	+	+	Sig	Sig
IPOS	+	+	+	-	Sig	Insig
IIBINF	+	+	-	+	Sig	Insig
IMBF	+	+	+	+	Insig	Sig

5.2 Conclusion of the study

Commercial banks in Ethiopia are investing huge amount of birr for electronic banking products. The overall result obtained from the regression model indicates that investment on Electronic banking has positive significance impact on performance of commercial Banks in Ethiopia to an important extent with some improvement observed from implementation of appropriate internet banking and POS service.

The study also found strong positive correlation coefficient between financial performance of Ethiopia commercial banks and investment on ATMS , The study also revealed that Recent ATM innovations offer financial institutions the opportunity to transform the ATM from a cash dispenser to a customer relationship management tool, helping to enhance loyalty among all customers, particularly those who almost exclusively use the ATM. the study concludes that investment on ATM had a positive influence on the financial performance of commercial banks in Ethiopia.

Mobile banking is being used to improve financial operations in commercial banks in Ethiopia. The banks have put in place measures to become more competitive by training its staff, investing in research and development of technology. In the long run, mobile banking is likely to have major impacts on the profitability of commercial banks as it smoothens the business operations.

Thus the study concludes that investment on Mobile banking had a positive influence on the financial performance of commercial banks in Ethiopia.

The study also concludes that investment in POS had a positive significant influence on the ROA but negative insignificant influence for ROE. In contrary to this investment on internet banking had a negative significant influence on ROA however investment on internet banking has appositve insignificant influence on ROE.

Investment on e-banking products fuelled the Commercial Banks of Ethiopia a great deal of cash capital flow that increase the ROA as well as ROE of the banks. Although the result indicated some negative influences by the selected variables, it is very clear that investment on e-banking is promising activity to increase the performance of Ethiopian Commercial Banks.

5.3 Recommendation

In this time of intact revolution the banks are not only obliged to go online but also threatened of their existence by innovative financial institutions based on block chain technologies. In the past ten years banking innovation like internet banking and online payment were seen as a break through innovations in the financial system. But in the past five years executing financial transaction is becoming a simple thing anybody can access from his phone without any financial intermediaries.

In our banking system the penetration of banking technologies is lagging behind even if almost all the banks have the package for banking technologies like internet banking, mobile banking, ATM, POS and agent banking facilities. The contribution of these technologies for the growth and profitability's of the banks is very minimal except ATM and mobile banking service. So based on this research the bank should work hard on the following things to get the maximum from them.

- The investments in ATM and mobile banking which have the best return for the banks still need to be improved in its service efficiencies. Mostly it is difficult to believe the ATMs service especially in weekends and night times. This pushes customers from the technologies and makes them switch back to the traditional branch system.
- Mobile banking facilities should be increased in order to make easily accessible by customers and to enhance financial performance.

- The POS machines should be fast and simple enough and they should have a way to handle network ups and downs. Most of the entire bank should create a compelling reason for the customer and the traders to use the service instead of cash.
- Beside commercial banks are advised to increase the number of POS terminal service in super market, oil station, café and restaurant to enhance the financial performances.
- The bank should diversify the service packages of the internet banking. Many customers don't do more than checking their balance which should be increased to interbank transaction and using them for e-payment to buy goods and services online.
- Commercial bank should work hard by creating awareness about the service of internet banking that enable customer to access bank service at any time and place.
- Investment return of electronic banking technologies is related with the level of utilization by the customers. To utilize the package, the customers, need a way to use them to pay their utility bills like electric city, water bill, telecom payment, tax payments and other small but habitual transactions. The banks should work hand in hand with these service providers which have the capacity to transform the banking payment system.

5.4 Suggestions for further studies

As was indicated in the scope and limitation section this study was only confined to the seven selected commercial Banks in Ethiopia. Hence, the study could be further enhanced by including more commercial banks. The study could also developed by including more independent and control variables like CBE birr, hello cash, amole and agent banking to the regression model. Moreover, if further studies are supplemented with qualitative data, the findings would be more informative.

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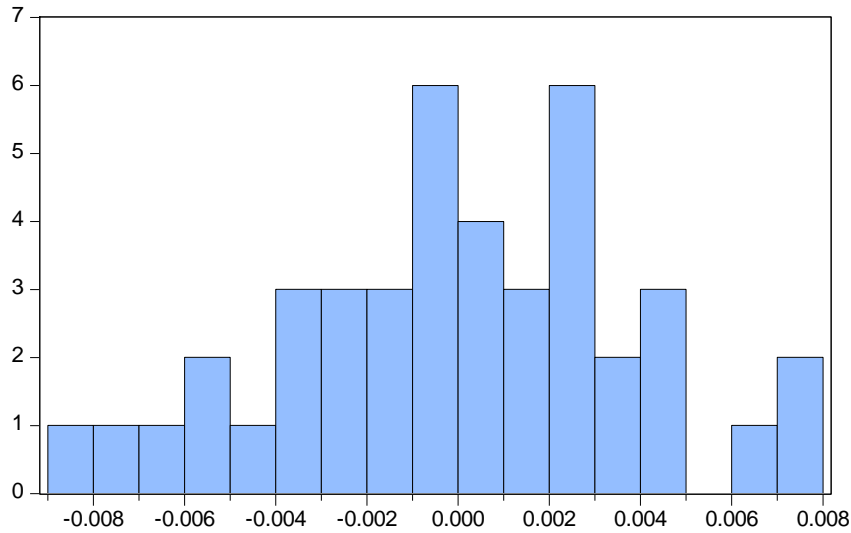
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Appendix

Appendix I: Diagnostic tests results for OLS Assumptions

Normality test

ROA

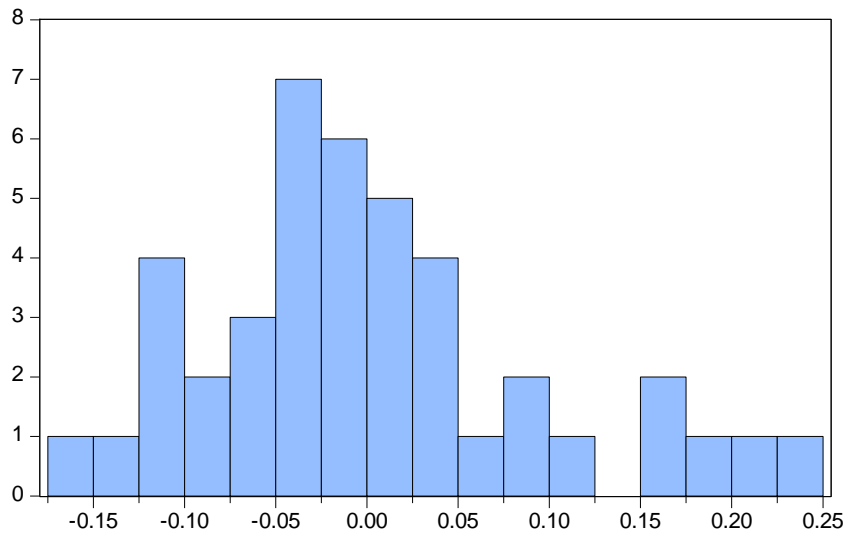


Series: Standardized Residuals
Sample 2013 2018
Observations 42

Mean -2.48e-19
Median 1.92e-05
Maximum 0.007459
Minimum -0.008628
Std. Dev. 0.003795
Skewness -0.193521
Kurtosis 2.677278

Jarque-Bera 0.444414
Probability 0.800750

ROE



Series: Standardized Residuals
Sample 2013 2018
Observations 42

Mean -2.91e-17
Median -0.017342
Maximum 0.244397
Minimum -0.164446
Std. Dev. 0.093797
Skewness 0.821612
Kurtosis 3.343596

Jarque-Bera 4.931926
Probability 0.084927

ROA Autocorrelation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.096979	Prob. F(3,34)	0.1189
Obs*R-squared	6.557785	Prob. Chi-Square(3)	0.0874

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 01/14/19 Time: 04:16

Sample: 1 42

Included observations: 42

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.024346	0.038334	0.635113	0.5296
LNIATM	0.000106	0.002677	0.039661	0.9686
LNIPOS	0.000810	0.001602	0.505328	0.6166
LNIIB	-0.000506	0.002913	-0.173805	0.8630
LNIMB	-0.001935	0.003143	-0.615793	0.5421
RESID(-1)	0.419009	0.178261	2.350541	0.0247
RESID(-2)	0.034945	0.200067	0.174668	0.8624
RESID(-3)	0.027158	0.179648	0.151172	0.8807

R-squared	0.156138	Mean dependent var	1.22E-17
Adjusted R-squared	-0.017599	S.D. dependent var	0.007318
S.E. of regression	0.007383	Akaike info criterion	-6.809749
Sum squared resid	0.001853	Schwarz criterion	-6.478764
Log likelihood	151.0047	Hannan-Quinn criter.	-6.688430
F-statistic	0.898705	Durbin-Watson stat	1.954998
Prob(F-statistic)	0.518698		

ROE Autocorrelation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.990045	Prob. F(4,29)	0.1224
Obs*R-squared	8.830244	Prob. Chi-Square(4)	0.0655

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 01/14/19 Time: 08:29

Sample: 2 42

Included observations: 41

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.175900	0.433014	-0.406221	0.6876
LNIATM	0.024656	0.028846	0.854760	0.3997
LNIPOS	0.005658	0.014939	0.378717	0.7077
LNIIB	-0.030103	0.031741	-0.948388	0.3508
LNIMB	0.019166	0.027598	0.694479	0.4929

CBEROE2017DUM	0.124239	0.127509	0.974355	0.3379
CBEROE2018DUM	0.100607	0.082408	1.220844	0.2320
ROE(-1)	-0.622516	0.287252	-2.167143	0.0386
RESID(-1)	0.760138	0.288003	2.639339	0.0132
RESID(-2)	0.601438	0.314281	1.913695	0.0656
RESID(-3)	0.396703	0.314199	1.262585	0.2168
RESID(-4)	0.330198	0.359229	0.919185	0.3656
<hr/>				
R-squared	0.215372	Mean dependent var	-6.97E-17	
Adjusted R-squared	-0.082246	S.D. dependent var	0.061818	
S.E. of regression	0.064309	Akaike info criterion	-2.411131	
Sum squared resid	0.119935	Schwarz criterion	-1.909598	
Log likelihood	61.42818	Hannan-Quinn criter.	-2.228500	
F-statistic	0.723653	Durbin-Watson stat	1.962368	
Prob(F-statistic)	0.707224			

ROAHeteroskedasticity Test

Heteroskedasticity Test: White

F-statistic	0.334764	Prob. F(4,37)	0.8528
Obs*R-squared	1.466920	Prob. Chi-Square(4)	0.8325
Scaled explained SS	1.334500	Prob. Chi-Square(4)	0.8555

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 01/14/19 Time: 04:38

Sample: 1 42

Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000145	0.000203	0.716044	0.4785
LNIATM^2	5.50E-07	9.04E-07	0.607985	0.5469
LNIPPOS^2	-2.35E-07	6.32E-07	-0.371980	0.7120
LNIIIB^2	-1.06E-06	1.05E-06	-1.009416	0.3193
LNIMB^2	2.50E-07	1.09E-06	0.229472	0.8198

R-squared	0.034927	Mean dependent var	5.23E-05
Adjusted R-squared	-0.069406	S.D. dependent var	8.10E-05
S.E. of regression	8.38E-05	Akaike info criterion	-15.82516
Sum squared resid	2.60E-07	Schwarz criterion	-15.61830
Log likelihood	337.3284	Hannan-Quinn criter.	-15.74934
F-statistic	0.334764	Durbin-Watson stat	2.286746
Prob(F-statistic)	0.852773		

ROE Heteroskedasticity Test

Heteroskedasticity Test: White

F-statistic	1.627423	Prob. F(6,35)	0.1688
Obs*R-squared	9.161508	Prob. Chi-Square(6)	0.1647
Scaled explained SS	7.455163	Prob. Chi-Square(6)	0.2808

Test Equation:
 Dependent Variable: RESID^2
 Method: Least Squares
 Date: 01/14/19 Time: 08:11
 Sample: 1 42
 Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.077934	0.033427	-2.331487	0.0256
LNIATM^2	0.000196	0.000142	1.378766	0.1767
LNIPOS^2	7.98E-06	9.68E-05	0.082458	0.9348
LNIIB^2	-3.28E-05	0.000167	-0.196390	0.8454
LNIMB^2	0.000167	0.000167	0.999196	0.3246
CBEROE2017DUM^2	-0.020418	0.013992	-1.459269	0.1534
CBEROE2018DUM^2	-0.018055	0.013593	-1.328267	0.1927
R-squared	0.218131	Mean dependent var	0.008588	
Adjusted R-squared	0.084096	S.D. dependent var	0.013307	
S.E. of regression	0.012735	Akaike info criterion	-5.737841	
Sum squared resid	0.005677	Schwarz criterion	-5.448230	
Log likelihood	127.4947	Hannan-Quinn criter.	-5.631687	
F-statistic	1.627423	Durbin-Watson stat	1.093345	
Prob(F-statistic)	0.168823			

Appendix II: - Regression Result

ROA

Dependent Variable: ROA
 Method: Panel Least Squares
 Date: 01/14/19 Time: 03:55
 Sample: 2013 2018
 Periods included: 6
 Cross-sections included: 7
 Total panel (balanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.113453	0.046432	-2.443439	0.0204
LNIATM	0.008109	0.002113	3.838161	0.0006
LNIPOS	0.007148	0.001869	3.823477	0.0006
LNIIB	-0.008801	0.003416	-2.576607	0.0150
LNIMB	0.002838	0.003618	0.784425	0.4387

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.769252	Mean dependent var	0.032119
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Adjusted R-squared	0.694817	S.D. dependent var	0.007900
S.E. of regression	0.004364	Akaike info criterion	-7.810587
Sum squared resid	0.000590	Schwarz criterion	-7.355483
Log likelihood	175.0223	Hannan-Quinn criter.	-7.643773
F-statistic	10.33456	Durbin-Watson stat	1.834851
Prob(F-statistic)	0.000000		

(Source: Author's computation)

ROE

Dependent Variable: ROE
Method: Panel EGLS (Cross-section random effects)
Date: 01/14/19 Time: 03:54
Sample: 2013 2018
Periods included: 6
Cross-sections included: 7
Total panel (balanced) observations: 42
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.649764	0.191876	-13.80978	0.0000
LNIATM	0.132862	0.013401	9.914553	0.0000
LNIPOS	-0.014105	0.007731	-1.824605	0.0766
LNIIB	0.021605	0.014683	1.471380	0.1501
LNIMB	0.036883	0.014659	2.516020	0.0166
CBEROE2017DUM	-0.075699	0.040146	-1.885595	0.0677
CBEROE2018DUM	-0.173133	0.039070	-4.431411	0.0001

Effects Specification		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		0.036689	1.0000

Weighted Statistics			
R-squared	0.518812	Mean dependent var	0.233988
Adjusted R-squared	0.436322	S.D. dependent var	0.135218
S.E. of regression	0.101519	Sum squared resid	0.360716
F-statistic	6.289435	Durbin-Watson stat	0.757743
Prob(F-statistic)	0.000148		

Unweighted Statistics			
R-squared	0.518812	Mean dependent var	0.233988
Sum squared resid	0.360716	Durbin-Watson stat	0.757743

(Source: Author's computation)