ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ACCOUNTING AND FINANCE

THE ROLE OF ELECTRONIC BANKING ON THE FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN ETHIOPIA

A Thesis Submitted to the School of Graduate studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Accounting and Finance.

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Addis Ababa, Ethiopia

Statement of Declaration

I declare that the thesis entitled: The role of electronic banking on the financial performance of commercial banks in Ethiopia, hereby submitted by me in partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance at Addis Ababa University, is my original work and has not been presented for the award of any degree in any other University or institution. I have undertaken it independently with the advice of my advisor, Abebe Yitayew (PhD). In performing the thesis I have used different sources and material which have been properly acknowledged.

Name: Elias Girma

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Date _____

Statement of Certification

This to certify that this thesis titled “The role of electronic banking on the financial performance of commercial banks in Ethiopia” carried out by Elias Girma Kebede. The work is original in nature and is suitable for the submission for the Master of Science Degree in Accounting and Finance.

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This is to certify that the thesis prepared by **Elias Girma**, entitled: **"The role of electronic banking on the 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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Internal examiner: _____ Signature _____ Date _____

External examiner:_____ Signature _____ Date _____

Advisor: Abebe Yitayew (PhD)_____Signature _____ Date _____

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List of Abbreviations and Acronyms

ATM	Automated Teller Machine
CLRM	Classical Linear Regression Model
DC	Debit Card
E-banking	Electronic banking
EFT	Electronic Fund Transfer
ETB	Ethiopian Birr
FEM	Fixed Effect Model
ICT	Information and Communication Technology
Ksh	Kenyan Shilling
LM	Linear Model
LOG	Logarithm
MOB	Mobile banking
NBE	National Bank of Ethiopia
NIAT	Net income after tax
NIBT	Net income before tax
NIM	Net Interest Margin
OLS	Ordinary List Square
PAT	Profit after Tax
PBT	Profit before Tax
POS	Points of Sale

REM	Random Effect Model
ROA	Return on Asset
ROE	Return on equity
SMS	Short Message Service
SSA	Sub Saharan African
TPB	Theory of Planned Behavior

Abstract

This study examines the Roles of E-banking on Financial Performance of commercial Banks in Ethiopia using return on equity as proxy of profitability. Technological development by banks is significant to maximize returns and pull in more customers who are becoming complex and demanding for better and quality service. The study used secondary data and employed purposive sampling technique to select ten commercial banks operating in Ethiopia covering the periods from 2015 to 2018. In light of prior literature, key bank specific and macroeconomic variables were identified to disclose their relationship and influence on financial performance of commercial banks. These variables were number of ATM terminals, number of debit cards, number of mobile banking users, value of ATM transactions, value of mobile banking transactions, bank size and inflation rate. The fixed effect regression technique and correlation analysis was used to analyze the data using the econometric package STATA version 13 software. The regression analysis showed that from bank specific variables, number of mobile banking users and value of ATM transactions had positive and significant roles on bank's profitability measured by return on equity which indicated that increasing the number of mobile banking users and the value or price of transactions executed by ATM had a positive roles on the financial performance of commercial banks as these made basic financial services more accessible by minimizing time and distance to the nearest bank branches as well as reduced the bank's overheads and transaction- related costs and had the potential to extend the limited nature and reach of the formal financial services to various customers thereby increasing their profitability. On the other hand bank size had negative and significant role while inflation had a positive significant role from macroeconomic variable on bank's profitability. The study suggests that focusing and enhancing on awareness creation alongside the key internal drivers could enhance e-banking practice as well as the performance of commercial banks in Ethiopia.

Keywords*: **Electronic Banking; Commercial banks; ROE; Profitability and Macroeconomic.***

CHAPTER ONE

INTRODUCTION

This chapter begins by presenting brief background of the study which is followed by the statement of the problem. Under the statement of the problem, the study states the reasons to carry out this study. Following the statement of the problem, the general and specific objectives of the study are presented. The next section presents the research hypothesis. Finally, significance of the study, scope and limitation of the study including organization of the paper are presented.

1.1. Background of the Study

Banks play significant role for economic development of nations in general and of developing countries like Ethiopia in particular, where the financial system as a whole is bank dependent due to poor development or even absence of the stock market. Banks play an important role as financial intermediaries for savers and borrowers in an economy. Financial intermediaries as a component of the financial system provide a payment mechanism, match supply and demand in the financial markets, deal with complex financial instruments and markets, provide market transparency, and perform risk transfer and risk management functions. All sectors of the economy virtually depend on the banking sector for their very survival and growth. Thus, financial performance analysis of commercial banks has been of great interest to academic research (Elshaday, T., Kenenisa, D. and Mohammed,S. 2018).

The fast advancing global information infrastructure, information technology and computer networks such as the Internet and Telecommunication systems, enabled the development of electronic commerce at a global level. The nearly universal connectivity which the Internet offers has made it an invaluable business tool. These developments have created a new type of economy, which is called the digital economy (Shah and Clarke, 2009).Today e-banking starts a new phase in competition because of its characteristics like speed, efficiency, diminishing the expenses, and gaining benefit of the unique opportunities. Obviously, if the bank`s investment rises the profitability, the e-banking usage in banking industry would be beneficial (Torki et al., 2004).

Electronic banking (e-banking) is the use of electronic and telecommunication networks to deliver a wide range of value added products and services to bank customers (Steven, 2002). It is transforming the banking and financial industry in terms of the nature of core products or services and the way these are packaged, proposed, delivered and consumed. It is an invaluable and powerful tool driving development, supporting growth, promoting innovation and enhancing competitiveness (Gupta, 2008; Kamel, 2005). The evolution of banking technology has been driven by changes in distribution channels as evidenced by automated teller machine (ATM), Mobile banking, Tele-banking, PC-banking and most recently internet banking (Gallup Consulting, 2008). ATM cards, credit cards, debit cards, smart cards, POS, mobile banking, all these have eased up human life to an extent that today life without these happen to be hard and loaded with inconveniences. The financial business over time has opened to noteworthy change that can be called e-developments which is progressing quickly in all areas of financial intermediation and financial markets, for example, e-finance, e-money, electronic banking (e-banking), e-brokering, e-insurance, e-exchanges, and even e-supervision (Bonsu, F. 2015).

The application of information and communication technology concepts, techniques, policies and implementation strategies to banking services has become a subject of fundamental importance and concerns to all banks and indeed a prerequisite for local and global competitiveness banking. The advancement in Technology has played an important role in improving service delivery standards in the banking industry. In its simplest form, Automated Teller Machines (ATMs) and mobile banking now allow consumers carry out banking transactions beyond banking hours. With online banking, individuals can check their account balances and make payments without having to go to the bank hall. This is gradually creating a cashless society where consumers no longer have to pay for all their purchases with hard cash hence improving customer relationship management system. For example, bank customers can pay for airline tickets by transferring the money directly from their accounts, or pay for various goods and services by electronic transfers of credit to the sellers account. As most people now own mobile phones, banks have also introduced mobile banking to cater for customers who are always on the move. Mobile banking allows individuals to check their account balances and make fund transfers using their mobile phones (Bonsu, F. 2015).

The practice of excellent service delivery integrated with consumer items is a powerful generator to cater for customers' needs and also engage them. Considering the fact that numerous banks offer undifferentiated products in a rival marketplace, banks are giving careful consideration to service delivery in order to pick up a greater advantage over their competitors. “Banks that deliver quality services can pick up a competitive edge in terms of higher revenue hence benefit, customer loyalty and customer retention” (Kumar et al., 2010).

The banking industry in Ethiopia is embarking on capacity building preparations and modernize the banking system by employing the state of the art technology being used anywhere in the world (Gardachew, W. 2010). Same fashion, now a day Commercial Bank of Ethiopia and other private Commercial Banks are also implementing different kinds of e-banking services. A few from among are: Internet banking, mobile banking, ATM (Automated Teller Machine) and POS (Point of Sale Terminal) channels.

The emergence of E-banking in Ethiopia goes back to the late 2001, when the largest state owned commercial bank of Ethiopia (CBE) introduced ATM to deliver service to the local users. Despite being the pioneer in introducing ATM based payment system, CBE was challenged by other competitor banks like Dashen Bank, which worked aggressively to maintain its lead in e-payment system (Gardachew, W. 2010).

The rapidly growing information and communication technology is knocking the front-door of every organization in the world, where Ethiopian banks would never be exceptional. In Ethiopia, however, cash is still the most dominant medium of exchange, and electronic payment systems are at an embryonic stage. In the face of rapid expansion of electronic payment systems throughout the developed and the developing world, Ethiopia’s financial sector cannot remain an exception in expanding the use of the system. Currently the use of cash has been replaced by digital cash and digital wallets. It can be precisely said that this is the fourth stage of evolution after Barter, Currency, Paper money (Checks) and now digital cash (Gardachew, W. 2010).

1.2 Statement of the Problem

Electronic banking has been recognized to play an important role in economic development on the basis of their ability to create liquidity in the economy through financial intermediation. Electronic banking system like mobile banking (m-banking), ATMs and internet banking has a

great impact on bank performance because they increase profitability, reduce bank cost of operations, and increase bank asset and bank efficiency (Ngango, M.A. 2015). Electronic banking has made banking transaction to be easier by bringing services closer to its customers hence improving banking industry performance (Josiah, A. and Nancy, k. 2012).

With the changes in the banking environment, all commercial banks in Ethiopia are investing a significant sum of their capital towards digital banking and digitizing their operations in order to meet up with international standards and also to gain domestic competitiveness (NBE websites), and It has been proven that integrating e-banking in banking operations leads to increase efficiency and speed in terms of how transactions are conducted and service delivered thus leading to increase profitability in the long run. But at the same time significant investment will have to be put in order to achieve a fully integrated e-banking sector, therefore the aspect of cost also comes in here, It is therefore important that e-banking innovations are made through sound analysis of risks and costs associated so as 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 (Josiah, A. and Nancy, k. 2012).

Pertinent to previous studies, different attributes have been reflected on the area of e-banking by various scholars. For example, Solomon, W. (2016) conducted a research on the roles of e-banking on financial performance of commercial banks in Ethiopia. The study used secondary data and employed purposive sampling technique to select ten commercial banks operating in Ethiopia covering the periods from 2013 to 2015.Using ROA as one of the most fundamental indexes of profitability, key explanatory variables were identified to disclose their relationship and influence on financial performance of commercial banks. These independent and other control variables were value or price of transaction of ATM, value or price of transaction of POS, debit card, number of automated teller machine terminals, number of point of sale terminal and market share of banks. Result exhibited that numbers of ATM terminals, number of POS terminals and bank market share had positive and significant role on financial performance of commercial banks measured by return on asset. The study showed that increased number of ATM, POS and market share had a positive role on the financial performance of commercial

banks with many banking institutions indicating that increased market share allowed a company to achieve greater scale in its operations which generally improved its profitability.

Girma, A.(2016) conducted a research on the impact of ICT (Information and Communication Technology) on the performance of Ethiopian banking industry using secondary data over the period 2010 – 2014. The study employed purposive sampling technique to select the required sample of banks from commercial banks in Ethiopia. Using ROA as a measure of performance in the study and the explanatory variables were ICT investment, ATM, POS, INF, BRAN and GDP. The finding showed that the ICT, ATM and POS had no statistically significant effect on return on asset on commercial banks in Ethiopia. Moreover the study result showed that the POS, ICT and number of branches had negative effect on return on asset on commercial banks in Ethiopia.

Despite the importance of e-banking in explaining banking performance, research on the effect of e-banking on banks performance is insufficient. Attempts have been made to investigate the role of electronic banking on bank performance, although the outcomes of the research are contradicting each other, For example, Karawish, H.A and Al-sa'di (2011) made an attempt to assess the impact of e-banking on profitability of the bank sectors, and results have shown that applying the e-banking services through the internet had no significant effect on Return on Equity (ROE), but significant in terms of Return on Assets (ROA). Three years later, similar study conducted by Mensah, M. (2014) clearly elaborated that e-banking had significant impact on profitability of banks both in terms of ROA and ROE. These researchers reached a conclusion by inferring ROA and ROE, but the present research tried to encompass ROA, ROE, and NIM which is more comprehensive than prior researches.

Although a number of earlier studies have made to add their own contribution to the role of electronic banking service on financial performance of commercial banks and stated their own policy implication, most of the studies were out of contexts where the cultural, geographical, and economic conditions are different from Ethiopia. But, few studies have been conducted on the roles of e-banking on the financial performance of commercial banks in Ethiopia. For instance, study conducted by Solomon,W. (2016) and Girma, A.(2016), However, other research works conducted in Ethiopia in relation to the issue of electronic banking, concentrated on adoption of e-banking and its challenge and opportunities in Ethiopian banking industry, i.e (Ayana, G.

2010) on adoption of e-banking in Ethiopia; Barriers and Drivers; Gardachew, W. (2010) on electronic banking practices in Ethiopia: opportunities and challenges, Million, (2013) on impact of electronic banking on customer satisfaction. This implies that prior research works did not give an emphasis on e-banking implication on profitability.

So the theme of this research is to examine the roles of e-banking on the financial performance of commercial banks in Ethiopia by adding variables: number of mobile banking users and value of transaction executed by mobile banking as a proxy of e-banking which were not included in previous study.

This study therefore intends to fill these relevant gaps in literature by studying the roles of e-banking service on ROE as a financial performance indicator of commercial banks by replicating the existing, in the Ethiopian context, and by providing other factors that are untouched and that affect profitability.

1.3 Research Objectives

1.3.1 General Objective of the Study

The general objective of the study is to examine the role of electronic banking service on financial performance of commercial banks in Ethiopia, focusing on its role on return on equity (ROE).

1.3.2 Specific Objectives

Specifically, this study addresses the following objectives:-

- To examine the roles of ATM terminals on the financial performance of commercial banks in Ethiopia
- To examine the roles of Debit cards on the financial performance of commercial banks in Ethiopia

- To examine the roles of Mobile banking on the financial performance of commercial banks in Ethiopia
- To examine the roles of Bank size on the financial performance of commercial banks in Ethiopia
- To examine the roles of inflation rate on the financial performance of commercial banks in Ethiopia

1.4 Research Hypothesis

The following research hypotheses were developed in order to address the research question. Therefore, this study attempts to test the following hypothesis, in order to address the impact of e-banking on the financial performance of commercial banks in Ethiopia.

Hypothesis 1: Number of ATM terminals has positive and significant role on ROE of Commercial banks in Ethiopia

Hypothesis 2: Number of debit card users has positive and significant role on ROE of Commercial banks in Ethiopia

Hypothesis 3: Number of mobile banking users has positive and significant role on ROE Of commercial banks in Ethiopia

Hypothesis 4: Value of transaction of ATM has positive and significant role on ROE of Commercial banks in Ethiopia

Hypothesis 5: Value of transaction executed by mobile banking has positive and significant role On ROE of commercial banks in Ethiopia

Hypothesis 6: Bank size has positive/negative significant role on ROE of commercial banks In Ethiopia

Hypothesis 7: Inflation has positive/negative significant role on ROE of commercial banks In Ethiopia

1.5 Significance of the Study

The finding of the study will be of great importance to managers of commercial banks in Ethiopia as they will understand the effect of electronic banking on profitability of commercial banks in Ethiopia, this will assist them in making decision on whether to adopt electronic

banking or not and the expected results of electronic banking adoption to their banks profitability.

The study finding will enlighten the policy makers in the banking industry on the expected effect of electronic banking on banks profitability; this will assist them in designing appropriate policy for electronic banking adoption of commercial banks in Ethiopia.

The study will be of great importance to future scholars and academicians as it will form basis for future research as well as providing literature for future studies on electronic banking.

1.6 Scope and Limitations of the Study

The study was limited to the roles of electronic banking on the financial performance of commercial banks in Ethiopia, where bank size was used as the control variable; other aspects that influence performance of the banks were not considered in this study. Other factors include; other products offered by the bank for example internet banking, POS, the different types of accounts, loans and advances, investments for example in government securities among others, but not relevant for this study and were cited by many other researchers.

The study was also limited to the degree of precision of the data obtained from the secondary source. While the data was verifiable since it came from each selected banks' head office and commercial banks published annual audited financial statements the data could still have some shortcomings as to precision.

The study was also limited to 10 out of 18 commercial banks registered in Ethiopia; the findings will be generalized to the entire banking industry. The study was based on 4 years period from year 2015 to 2018. The short period which especially mobile banking has been in existence could not give a long trend for analysis. Mobile banking was only introduced in Ethiopia in 2012(VOA news). It has only been seven years since the launch which may not give a clear picture of the relationship as not all commercial banks have adopted mobile banking in its operations. This may have probably given a shorter time focus hence given a limited dimension to the problem. The size of the bank has been held constant across the period.

Lastly, the study did only factor, annual inflation rate in the changes in the macroeconomic environment and did no factor other changes in the macroeconomic environment such as real

GDP and Foreign exchange rate that could have affected the financial performance of commercial banks.

1.7 Organization of the Paper

This study consists of five chapters. Chapter one presents introduction, statement of the problem, objective of the study, hypotheses, scope and limitations and significance of the study. Chapter Two reviews the most significant theoretical and empirical studies. Chapter three presents methodology of the study. Then chapter four provides data analysis and presentation of econometric model outcomes and finally, chapter five gives summary, conclusions and recommendations with policy implication and further research direction.

CHAPTER TWO

LITERATURE REVIEW

This chapter discusses the literature related with e-banking. Accordingly, the review of the literature provides the reader with the explanation of the theoretical rationale of the problem being studied, types of electronic banking as well as what research has already been done and how the findings relate to the problem at hand. The purpose of the literature review is to avoid unnecessary intentional or accidental duplication of material already covered. This literature review was reviewed from previous past major activities that had been undertaken to address the issues in electronic banking.

2.1 Theoretical Review

There are numerous theoretical foundations that serve as basis to formulate a model to practice a research. For instance, in determining the performance and profitability of the bank service employing high technology devices and machines there are four significant theories. These are innovation diffusion theory; task technology fit theory, theory of planned behavior, and technology acceptance model. According to (Ajzen, I. 1991), a theoretical framework guides research, determining what variables to measure, and what statistical relationships to look for in the context of the problems under study. Thus, the theoretical literature helps the researcher to identify clearly the variables of the study; provides a general framework for data analysis; and helps in the selection of applicable research design.

2.1.1 Innovation Diffusion Theory

This theory was officially introduced by Bradley and Stewart in the year 2002 and it affirms that firms engage in the diffusion of innovation in order to gain competitive advantage, reduce costs and protect their strategic positions. The innovation diffusion theory put forward by Rogers in 1962 is a well -known theory that explains how an innovation is diffused among users over time (Liu, Y. & Li, H. 2009).It also helps to understand customers‟ behavior in the adoption or non-adoption of an innovation (Vaugh, J., Schavione, F. 2010; Lee and others, 2003). The theory depicts that the adopters of any innovation follow a bell shaped distribution curve which may be divided into five parts to categorize users in terms of innovativeness (Liu, Y. & Li,

H. 2009). Rogers classified users as innovators, early adopters, early majority, late majority and laggards (Liu, Y. & Li, H. 2009).

The adoption and use of mobile banking has the potential to extend the limited nature and reach of the formal financial sector to the poor and rural population in Africa. Most of the existing literature is from the developmental practitioners' arena with a few scholarly studies emerging (Mas, I. and Morawczynski, O. 2009).

Although most of the studies from the practitioners are not peer reviewed, they provide valuable information on actual usage and contextual information on the development and use of the phenomenal. For example, Ivatury, G. and Pickens, M. (2006) provided valuable insight into the characteristics of the early adopters of WIZZIT, one of the first major initiatives dedicated to offering mobile banking to the poor in South Africa.

By applying the traditional technology acceptance models and frameworks to the adoption of transformational mobile banking services, this study aims to bring the discussion to the mainstream information systems literature. This theory was used to study how various new mobile banking products affects financial performance of commercial banks.

2.1.2 Task Technology Fit (TTF) Theory

Task technology fit (TTF) theory contends that information technology (IT) is more likely to have a positive impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform (Goodhue, D., & Thompson, R. 1995). Further, Goodhue, D. & Thompson, R. (1995, P.141) mentioned the factors that measure task-technology fit as; quality, floatability, authorization, and compatibility, eases of use/training, production timeliness, systems reliability and relationship with users". Their model is useful in the analysis of various context of a diverse range of information systems including electronic commerce systems and combined with or used as an extension of other models related to information systems outcomes.

According to TTF theory the success of an information system have a strong correlation between task and technology, hence success has been related to individual performance (Goodhue, D. & Thompson, R.1995) and to group performance **(**Zigurs, I. & Buckland, B. 1998). For group

support systems, a specific theory of TTF was developed by Zigurs, I. & Buckland, B. (1998) and later tested by Wilson et al. (1999) and detailed the requirements of group support systems to fit group tasks. For mobile information systems, TTF has been shown to be generally relevant, but more specific questions regarding the applicability of task technology fit to mobile information systems remain unanswered (Gebauer, J. & Shaw, M. 2004).

The theory of task-technology fit maintains that a match between business tasks and information technology is important to explain and predict the success of information systems (Goodhue, D. & Thompson, R.1995; Zigurs, I. & Buckland, B. 1998). For various scenarios of task and technology, statistical significance has been established of a positive association between task-technology fit and information system success measures, such as Dishaw, M. & Strong, D. 1999, and impact on individual performance Goodhue, D. & Thompson, R. 1995, and on group performance (Zigurs et.al 1999). The concept of task technology fit promises to help identify aspects that are critical to support a given business task, and can thus, contribute to the success of technology innovations (Junglas, I. & Watson, R. 2006). One such innovation is represented by mobile technology to support an increasingly mobile workforce (Barnes, S.J. 2003).

2.1.3 Theory of Planned Behavior

The theory of planned behavior (TPB) was developed by Ajzen, I. 1988. The theory posits that individual behavior is driven by behavior intentions, where behavior intentions are a function of three determinants: an individual's attitude toward behavior, subjective norms and perceived behavioral control. Attitude refers to the degree to which a person has positive or negative feelings of the behavior of interest. Behavioral intention represents a person's motivation in the sense of her or his conscious plan or decision to perform certain behavior (Conner, M. & Armitage, C.J. 1998). Subjective norms perceived are a person's own estimate of the social pressure to perform the target behavior. Subjective norms are assumed to have two components which work in interaction: beliefs about how other people, who may be in some way important to the person, would like them to behave (normative beliefs). Perceived behavioral control is the extent to which a person feels able to enact the behavior. It has two aspects: how much a person has control over the behavior and how confident a person feels about being able to perform or not perform the behavior (Conner, M. & Armitage, C.J. 1998).

The theory of planned behavior predicts behavior, because behavior is planned. This theory has been widely applied and extended to studies on individual behavior, especially in the prediction of individual's intention to behave and the actual behavior. It is generally expected that the more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior (Chen, S. & Li, S. 2010).

2.1.4 Technology Acceptance Model

Technology acceptance model (TAM) was originally proposed by Davies in 1986. This model was designed to forecast the user's acceptance of information technology and usage in an organizational setting. David, C. (2004) posits that firms are adopting technology to cope with the dynamics of the external environment. This model has been tailored in a manner that can accommodate changes for improved costs reduction and efficiency. Technology Acceptance Model deals with perceptions as opposed to real usage, the model suggest that users , the key factors that influence their decision on how, where and when they will use it (Davis, F.D 1989).

The factors to consider are: Perceived usefulness (PU). According to Davis, it is the degree to which a person believes that using a particular system will lead to improved performance (Britton, D.B & McGonegal, S. 2007). Perceived ease-of-use (PEOU) is explained as the degree to which a person believes that using a particular system would results to improved productivity. The TAM was proposed by Davis, F.D. (1989), this model expounds on the attitude behind the objective to use technology or a services. This theory is relevant to this study since it explains user's acceptance of information technology and usage in an organizational context. Acceptance is the first process in technology use and has a bipolar implication. First of all acceptance is a precursor to adoption and hence this theory complements the preceding theories. Secondly, acceptance dictates the attitude and perception of the users which eventually affects efficiency of use and hence performance. Strategic adoption as well as operational efficiency and hence productivity of systems are a function of acceptance of the technology. It is thus plausible to conclude that without acceptance, the rest of the theories would be redundant and invalid. Though acceptance is an initial phase, it is also an attitude shaping facet that influences adoption and effectiveness of use Davis, F.D. (1989).

2.1.5Theories of Bank Profitability

According to literatures, bank performance studies have been started in the late 1980s and/or early 1990s. These studies revolve on different theories. For Instance, the signaling theory, which elaborates the relationship between capital and profitability, suggests that higher capital is a positive signal to the market of the value of bank. (Berger, A.N. 1995) By the same token, a lower leverage indicates that banks perform better than their competitors who can't raise their equity without further deteriorating the profitability (Ommeren, S. 2011).

Bankruptcy cost hypothesis on the other hand, argues that in case where bankruptcy costs are unexpectedly high , a bank holds more equity to avoid period of distress (Berger, 1995). Hence, both the signaling theory and bankruptcy cost hypothesis support the existence of a positive relationship between capital and profitability. However, the risk-return hypothesis suggests that increasing risks, by increasing leverage of the firm, leads to higher expected return (profitability) on one hand and it will definitely reduce the equity to asset ratio (represented by capital) on the other hand. Thus, risk-return hypothesis predicts a negative relationship between capital and profitability. (Obamuyi, T.M. 2013)

Contrary to the above argument, Modigliani - Miller theorem conclude that no relationship exists between the capital structure (debt or equity financing) and the market value of the bank (Modigliani and Miller, 1958). In other words, no relationship exists between equity to asset ratio and funding costs or profitability under perfect market. However, when the concept of Money Market's perfect market is scrutinized there is no such a thing in the real world owing to agency problem, information asymmetry problem, existence of transaction costs, etc. Thus, when the perfect market does not hold there could be a possible negative relationship between capital and profitability. (Ommeren, S. 2011)

Olweny and Shipho (2011) argued that the Market Power theory (MP) assumes bank profitability is a function of external market factors, while the Efficiency Structure (ES) theories and the balanced portfolio theory largely assume that bank performance is influenced by internal efficiencies and managerial decisions. Despite the existence of several models to deal with bank specific aspects, none of the models are believed to be sufficient to express all bank specific behaviors in a holistic manner.

2.1.6 Definition of E-Banking

The term e-banking can be explained in different way from different perspectives. Nonetheless, researchers across the world have made extensive efforts to provide a precise and all-inclusive concept of e-banking.

E-banking means a system through which financial service providers, customers, individuals and businesses are able to access their accounts, do transactions and obtain latest information on financial products and services from public or private networks, such as the internet. For example, using intelligent devices such as personal computer, automated teller machines (ATMs) and personal digital assistant (PDA), customers access e-banking services and do their transactions with less effort as compared to the branch based banking. The term "e-banking" refers to a method of banking through which customers are able to carry out their banking transactions electronically without visiting a bank branch (Simpson, J. 2002).

Electronic banking or e-banking refers to an umbrella term for the process by which a customer may perform banking transactions electronically without visiting a brick-and-mortar institution (Ombati et al, 2011). E-banking is also 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.

The concept of e-banking is a delivery channel for banking services. Banks have used electronic channels for years to communicate and transact business with both domestic and international corporate customers. With the development of the Internet and the World Wide Web (WWW) in the latter half of the 1990s, banks are increasingly using electronic channels for receiving instructions and delivering their products and services to their customers. This form of banking is generally referred to as e-banking or Internet banking, although the range of products and services provided by banks over the electronic channel vary widely in content, capability and sophistication.

Daniel, E. (1999), defines E-banking is as the automated delivery of new and traditional banking products and services directly to customers through electronic, interactive communication channels.

Salehi, M. and Zhila, A. (2008), describes e-banking as an electronic connection between bank and customer in order to prepare, manage and control financial transactions. Electronic banking can also be defined as a variety of following platforms: (i) Internet banking (or online banking), (ii) telephone banking, (iii) TV-based banking, (iv) mobile phone banking, and e-banking (or offline banking).

According to Shan, T.C. (2004), Electronic banking (e-banking) can be defined as the automated, smooth and efficient delivery of modern and traditional banking services through electronic and communicative channels. It includes the systems that customers use to access accounts, transact businesses and obtain information through networks, including the internet. Electronic banking is, therefore, a general term describing the whole process of performing such transactions without the need to physically visit the financial institution. All of the following terms refer to different forms of electronic banking; personal computer (PC) banking, online banking, home banking, mobile banking and virtual banking. Virtual banking is the situation where banks do all their transactions online by the use of mobile, emails and Automated Teller Machines without having a physical location while online banking involves the bank having a physical location but offering services online. Internet banking is called transactional online banking, because it involves provision of facilities such as accessing accounts, funds transfer and buying financial products or services online.

According to Arunachalam, L and Sivasubramanian, M. (2007), Internet (electronic) banking is where a customer can access his or her bank account via the Internet using personal computer (PC) or mobile phone and web-browser. In addition, Ongkasuwan, M and Tantichattanon, W. (2002) further defines Internet (electronic) banking service as banking service that allows customers to access and perform financial transactions on their bank accounts from their web enabled computers with Internet connection to banks' web sites any time they wish. Internet banking service also enables bank customers to perform transactions such as transfer and payments, access of latest balance, statement viewing, account detail viewing, customization, print, downloading of statements and obtaining a history statement on all accounts linked to the bank’s customers‟ Auto Bank (ATMs).

According to Khan, S.K (2007), Internet (electronic) banking includes the system that enables financial institution customers, individuals or businesses, access accounts, transact business, or

obtain information on financial products and services on public or private network including Internet. Internet (electronic) banking is the act of conducting financial intermediation on the Internet (Kim et al., 2006). It is that process whereby the customer is able to access, control and use his/her account over the Internet. It should be noted, however, that the terms used to describe the various types of electronic banking are often used interchangeably.

2.1.7 Overview of Banking and Banking Practice in Ethiopia

It was in 1905 that the first bank, the -Bank of Abyssinia‖, was established based on the agreement signed between the Ethiopian Government and the National Bank of Egypt, which was owned by the British. According to the agreement, the bank was allowed to engage in commercial banking (selling shares, accepting deposits and effecting payments in cheques) and to issue currency notes. The agreement prevented the establishment of any other bank in Ethiopia, thus giving monopoly right to the Bank of Abyssinia. Apart from serving foreigners residing in Ethiopia, and holding government accounts, it could not attract deposits from Ethiopian nationals who were not familiar with banking services (Fasil, A. & Merhatibeb, T. 2009).

The Ethiopian Government, under Emperor Haile-Sellassie, closed the Bank of Abyssinia and established the Bank of Ethiopia which was fully owned by Ethiopians. The Bank started operation in 1932. The majority shareholders of the Bank of Ethiopia were the Emperor and the political elites of the time. The Bank was authorized to combine the functions of central banking (issuing currency notes and coins) and commercial banking. With the Italian occupation (1936-1941), the operation of the Bank of Ethiopia came to a halt, but a number of Italian financial institutions were working in the country. These were Banco Di Roma, Banco Di Napoli and Banca Nazionale del Lavora. It should also be mentioned that Barclays Bank had opened a branch and operated in Ethiopia during 1942-43. With the departure of the Italians and the restoration of Emperor Haile Selassie‘s government, the State Bank of Ethiopia was established in 1943. In 1963, the State Bank of Ethiopia split into the National Bank of Ethiopia and the Commercial Bank of Ethiopia S.C. with the purpose of segregating the functions of central banking from those of commercial banking. The new banks started operation in 1964 (Fasil, A. & Merhatibeb, T. 2009).

The first privately owned company in banking business was the Addis Ababa Bank S.C., established in 1964. The Bank carried out typical commercial banking business. Banco Di Roma and Banco Di Napoli also continued to operate. Thus, until the end of 1974, there were state owned, foreign owned and Ethiopian owned banks in Ethiopia. The banks were established for different purposes: central banking, commercial banking, development banking and investment banking. Such diversification of functions, lack of widespread banking habit among the wider population, the uneven and thinly spread branch network, and the asymmetrical capacity of banks, made the issue of competition among banks almost irrelevant (Fasil, A. & Merhatibeb, T. 2009).

Following the 1974 Revolution, on January 1, 1975 all private banks and 13 insurance companies were nationalized and along with state owned banks, placed under the coordination, supervision and control of the National Bank of Ethiopia. The three private banks, Banco Di Roman, Banco Di Napoli and the Addis Ababa Bank S.C. were merged to form ―Addis Bank.

Eventually in 1980 this bank was itself merged with the Commercial Bank of Ethiopia S.C. to form the ―Commercial Bank of Ethiopia, thereby creating a monopoly of commercial banking services in Ethiopia. In 1976, the Ethiopian Investment and Savings S.C. was merged with the Ethiopian government saving and Mortgage Company to form the Housing and Savings Bank.

The Agricultural and Industrial Development Bank continued under the same name until 1994 when it was renamed as the Development Bank of Ethiopia. Thus, from 1975 to 1994 there were four state owned banks and one state owned insurance company, i.e., the National Bank of Ethiopia (The Central Bank), the Commercial Bank of Ethiopia, the Housing and Savings Bank, the Development Bank of Ethiopia and the Ethiopian Insurance Corporation. After the overthrow of the Dergue regime by the EPRDF, the Transitional Government of Ethiopia was established and the New Economic Policy for the period of transition was issued. This new economic policy replaced centrally planned economic system with a market-oriented system and ushered in the private sector. Several private companies were formed during the early 1990s, one of which is Oda S.C. which conceived the idea of establishing a private bank and private insurance company

in anticipation of a law which will open up the financial sector to private investors (Fasil, A. & Merhatibeb, T. 2009).

Currently, the industry comprises one state-owned development bank and 17 commercial banks, one of which is state-owned, which is the dominant Commercial Bank of Ethiopia (CBE). After the merger of Construction and Business bank, with CBE that make the composition of the sector to two state owned banks; Commercial bank of Ethiopia and Development bank of Ethiopia and 16 private commercial banks. The private commercial banks currently operating in Ethiopia alphabetically: Abay bank, Addis International Bank, Awash International bank, Bank of Abyssinia, Birhan International bank, Bunna International bank, Cooperative bank of Oromia, Dashen bank, Debub global bank, Enat bank, Lion International bank, Nib international bank, Oromia International bank, united bank, Wegagen bank, and Zemen bank (www.nbe.gov.et).

Studies made regarding the financial sectors in Ethiopia witness its infancy and dominancy by the state owned Commercial bank. Keatinge (2014) strengthen this claim declaring, State owned CBE dominate the sector with assets accounting for approximately 70 percent of the industry's total holdings. The dominance of public sector banking certainly restricts financial intermediation and economic growth. It contrasts with regional and international peer countries where banking industries have a much higher share of private sector and foreign participation. (Keating, 2014) Literatures revel, compared to most countries, Ethiopia has taken a cautious approach toward the liberalization of its banking industry. For all intents and purposes, its industry is closed and generally less developed than its regional peers (Keating 2014 and Harvey1996).

The Ethiopian financial sector is dominated by the banking sector. Banks are the important component of any financial system. They play important role of channeling the savings of surplus sectors to deficit sectors. The efficiency and competitiveness of banking system defines the strength of any economy. Like other developing countries in Ethiopia banks plays a vital role in the process of economic growth and development. Despite a rapid increase in the number of financial institutions since financial liberalization, the Ethiopian banking system is still underdeveloped compared to the rest of the world. Cash is still the most dominant medium of exchange. The use of checks is mostly limited to government institutions, NGOs and some private businesses (Garedachew, W. 2010).

Commercial banks in Ethiopia provide the same services with the same operational style that they used to offer before decades. The common banking functions provided by public and private banks in Ethiopia are deposit mobilization, credit allocation, money transfer and safe custody. Banks in Ethiopia are unable to improve customer service, design flexible and customized products, and differentiate themselves in a market where product features are easily cloned. Ethiopian banking is unable to come from long way of being sleepy to a high proactive and dynamic entity. The customers of Ethiopian commercial banks have missed to enjoy with the technological advancement in banking sector which has been entertained elsewhere in Africa and the rest of the world. The modern banking methods like ATMs, Debit cards, Credit cards, Tele banking, Internet banking, Mobile banking and others are new to the Ethiopian banking sector.

E-banking which refers to the use of modern technology that allows customers to access banking services electronically whether it is to withdraw cash, transfer funds, to pay bills, or to obtain commercial information and advices are not known in Ethiopia. In Ethiopia it is impossible to withdraw money without presenting the pass book and money transfer is allowed only in between branches of the same bank. However, from the public and the economy there is a strong need for strengthening linkages among banks in order to allow healthy flow of financial resources among financial institutions and optimize the contributions of the entire financial system to the development processes as a whole (Garedachew, W. 2010).

2.1.7.1 Overview of E-Banking in Ethiopia

The appearance of E-banking in Ethiopia goes back to the late 2001, when the largest state owned, commercial bank of Ethiopia (CBE) introduced ATM to deliver service to the local users. In addition to eight ATM Located in Addis Ababa, CBE has had Visa membership since November 14, 2005. But, due to lack of appropriate infrastructure it failed to reap the fruit of its membership. Despite being the pioneer in introducing ATM based payment system and acquired visa membership, CBE Lagged behind Dashen bank, which worked aggressively to maintain its lead in E-payment system. Dashen bank, a forerunner in introducing e-banking in Ethiopia, has installed ATMs at convenient locations for its own cardholders (Garedachew, W. 2010).

By the end of 2008 Wegagen Bank has signed an agreement with Technology Associates (TA), a Kenyan based information technology (IT) firm, for the development of the solutions for the payment system and installation of a network of ATMs on December 30, 2008 (Asrat, S. 2010).

Zemen Bank, the only Ethiopian bank anchored in the idea of single branch banking, by launching full-blown internet banking, a service which is new to Ethiopian banking industry in the year 2010. The bank tested the venture through its first phase of the online service, and now it is already started the full-fledged version, which enable customers to make online money transfer freely. Previously, the online banking service, delivered by the bank, only gave access to bank statements and exchange rate information. The new and never-been-tried service proposed by the bank is to include free account money transfer, corporate payroll uploading system where employers could upload payroll to the system and make payments to individual worker's accounts online and online utility bill settlement system, when utility companies are ready (Asrat, S. 2010).

The number of banks which deliver E-banking service is increase gradually up to 2011 and reaches 4. Surprisingly, on June 2012, 3 banks enter in to the market with consortium which makes the provider of E-banking service to 7. And at the end of 2013, Berhan international bank joined group and makes the provider of E-banking service in to 8.now all commercial banks start e-banking service for their customers using et-switch solution (NBE website and Et-switch website).

Certainly the banking industry in Ethiopia is underdeveloped and therefore, there is an all immediate need to embark on capacity building arrangements and modernize the banking system by employing the state of the art technology being used anywhere in the world. With a growing number of import-export businesses, and increased international trades and international relations, the current banking system is short of providing efficient and dependable services and therefore all banks operating in Ethiopia should recognize the need for introducing electronic banking system to satisfy their customers and meet the requirements of rapidly expanding domestic and international trades, and increasing international banking services (Garedachew, W. 2010).

The agreement signed by three private commercial banks to launch an Automated Teller Machine (ATM) and Point of Sale terminal (POS) network, in February 2009 is welcoming strategy to improve electronic card payment system in Ethiopia. Three private commercial banks: Awash International Bank S.C., Nib International Bank S.C and United Bank S.C. have agreed in principle to establish an ATM network called Fettan ATM network. If everything goes as planned, Fettan ATM will install over 140 ATM machines and over 340 POSs across Ethiopia. There will be one ATM at every branch of the consortium banks, all domestic airports serviced by commercial service, shopping complexes and merchants. The agreement is the first significant cooperation between competing banks in Ethiopia, which others should be encouraged to follow as there is no single bank in Ethiopia that can afford to provide extensive geographical coverage and access (Binyam, T. 2009).

2.1.8 Types of E-Banking Service

2.1.8.1 Automated Teller Machine (ATM)

The basic form of non-branch bank is the ATM (Automated teller machine) 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. Kaplan, R. and Norton, D. (2002), postulate that ATM allows a bank customer to conduct his/her banking transactions from almost every other ATM machine in the world. However, the spread of the machines has been generating a lot of heat, as customers face a splurge of frustration in using it; either the machines will not dispense cash, or debit transactions when cash is not dispensed or cards get stuck in them. The proliferation of the machines is giving more concern. As with every other technological breakthrough the ATMs have generated astronomical challenges and problems for the beneficiaries of financial services in most countries. Most users of ATM have encountered the problem of scam.

The relationship between banking efficiency and the use of ATM (Automated Teller Machine) is a complex one. This is because the overall levels of efficiency and productivity do influence the organization overall success. This explains why most modern banking sectors develop ways of increasing organization and workers' efficiency. Some of these ways include goal setting, job

enrichment, adoption information technology, globalization, training and development (Karen, F. 2010). All these represent several practical ways of increasing banking sector's performance, which could also be a reflection of institutions efficiency.

2.1.8.2 Point of Sale Terminal (POS)

Point of sale is the place where a customer completes a transaction, such as a checkout counter and these point-of-sale transactions can be processed using a wide variety of tools including cash registers, electronic card readers and barcode scanners (Investopedia LLC, 2017). A POS is a device that installed in sale centers to remove the need to transfer the physical money and to deduct money from buyer account and to add it to seller account. This activity is done by a POS connected to central computer in the bank. It is provided by the bank for the seller and has modem and printer. Sale center and department stores are where POS is used. A POS perform functions like; exchanging currency from buyer account to seller account, that is very secure, printing the account on paper and bill paying availability (Meihami et al, 2013).

2.1.8.3 Mobile Banking Service

Mobile 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 or Personal Digital Assistant (PDA). Mobile banking is also known as M-Banking or m-banking. M-banking is defined as "a form of banking transaction carried out via a mobile phone". Moreover, it is defined as a "type of execution of financial services in the course of which - within an electronic procedure- the customer uses mobile communication techniques in conjunction with mobile devices" (Johnson, A.M. 2013).

Mobile banking offers millions of people a potential solution in emerging markets that have access to a cell phone, yet remain excluded from the financial mainstream. It can make basic financial services more accessible by minimizing time and distance to the nearest retail bank branches (CGAP, 2006) as well as reducing the bank's own overheads and transaction- related costs. Mobile banking presents an opportunity for financial institutions to extend banking services to new customers thereby increasing their market (Lee, Lee and Kim, 2007).Banking was driven by income generated from fees for services rendered, interest earned deposits and interest received from loans. The move from traditional banking to agency banking and currently

mobile banking has been beneficial to both the banks and customers as it reduces operating cost of the institution and its convenient and cheap as lesser fees are charged on mobile transaction.

Mobile banking is the provision of banking services with the help of mobile devices. The advent of M-banking was fostered by competition from telecommunication industry mainly Safaricom with their Mpesa services to their customers and Airtel (formerly Zain) with Airtel Money services. These services facilitated the customers to deposit money into their account, transfer money to other user for instance sellers of goods and services, relatives and friend; this brought convenience. The banking sector has had to adopt technological change to remain competitive. In search of competitive advantages in the technological financial service industry, banks have acknowledged value of differentiate themselves from others financial institution through new service distribution channels. Banks bureaucratic process of account opening cut out many rural poor, as they could not qualify to own accounts. With competition, banks had to simplify the process and had to come up with innovative ways of doing so. Mobile banking provides a number of advantages for both banks and customers. Mobile banking removes geographical limitation to customers and therefore bringing convenience. There is no time limitation i.e. banking maybe performed throughout the day and in any place. Mobile banking also provides efficient cash management and security of cash (Johnson, A.M. 2013).

2.1.8.4 Internet Banking Service

Internet banking (e-banking) is the use of internet and telecommunication networks to deliver a wide range of value added products and services to bank customers. Internet banking includes importing data into personal accounting software. Some online banking platforms support account aggregation to allow the customers to monitor all of their accounts in one place whether they are with their main bank or with other institutions. Banking through internet is considered as a complimentary delivery channel for the services rather than a substitute for the brick and mortar banking branches. Internet has changed the dimensions of competition in the retail banking sector. Following the introduction of PC banking, ATMs and phone banking, which are the initial cornerstones of electronic finance, the increased adoption and penetration of Internet has added a new distribution channel to retail banking: Internet/Online-banking. Internet banking has gained worldwide acceptance as a new delivery channel for performing various banking transactions. It provides the opportunity to the customers to conduct banking transactions at their

convenience. There are two ways to offer Internet banking. First, an existing bank with physical offices can establish a website and offer Internet banking in addition to its traditional delivery channels. Second, a bank may be established as a "branchless," "Internet-only," or "virtual" bank (DeYoung, R.2001, Allen et al, 2002, Steven, 2002).

Internet banking is called transactional online banking, because it involves provision of facilities such as accessing accounts, funds transfer and buying financial products or services online. The Internet also helps banks penetrate other financial markets without requiring their physical presence in those markets. The widespread availability of Internet banking is expected to affect the mixture of financial services produced by banks, the manner in which banks produce these services and the resulting financial performances of these banks. This therefore is seen by banks as a better means to serve its wide and ever growing customer base with quality service, fast, efficient and convenient manner. It is also believed to create good revenue to banks thus leading to profitability. (Simpson, J. 2002)

2.1.8.5 Debit Card

Debit card is a banking card enhanced with ATM and POS features so that it can be used at merchant locations. Debit cards allow you to spend only what is in your bank account. It is a quick transaction between the merchant and your personal bank account. A debit card is linked to an individual's account, allowing funds to be withdrawn at the ATM and point of sale without writing a cheque. When using a debit card to pay for goods and services, the purchase amount is deducted from the cardholder's checking account. The types of debit card include online debit card and offline debit card. With offline debit card, debit is not made immediately. Benefits of using a debit card include making the payment process at the checkout counter quicker and more convenient, eliminating the need to carry a cheque book and a lot of cash, using it at locations where personal cheques are not accepted, and reducing the possibility of loss or theft of cash (Okoye, L. 2013).

2.1.8.6 Credit Card

A credit card is a small plastic card issued to users as a system of payment. It allows its holder to buy goods and services based on the holder's promise to pay for these goods and services. The issuer of the card creates a revolving account and grants a line of credit to the consumer (or the

user) from which the user can borrow money for payment to a merchant or as a cash advance to the user (Mavri, M. & Ioannou, G. 2006). A credit card is different from a debit card in that it does not withdraw money from the users account after every transaction. The issuer lends money to the consumer to be paid to the merchant. Holders of a valid credit card have the authorization to purchase goods and services up to a predetermined amount, called a credit limit. The vendor receives essential credit card information from the cardholder, the bank issuing the card actually reimburses the vendor, and eventually the cardholder repays the bank through regular monthly payments. If the entire balance is not paid in full, the credit card issuer can legally charge interest fees on the unpaid portion.

2.1.8.7 Agent Banking

Bank agents help financial institutions to divert existing customer from crowded branches providing a "complementary" often more convenient channel of accessing bank services. Financial institutions in developing markets reach an "additional "client segment or geography.

Reaching poor clients in rural areas is often prohibitively expensive for financial institutions since transaction numbers and volumes do not cover the cost of a branch. (Kitaka P.2001). In such environments banking agents that piggy bank on existing retail infrastructure and lower set up and running cost can play a vital role in offering many low income people their first time access to a range of financial services. Also low income clients often feel more comfortable banking at their local store than walking into a mobile branch. Brazil is a pioneer in agent banking. Since 1999, more than 100,000 retail outlets have been turned into bank agents, reaching 13 million extra unbanked people. (Adiera, A.1995).

According to NBE Directive, agent banking is the conduct of banking business on behalf of a financial institution through an agent using various service delivery channes. Mobile banking is performing banking activities which primarily consists of opening and maintaining mobile/regular accounts and accepting deposits; furthermore, it includes performing fund transfer or cash in and cash out services using mobile devices.

In Ethiopia there are different banks that launch mobile and agent banking services. As per recent data by Belcash technology Solutions (2017), they are vending agent banking service by brand name called "Hello cash" having feature including account opening, cash depositing, cash

withdrawal, bill payments, top upping mobile balance, transferring money and upcoming services like receiving international money transfers from worldwide. They currently launch their service in two banks: Lion International bank, Cooperative Bank of Oromia and one micro-finance: Somali Micro-finance. With those financial institutions, there are about 5,000 agents and 825 acceptance networks (Servicing only payments of goods and services) having around 710,000 customers running a total transaction of 3.4 million with the total value balance of 2.1 billion birr. In daily bases, they are running around 20,000 transactions with the value balance of 12 million birr (NBE website).

- **Hibir Agent Banking**

Following the permission of mobile and agent banking, united bank established a team responsible for the implementation of the service in line with the Bank's strategic focus on technology led banking which synchronize with its new motto "Beyond Core Banking to Technology Led Excellence".

The service enables the Bank to use Banking agents as a kind of branch to process basic banking services including opening M-wallet account, making deposits and withdrawals, transferring funds as well as sending and receiving money. United bank received the approval to go on delivering the service on March 31, 2015. In its Agent Banking Services, United will provide branchless services banking especially for the unbanked society (NBE website).

2.1.9 Determinants of Banks Profitability

Theoretically factors affecting bank profitability are mainly divided into two categories as internal and external variables. The internal (bank-specific factors) are factors that are related to internal efficiencies and managerial decisions. As stated in the above section the efficiency theory highly assume as bank performance is influenced by those internal factors that are related to internal efficiencies and managerial decisions. Such factors include determinants such as bank size, capital adequacy, liquidity risk, operational efficiency (expenses management), management efficiency, employee efficiency and funding cost. On the other hand, the capital asset pricing theory assumes as bank profitability is a function of external market factors.

Accordingly, the external factors (variables) that can affect bank profitability are the macroeconomic factors such as real GDP, foreign exchange rate and inflation rate among others that are related to both the economic and legal environments in which the banks operate Athanasoglou et al, (2006).

Bank specific variables are variables that affect the profitability of a specific bank. These factors are within the scope of the bank and are easy to be manipulated and differ from bank to bank.Andreas, D. and Gabrielle, W. (2009) stated that the bank profitability is usually measured by internal determinants which include bank specific variables. Athanasoglou et al, (2006) argued that profitability is a function of internal factors that are mainly influenced by a bank's management decisions and policy objectives such as the level of liquidity, provisioning policy, capital adequacy, expense management and bank size, and the external factors such as Gross Domestic Product, Inflation, Interest rate, macroeconomic policy stability and other macroeconomic factors.

The impact of size on a bank's performance has been greatly argued among researchers. De Jonghe, O. (2010) concludes that small banks are better able to withstand difficult economic conditions, while Barros, Ferreira and Williams (2007) argue that small banks are more likely to get good performance and less chances of getting bad performance. Conversely, large banks are less likely to obtain good performance and a greater chance of getting bad results. Barros et al. (2010) responded to the argument of economies of scale and argued that some costs can be reduced simply by increasing the size.

Needless to say, even though the main focus of this particular study is mainly confined to quantitative measure of both bank specific and macroeconomic variables; It should be properly noted that quantitative performance measurements by their nature are not comprehensive enough since they lack to incorporate qualitative elements such as monetary policy, regulation and supervision, financial sector openness, institutional environment, financial sector and non-bank, the management style and risk taking behavior of the bank itself. Any financial sector indicators lacking these qualitative elements could not be complete enough to capture the true level of the sector (Creane, et.al 2004).

The exact relationship between these factors and the bank profitability and the significance of the relationship remain as questions to be addressed more specifically in the context of Ethiopia.

2.1.10 Electronic-Banking and Financial Performance

The banking sector is considered to be an important source of financing for most businesses. The common assumption, which supports much of the financial performance research and discussion, is that increasing financial performance will lead to improved functions and activities of the organizations. The subject of financial performance and e-banking into its measurement is well advanced within finance and management fields.

From different literatures, electronic banking services like Automated Teller Machines attracted many people to open up accounts especially those who prefer convenience. These machines are located in various places of convenience like shopping malls, universities, hotels and airports. Their installation in such areas have reduced overcrowding in the bank's premise and increased the transactions completed in a day (Baxley, J.B 1987).

The installation of various automated teller machines by commercial banks in their branches is one of the motives to increase customer base and acquire more deposits available to the bank. This in the long run increases the bank's revenue that determines the profitability level and finally the general financial performance (Baxley, J.B 1987).Electronic banking plays a big role in terms of saving to the bank and the client (reduced costs). This is as a result of efficiency and effectiveness maintained by various systems like electronic fund transfer, Mobile banking and ATMS.

The elimination of paper work would also minimize costs in stationery and also administrative costs of human tellers and other personnel that would affect such transactions. As seen from above, the operating costs determine the firm's profitability and therefore the application of electronic banking system minimizes the level of such costs hence crucial in determining the financial performance levels of Banks (Ogare, H.O 2013).

According to Nathan, L. (1999), electronic banking services have provided numerous benefits for both banks and customers. The first benefit for the banks offering electronic banking service is better branding and better response to the market. Those banks that would offer such service

would be perceived as leaders in technology implementation. As a result, they would enjoy a better brand image. The other benefits are possible to measure in monetary terms. The main goal of every company is to maximize profits for its owner and other stakeholders. According to Allen and Hamilton (2002), an estimated cost of providing the routine business of a full service branch in USA is $1.07 per transaction, as compared to 54 cents for telephone banking, 27 cents for ATM banking and 1.5 cent for internet banking. On the other hand, the advantages for the customers are significant time saving and reduced costs in accessing and using the various banking products and service, increased comfort and convenience (Pyun, C. Scruggs, L. and Nam, N. 2002).

Internet and mobile banking are considered beneficial because of low operational costs, time saving promptness, and interactive ability. For these reasons, banks are able to substantially reduce overhead expenses by divesting away from physical branch offices, which could be substituted by internet and mobile banking systems to enhance their profitability (Kim & Park, 2003). Banks could then use the resulting savings to reduce their loan interest rates or increase their deposit interest rates, thus retaining most profitable customers and attracting new customers without sacrificing earnings. According to Okiro, O. & Ndungu, J. (2013), the world is becoming increasingly addicted to conducting business across the internet and World Wide Web (WWW).

Similarly, mobile banking as an innovation has progressively began to dominate commercial transactions in major financial and other sectors of the economy and more often than not, the two are being used simultaneously to achieve efficiency.

Considering that the growth potential of internet and mobile banking consists in its cost efficiency, it is expected that investment in e-banking and m-banking would ultimately bring positive outcomes. Simpson, J. (2002) suggests that e-banking is driven largely by the prospects of operating costs minimization and operating revenues maximization

2.1.11 Performance Measurement in Banks

According to Aburime, T.U (2009), the importance of bank profitability can be appraised at the micro and macro level of the economy. At the micro level, profit is the essential prerequisite of a competitive banking institutions and the cheapest source of funds. It is not merely a result, but also a necessity for successful banking in a period of growing competition on financial markets.

Hence, the basic aim of every bank management is to maximize profit, as an essential requirement for conducting business.

Various literatures written by academicians also assert that profitability is the bottom line or ultimate performance result showing the net effects of bank policies and activities in a financial year. As a matter of fact, numerous factors such as inflation, accounting policy, high level of competition, etc., may have an influence on a bank's profitability. In due course, wide varieties of ratios are discussed and different measures of profitability of commercial banks have been suggested.

For instance, Net Interest Margin (NIM), Return on Assets (ROA), and Return on Equity were identified by Ahmed (2003) are in use in the literature since then. Profitability measures according to Akinola (2008) include Profit before Tax (PBT), Profit after Tax (PAT), ROE, Rate of Return on Capital (ROC) and ROA. Some other, studies on profitability have also used returns on average bank assets (ROAA), net interest margin (NIM) and return on average equity (ROAE) to measure profitability according to Francis (2013). However, owing to divergent views among scholars on the superiority of one indicator over the others as measures of profitability, there is no clear cut stand as to which best fits. Nonetheless, most literatures confine the profitability measure only to the three widely used measures namely Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). Accordingly, some scholars select either of the three and some others preach to select three of them at once.

In line with the above discussion, the researcher has used ROE as measure of profitability for this particular study owing to the limitations of NIM & ROA. NIM is reported to have two major limitations. First, it doesn't measure the total profitability of the bank as most of them earn fees and other non-interest income through service like brokerage and deposit account services without taking account operating expenses, such as personnel and facilities costs, or credit costs. Besides, net interest margin of two banks can't be contrasted as both the banks are poles apart in their own way in the nature of their activities, composition of customer base, etc. http: // www.readyratios.com

ROA has also limitations that, it does not account for outstanding liabilities and may indicate a higher profit level than actually derived, i.e ROA is a measure of firm's success in using assets to

generate profit without looking at how the assets were financed .Therefore, although, ROA is an important measure to use and understand, its flaw is that the metric does not account for the size of the invested capital (Selling, T.I. and Stickney C.P. 1989).

Therefore, for the purposes of this study financial performance was relating more to the profitability of a company than to the possible wider interpretation of financial performance, i.e. this study attempts to measure profitability by using ROE similar to most of the under mentioned researchers: Hall, M. and Weiss, A. (1967); Khrawish, H.A, Al-Sa'di (2011), Al-Smadi, M. and Al-Wabel, S. (2011), and Ongare, H.O (2013).

ROE is measured as net profit after tax divided by average shareholders' equity, similar to: Al-Smadi, M and Al-Wabel, S. (2011), Kashif M. k. & Muhammad E.J (2016) and Joseph M.V. (2017).

$$\textbf{ROE}=\frac{\textbf{Net income}}{\textbf{Average stockholder equity}}$$

$$ROE= \beta 0+\beta 1NATMi,t + \beta 2DCi,t +\beta 3NMOBUi,t + \beta 4VATMTi,t + \beta 5VMOBTi,t$$

$$+\beta 6BSi, t +\beta 7INFi, t+ Є i,t$$

2.2 Review of Empirical Studies

2.2.1. Related Empirical Studies in the World

A number of empirical studies exist in the literature, which have examined the relative performance of banks offering internet and mobile banking services. Egland et al. (1998) was the first important study, which estimated the number of US banks offering electronic banking and analyzed the structure and performance characteristics of these banks. It found no evidence of major differences in the performance of the group of banks offering internet banking activities compared to those that do not offer such services in terms of profitability, efficiency or credit quality. However, transactional internet banks differed from other banks primarily by size.

In contrast to the results of Egland et al. (1998), Furst et al. (2002) found that banks in all size categories offering e-banking were generally more profitable and tended to rely less heavily on traditional banking activities in comparison to traditional banks. Similarly, Hasan et al. (2002) found that the e-banking institutions were performing significantly better than the traditional banking groups.

Karimzadeh, D.S (2014) studied electronic banking effect on commercial bank profitability in Iran. The study sought to establish whether there exists a relationship between the dependent variable, ROA and the independent variables consisting of No. of ATM, Terminal Branches, POS, Market Concentration, Bank Size, and Credit Cards for period 2004-12.Result confirmed that number of terminal branches, ATMs, Credit Cards, POS, Bank Size has a positive and significant impact on the profitability of banks while Market Concentration has had a negative and significant impact on bank profitability because it reduces competitiveness and efficiency of banks so increase in e-banking channels increases the bank services to the customers, which lead towards increase in deposit and ultimately bank's profitability.

A study done by Sujud, H. & Hashem, B. (2017) on the effect of Bank Innovations on Profitability and Return on Assets (ROA) of Commercial Banks in Lebanon. They sought to establish whether there was relationship between the dependent variables Profit and ROA and the independent variables: ATM, POS, Mobile Banking, Debit & Credit Cards, Internet Banking and EFT. For this study, data was collected from 200 employees and it was found that 59.3 per cent variation in profitability was explained by these variables and among all Independent variables it was found that only EFT has significant impact on profitability of commercial banks in Lebanon. Secondly, 97.7 per cent variation in ROA was explained by these variables and among all only debit and credit cards had positive and significant contribution in ROA. Overall, it can be concluded that bank innovations potentially leads to higher profitability and higher return on assets of commercial banks.

Kashif, M., Kamboh, M. & javaid, M. (2016) examined the impact of cashless banking on profitability of Pakistani banking industry. To measure cashless banking in the country proxies of Automated Teller Machines Transactions (ATMT), Point of Sales Transactions (POST), Call Center Banking Transactions (CCT) and Mobile Banking Transactions (MOBT) were used to examine their impact on aggregate Return on Equity (ROE) of the banking industry. Ordinary

Least Square (OLS) multiple regressions were used to obtain the results and data from 2nd quarter of 2007 to 4th quarter of 2014 was used. The results showed that POST and MOBT were positively significantly related to ROE, CCT and ATMT were negatively significantly associated with profitability.

Sarokolaei, M.A. (2011) "Investigating the effect of E-Banking on Increasing of Bank Revenues" Factors: Bank Cards, ATM, POS, Internet Bank, Mobile Bank as proxy for e-banking, to know the effect of E-Banking on service fees. The study was done in Iran on Private Banks of 2009-2011.By using Regression and Correlation Analysis, It was assessed that ATM, POS, Bank Card, Internet Bank, Telephone Bank and Service Fee had a positive and significant relation. So Electronic Banking can increase the revenue of private banks because E-Banking helps in reducing cost of service.

Alipour, M. and Salehi, M. (2010), in their study entitled "E-Banking in Emerging Economy: Empirical Evidence of Iran", focused mainly on advantages of e-banking. The results of this study showed that e-banking serves several advantages to the Iranian banking sector, however, the study also showed that the Iranian customers had not enough knowledge regarding e-banking which was rendered by the banking sector in Iran. The introduction of e-banking in Iran has led to more use of ATM in Iran. The authors came to conclusion that the active ATM in the banking sector will cause a decrease in cash circulation and the efficiency of the banking sector will increase.

Floros, C.H. and Gordian, G. (2015), in their paper showed how useful the number of ATMs is for modeling and estimating banking efficiency. To estimate banking efficiency they employed DEA and Free Disposal Hull (FDH) methods. The result of the study showed that large banks were more efficient than medium and small sized banks in Greece. Furthermore, banks with a large number of ATMs were more efficient than those with a less number of ATMs. However, provision of e-banking services by banks did not influence their efficiency scores.

Siam, A Z (2006), examined the impact of e-banking on Jordanian banks and concluded that the majority of the banks were providing services on the Internet through their websites and the findings showed that the attention was more on satisfying and fulfilling customers‟ needs through e-banking. He also concluded that there should be a well-articulated strategy to achieve

success and profits in the long run. Results revealed that electronic banking services had a negative effect on banks profitability in the short run due to the capital investment by the banks on infrastructure and training but will be positive in the long run.

Goodarzi, A. and Zebidi, H. (2008), in their study entitled "Impact of e-Banking Development on Profitability of Commercial Banks", examined the relationship between e-banking development and profitability of banks with the help of econometric models. The result of paper showed that the increase in number of ATM of each bank had a positive effect on profitability of that bank (ROA) and this effect strengthen by joining of each bank to Interbank Information Transfer Network (Shetab) of the country. Therefore, the study concluded that e-banking had a significant effect on banking profitability.

Using a panel data of fifteen Jordanian banks for the period of 2000–2010, Al-Smadi, M. and Al-Wabel, S. (2011) studied the impact of e-banking on the performance of Jordanian banks. In their study, performance of banks was measured by ROE and two sets of control variables were used. Using pooled OLS regression technique they found significant negative impact of e-banking on financial performance of banks. Since adoption of e-banking technology involves cost, this might take time to recover cost and experience profits.

Using panel data of 13 banks over the period of 2003–2013, Siddik, M., Sun, G., Kabiraj, S. Shanmugan, J. and Yanjuan, C. (2016), empirically investigated the impact of e-banking on the performance of Bangladeshi banks measured in terms of Return on Equity, Return on Assets and Net Interest Margin. Results from pooled ordinary least square analysis showed that e-banking began to contribute positively to banks' Return on Equity with a time lag of two years while a negative impact was found in first year of adoption.

2.2.2. Related Empirical Studies in Africa

Ongare, H.O (2013), did a study on the effect of electronic banking on the financial performance of commercial banks in Kenya, the study sought to establish whether there exists a relationship between the dependent variable, for example, performance measured by profit after tax and the independent variables consisting of number of ATMS, number of debits and credit cards issued to customers, number of point of sales terminals and the usage levels of Mobile banking, Internet banking and Electronic funds transfer, as components of e-banking. The study used secondary

data which was collected from the annual report of commercial banks and Central Bank of Kenya. The study used both descriptive and inferential statistics in analyzing the data. The findings of the study were that e-banking has a strong and significant effect on the profitability of commercial banks in the Kenyan banking industry. Thus, there exists positive relationship between e-banking and bank performance. The significance test showed that the influence of bank innovations on bank profitability was statistically significant meaning that the combined effect of the bank innovations in this research was statistically significant in explaining the profits of commercial banks in Kenya.

Josiah, A. and Nancy, k. (2012) studied the Relationship between Electronic Banking and Financial Performance among Commercial Banks in Kenya from 2006 to 2010 using descriptive and inferential statistics. The study established whether there was relationship between the dependent variable return on assets and the independent variables: investments in e-banking, number of ATMS and number of debits cards issued to customers as proxy for e-banking. The study revealed that e-banking had strong and significance marginal effects on returns on asset in the Kenyan banking industry by making workers performance more effective and efficient. ATMs, Debit Card had significant influence on performance of banks by bringing services closer to its customers and hence improved industry performance. Thus, there exists positive relationship between e-banking and bank performance.

Joseph M.V. (2017) studied the Impact of Electronic Banking on the Profitability of Commercial Banks in Kenya. Ordinary Least Square (OLS) multiple regressions were used to obtain the results and Data collected from 43 commercial banks from January 2007 to June 2015 (34 Quarters). The study concluded that ATM Transactions and POS transactions had positive and significant effect on ROE whereas mobile banking transactions had negative and insignificant effect on bank profitability.

Makur, P.M (2013) examined the effects of Financial Innovations on the Financial Performance of Commercial Banks in South Sudan. Using Regression and Correlation Analysis data was collected from 16 Commercial banks from 2009-13.The study revealed that No. of Daily Transactions through ATM and financial performance of Commercial Banks had Positive Relation. No. of Daily Transactions using Phones had positive but weak relations with financial performance. Money Borrowed using Internet Transactions had also positive relation with

profitability of Commercial Banks. So Financial Innovation had a positive and significant impact on Financial Performance of Commercial Banks but there was need to fast and secure payment system for development of business and economic growth of all sectors and facilitating financial deepening.

Gambo.J, Arikpo, I. (2013) studied-banking and Bank Performance: Evidence from Nigeria, The study sought to establish whether there exists a relationship between the dependent variables=ROA,ROE and Net Interest Margin, Independent Variables=Loan/ Assets, Loan/Deposit, Equity/Total Assets, Operating Expenses/Total Assets, Logarithm of Total Assets, Log of Operating Expenses, E-banking. Macroeconomic Variables= Inflation, Cyclical Output=GDP, Bank consolidation. Data was collected from 8 commercial Banks of 1999-2010. Using Ordinary Least Square Regression Model, It was reported that in the first year of adoption, negative impact was observed but e-banking contributes positively to bank performance after two years of adoption in terms of ROA and NIM due to financial cost of adopting e-banking. So investment in E-Banking should be rational so as to justify cost and revenue implications on bank performance.

2.2.3. Related Empirical Studies in Ethiopia

Solomon, W. (2016) conducted a research on the Roles of E-banking on Financial Performance of Commercial Banks in Ethiopia. The study used secondary data and employed purposive sampling technique to select ten commercial banks operating in Ethiopia covering the periods from 2013 to 2015.Using ROA as one of the most fundamental indexes of profitability, key explanatory variables were identified to disclose their relationship and influence on financial performance of commercial banks. These independent and other control variables are value or price of transaction of ATM, value or price of transaction of POS, debit card, number of automated teller machine terminals, number of point of sale terminal and market share of banks.

Result exhibited that numbers of ATM terminals, number of POS terminals and bank market share had positive and significant role on financial performance of commercial banks measured by return on asset. The study showed that increased number of ATM, POS and market share had a positive role on the financial performance of commercial banks with many banking

institutions indicating that increased market share allowed a company to achieve greater scale in its operations which generally improved its profitability.

Girma, A. 2016 conducted a research about the impact of ICT on the performance of Ethiopian banking industry using secondary data over the period 2010 – 2014. Data analysis was carried out in panel environment. The study employed purposive sampling technique to select the required sample of banks from commercial banks in Ethiopia. Using ROA as a measure of performance in the study and the explanatory variables were ICT investment, ATM, POS, INF, BRAN and GDP. The finding shows that the ICT, ATM and POS have no statistically significant effect on return on asset on commercial banks in Ethiopia. Moreover result showed that the POS, ICT and number of branches have negative effect on return on asset on commercial banks in Ethiopia.

A research undertaken by Uvaneswaran (Dr) S.M, Eldana, M., Kassa, C. & Hamid, M. (2017*)*, on Challenges in e- banking Services and its impact on profitability of public sector bank in Ethiopia particularly Commercial Bank of Ethiopia (CBE) before and after introduction of e-banking services. To meet this objective, a stratified-random sampling design was used. Data were collected both from primary and secondary sources. The primary data were collected from e-banking customers of the seven Dessie town branches and the secondary data were collected from the banks financial statement and analyzed to see the relationship between e-banking service and profitability of CBE. Finally, presentation and appraisal was illustrated in simple descriptive statistics, relative ranking score and t test. This paper highlights that the e-banking services has any impact on the profitability of CBE in terms of three financial performance indicators of ROA, ROE and, NIM.

A research undertaken by Ayana, G. (2014) on factors affecting adoption of e-banking system in Ethiopian banking industry, focused on factors that affect adoption of e banking in Ethiopian banking industry. The study statistically analyzed data obtained from survey of staffs of 4 purposely selected banks using qualitative and quantitative research approach on a research framework developed based on Technology Organization Environment mode (TOE). And concluded e-banking system such as ATM, mobile banking, internet banking and others were not well adopted by Ethiopian banking industry, due to low level of ICT infrastructure and lack of legal frameworks at NBE. In addition the result of the study also showed that security risk and

lack of trust on the use of technological adoption were other major barriers for the system. Limited technical and managerial skills availability in Ethiopian banks were also mentioned as an influential factor for the choice of technology.

A study conducted by Gardachew, W. (2010), on practices, opportunities and challenges of E banking in Ethiopia, analyzed the main challenges and opportunities of E-banking. After conducting a survey he came up with the challenges being low level of internet penetration and poorly developed telecommunication infrastructure, lack of suitable legal and regulatory framework for e-commerce and e-payment, high rates of illiteracy, high cost of internet, absence of financial networks that link different banks, lack of reliable power supply and cyber security issues. And mentioned opportunities offered by ICT through e-learning programs, with the help of nongovernmental agencies like ECA and World Bank to developing countries to design national strategies like e-commerce and commitment of the government on ICT as prospects for E banking development.

Abraham (2012) described that among the common problems known in Ethiopian which were related to electronic banking few of them were lack of banking services through the web or other electronic means such as using mobile phone, weak telecommunications, lack of Internet awareness, broken and slow Internet connections, data and network security and privacy, lack and limitation of government policies, regulations and e-commerce laws, as well as legislation to protect workers and to make the Internet secure.

2.2.4 Gaps in Literature

Information technology is considered as the key driver for the changes taking place around the world. Due to a pervasive and steadily growth of information and communication technology, the world banking industry is entering into new phenomena of unprecedented form of competition supported by modern information and communication infrastructure. The Ethiopian banking system is very much behind compared to the rest of the world. Cash is still the most dominant medium of exchange.

Previously the banking industry was without simple electronics like ATM and SMS alert. This made all customers of banks to personally walk to the banking hall to be able to transact simple transactions like checking account balances, verifying deposits and making withdrawals. This led

to long queues, energy exacting and time consuming, and on the whole it was costly. Physical cash, long distant travelling and paperwork characterized most of the payment systems in Ethiopia. However the situation has changed in recent times due to the introduction of electronic banking services into the Ethiopian banking industry by various financial institutions.

Technological follow ups like the ATMs, Electronic Funds Transfer at Point of Sale, internet banking, SMS alert, and debit cards have graced the Ethiopian banking environment. These highly economic innovations go a long way to decrease drastically the pressure on manual services to banks' customers which enhance services delivery and also improve banks profitability (Appiah, A. & Agyemang, F. 2005).

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. It is therefore important that e-banking innovations are made through sound analysis of risks and costs associated so as 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 (Josiah, A. and Nancy, k. 2012).

From the review of the relevant literature relating to the roles of electronic banking on financial performance of commercial banks, it's possible to see the existence of knowledge gap. Even though studies were undertaken by (Solomon, 2016) and Girma, A. (2016), they failed to include important variables such as number of mobile banking users and value of transaction using mobile banking. These variables were very important variables which can significantly affect ROE of commercial banks in Ethiopia.

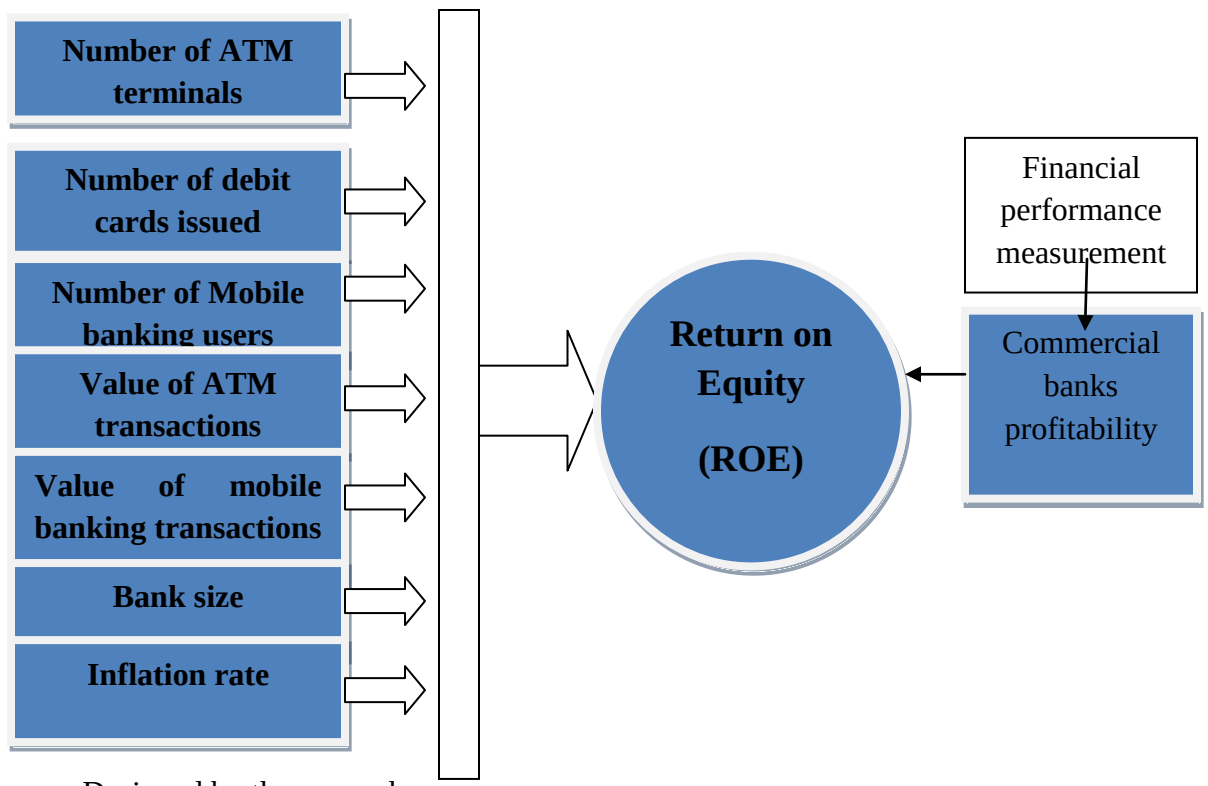
Besides, other research works conducted in Ethiopia in relation to electronic banking focused on e-banking adoption, barriers and benefits, challenges and prospect, customer satisfaction and behavior towards e-banking but, this research focused on the roles of e-banking on the financial performance of commercial banks. This makes the study more relevant and therefore intends to fill these relevant gaps in literature by examine the roles of e-banking on the financial performance of commercial banks in Ethiopia by adding variables, number of mobile banking

users and value of transaction executed by mobile banking as a proxy of e-banking which were not included in previous study.

2.2.5 Conceptual Framework

From the theoretical and empirical literature reviews, the following conceptual framework of the study was developed by the researcher.

Figure 2.1 The Conceptual Framework or Model of the Study



Source: Designed by the researcher

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Research methodology is the procedures by which researchers go about their work of describing, explaining and predicting phenomena (Rajasekar et al. 2013). This section explains the research methodology that was applied to obtain representative data from commercial banks in Ethiopia. This study also aims to examine the role of electronic banking on financial performance of commercial banks in Ethiopia. Accordingly, this chapter discusses the research procedure that is used to carry out this study. In case, it starts by discussing research design followed by the nature and instruments of data collection and sampling design. The subsequent section presents and discusses method of data process and analysis. The final two sub parts present variables definition & hypothesis development and operationalization of study variables.

3.1 Research Design

Research design is a plan outlining how information is to be gathered for an assessment or evaluation that includes identifying the data gathering method(s), the instruments to be used, how the instruments would be administered, and how the information would be organized and analyzed (Assumptah, M. J., & Muhari, W. J. 2017). Quantitative research design was used to meet the overall objective of the study and to test hypotheses under it.

A panel data study design which combines the attributes of cross-sectional (inter-firm) and time series data was used. A Panel data provides results that are simply not detectable in pure cross sections or pure time series studies Brooks, (2008). In addition Hsiao, (2003) described panel or a longitudinal data set is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample.

The advantage of panel data analysis is that more reliable estimates of the parameters in the model can be obtained and have space and time dimensions, can take heterogeneity explicitly into account, give more variability, less co-linearity among variables, more degree of freedom and more efficiency(Gujarati, 2004).

3.1.1 Population of the Study and Sampling Techniques

The target population of the study was all commercial banks adopting e-banking service in Ethiopia. However to conduct the research, commercial banks operating in Ethiopia, have no complete data related with e-banking service before 2015 especially data related with mobile banking service.

Therefore, those banks having organized e-banking service report to NBE since 2015 were considered as a sample. Due to this reason, by using purposive sampling technique from eighteen commercial banks operating in Ethiopia the study took ten banks based on information available on their annual reports with regard to their extensive investment and application of e-banking service, and based on being pioneer in implementing e-banking services. The selected banks were: Commercial bank of Ethiopia, Awash International bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank, Nib International bank, Oromia International Bank, Berhan International bank and Zemen Bank.

3.1.2 Source and Types of Data

The study employed a quantitative research approach by using secondary data gathered from National Bank of Ethiopia and published annual audited financial statements, which were calculated in Ethiopian Birr as of June 30 of each year from 2015to 2018 of ten purposively selected banks out of 18 existing commercial banks which were readily available on their website and archives as well as the bank specific variable data: No of ATM installed, No of debit cards issued, Number of mobile banking users, Value of ATM transactions and Value of transactions executed by mobile banking were gathered from each selected banks' head office (e-banking departments) by the researcher. Financial statements and other published and unpublished documents were also used to construct the literature part of this thesis and cited accordingly.

3.1.3 Data Analysis

The data collected using data collection sheet were edited, coded and cleaned. To achieve the broad research objective, the paper was primarily based on a panel secondary data, which was collected through structured document review. Thus, the collected data was analyzed using

descriptive statistics, correlation analysis and multiple linear regression analysis. Descriptive analysis deals with a simple description of variables. It includes mean, maximum, minimum and standard deviation of each variable to analyze the general trends of the data from 2015 to 2018 based on the sector sample of ten banks. Correlation analysis was also used to examine the relationship between the dependent variable and explanatory variables. On the other hand, the regression analysis known as OLS was used to estimate the relationship between profitability and its determinants. The multiple linear regressions model was run, and thus OLS was conducted using Stata 13 econometric software package, to test the casual relationship between banks' financial performance (Profitability) and their potential determinants and to determine the most significant and influential explanatory and other control variables affecting the financial performance (ROE) of commercial banks in Ethiopia. According to Gujarati (2004) regression analysis is concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view to estimating and/or predicting the (population) mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter.

3.2 Model Specification

The researcher formulates some econometric model which is a representation of the basic features of an economic phenomenon so as to achieve the broad research objective. It is an abstraction of the real world. The specification of a model is based on the available information relevant to the study in question. This is to say, the formulation of an economic model is dependent on available information on the study as embedded in standard theories and other major empirical works, or else, the model would be theoretical.

The literatures reviewed in the previous chapter identified the roles of e-banking on financial performance of commercial banks. This chapter presents a framework of analysis on the basis of these studies, and involves adopting a model that would help demonstrate the significance (responsiveness) of certain key variables in influencing the financial performance of commercial banks in Ethiopia. The performance indicator utilized for this particular study was Return on equity (ROE) and the major determinants (independent variables) considered were: No of ATM terminals, Debit cards issued, number of mobile banking users, value of ATM transactions, Value of transactions executed by Mobile banking, bank size and annual inflation rate.

Accordingly, the study adopted a model that existed in most literatures, like: Hall, M. and Weiss, A. (1967); Khrawish, H.A, Al-Sa'di (2011), Al-Smadi, M. and Al-Wabel, S. (2011), and Ongare, H.O (2013), Kashif, M. ,Kamboh, M. & javaid, M. (2016) and Joseph M.V. (2017).

According to Brooks (2008), the general multivariate regression model with K independent variables can be written as follows:

$Yi = \beta 0 + \beta 1X1i + \beta 2X2i + \ldots + \beta kXki + \varepsilon i$ (i 1, 2, 3…, n)

Where Yi is the ith observation of the dependent variable, X1i,…, Xki are the ith observation of the independent variables, β0,…,βk are the regression coefficients, εi is the ith observation of the stochastic error term, and n is the number of observations. Hence, the roles of e-banking on profitability of commercial banks can be modeled as described below:-

$ROE = \beta 0 + \beta 1NATMi,t + \beta 2DCi,t + \beta 3NMOBUi,t + \beta 4VATMTi,t + \beta 5VMOBTi,t$

$+\beta 6BSi, t + \beta 7INFi, t + Є i,t$

Where;

ROE = Profit after tax / Average stockholder equity

NATM= Number of ATM installed by banks

DC = Number of debit cards issued by banks

NMOBU= Number of mobile banking users

VATMT = Value of transactions executed by ATM = (Natural logarithm of the value of ATM transactions)

VMOBT=Value of transactions executed by Mobile banking = (Natural logarithm of the value of Mobile banking transactions)

BS = Bank size (other control variable) which is measured by the natural log of total assets

INF= annual inflation rate

βo = Constant term

β1, 2, 3…8 are parameters to be estimated

Є = is the error component for Bank i at time t assumed to have mean zero E [Є it] =0

i = commercial banks i = 1. . . 10; and

t = the index of time periods and t = 1- 4

3.3 Variables Definition and Hypothesis Development

It is the process of strictly defining variables into measurable factors. The process defines vague concepts and allows them to be measured, empirically and quantitatively (Creswell, J.W. 2009).

A variable is a measure characteristic that assumes different values among subject, Mugenda, O. and Mugenda, A. (2003). Independent variables are variables that a researcher manipulates in order to determine its effect of influence on another variable. Kombo, K.D. and Tromp, D.L. (2006), states that independent variable (explanatory variable) is the presumed change in the cause of changes in the dependent variable; the dependent variable attempts to indicate the total influence arising from the influence of the independent variable Mugenda, O. and Mugenda, A. (2003).

3.3.1 Dependent Variable

More than any other accounting measure, profits demonstrate how well management is doing in investment and financing decisions. Profitability ratios measure how effectively a firm's management is generating profits on sales, total assets, and stockholders' investment. Therefore, anyone whose economic interests are tied to the long-run survival of a firm will be interested in profitability ratios (Moyer, C. James, M. & William, K. 2006).

As concluded by extensive Prior academic research there are different accounting based measures for banks' profitability of which ROA and ROE are the major ones Alexandru et al (2008).While these measures of profitability are widely accepted as reliable and strong measures of profitability they have certain shortfalls. Most commonly, that they are based on accounting information and thus accounts for neither the time value of money nor the investment risks faced by the shareholders.

Although ROE disregards the risks associated with high financial leverage, is an internal performance measure of shareholder value, and by far the most popular measure of performance, since: (i) it proposes a direct assessment of the financial return of a shareholder's investment; (ii) it is easily available for analysts, only relying upon public information; and (iii) it consider the effect of borrowed capital in financing the assets to generate profit. Therefore, this study attempts to measure profitability by using ROE similar to most of the aforementioned researchers.

ROE is measured as net profit after tax divided by average shareholders' equity similar to Kashif, M. ,Kamboh, M. & javaid, M. (2016) and Joseph M.V. (2017).

Return on Equity

ROE is an internal and by far the most popular measure of performance that reflects how much profit a bank earned compared to the total amount of shareholder equity invested or found on the balance sheet and it measures how effectively a bank management is using shareholders' funds. ROE is the product of ROA and assets-to-equity ratio (equity multiplier that measures financial leverage).It brings together the income statement and the balance sheet, where net income or profit is compared to the shareholders' equity. The number represents the total return on equity capital and shows the firm's ability to turn assets into profits. To put it another way, it measures the profits made for each dollar from shareholders' equity. Essentially the ROE–ROA relationship clearly illustrates the fundamental tradeoff that banks face between risk and return, whereas the equity multiplier reflects the leverage or financing policies, i.e. the debt-equity proportion that the bank management used to fund the bank.

A sustainable and increasing ROE over time can mean a company is good at generating value because it knows how to reinvest its earnings wisely, so as to increase productivity and profits. In contrast, a declining ROE can mean that management is making poor decisions on reinvesting capital in unproductive assets. However, it doesn't fully show the risk associated with that return. A company may rely heavily on debt to generate a higher net profit, thereby boosting the ROE higher. According to Khrawish, H.A. 2011, it is measured by the ratio of net profit to average shareholders' equity as follows:

$$\mathbf{ROE}=\frac{\textbf{Net income}}{\textbf{Average stockholder equity}}$$

3.3.2 Independent and Other Control Variable

Independent variables are explanatory variables that explain the dependent variables. In case the independent variables included in this study were: number of ATMs installed, debit cards issued, number of mobile banking users, value of transactions executed by ATM, value of transactions executed by mobile banking , bank size (BS) and inflation.

Bank Specific Variables

3.3.2.1 Number of Automated Teller Machine Terminals (NATM)

The combined services of both the Automated and human tellers imply more productivity for the bank during banking hours. Also, as it saves customers time in service delivery as alternative to queuing in bank halls, customers can invest such time saved into other productive activities. ATMs are a cost-efficient way of yielding higher productivity as they achieve higher productivity per period of time than human tellers (an average of about 6,400 transactions per month for ATMs compared to 4,300 for human tellers Rose (1999). Furthermore, as the ATMs continue when human tellers stop, there is continual productivity for the banks even after banking hours.

Holden, K. and El-Bannany, M. (2004) checked profitability of UK banking industry due to introduction of modern e-banking equipment along with traditional measures like bank size, market share etc. Results confirm that ATMs significantly increase profitability of UK banking industry.

Gambo.J, Arikpo, I. (2013) studied e-banking and Bank Performance in Nigeria using dependent variables=ROA, ROE and Net Interest Margin. Result confirmed that in the first year of adoption, negative impact was observed but e-banking contributes positively to bank performance after two years of adoption in terms of ROA, ROE and NIM due to financial cost of adopting e-banking.

Karimzadeh, D.S (2014) studied "The Effects of Electronic Banking Expansion on Profitability of Commercial Bank of Iran". The study used ROA as dependent variable and No. of ATM, Terminal branches, POS, Market Concentration, Bank Size, and Credit Cards as independent variables for the period from 2004 to 2012. The result depicted that Terminal branches, ATMs, Credit Cards, POS, Bank Size has a positive and significant impact on the profitability of banks while Market Concentration has had a negative and significant impact on bank profitability because it reduces competitiveness and efficiency of banks so overall E-Banking has a positive impact on bank profitability.

Goodarzi, A. and Zebidi, H. (2008), in their study entitled "Impact of e-Banking Development on Profitability of Commercial Banks", examined the relationship between e-banking development and profitability of banks with the help of econometric models. The result of paper showed that the increase in number of ATM of each bank has a positive effect on profitability of that bank (ROA).

Evidence from other empirical studies conducted on the contribution of automated teller machines (ATM) to bank's profitability reveal that investment in ATMs increases both the volume and value of deposit accounts, reduces banking transaction costs, reduces number of staff and the number of branches, a decrease in cash circulation and consequently improves bank's profitability (Abdullah, 1985).

ATM is considered in terms of total number of ATM terminals and value of transaction executed by ATM (VATMT)

3.3.2.2Debit Card (DC)

Debit cards are prepaid cards which incorporate a computer chip/integrated circuit on which value is loaded, either from the card holder's bank account or in return for cash. Value is then removed from the card as purchases are made using special POS terminals.

Debit cards have surpassed credit cards to become the most common form of Visa point-of-sale ("POS") transaction in most parts of the world. Overall, debit cards were used for over 15.5 billion POS transactions totaling $700 billion in the year 2002 in the United States. This represented about 35% of electronic payment transaction volume and 12% of POS noncash

payments (Gerdes & Walton, 2002).Industry observers predict continued strong growth for debit cards. Debit card improves efficiency and flexibility to customers. Customers can still access their bank accounts and other details without necessarily visiting the banking halls. This has attracted more customers since they enjoy banking services that are convenient and flexible.

Fu-Qiang, S and Sajid, K. (2014) investigated effect of debit card usage on profitability of banking industry in form of ROA over the period of 2004 to 2013 quarterly in the banking sector in Pakistan. The results showed that increased in debit card usage enhance the profitability of banking industry in form of ROA over the period of 2004 to 2013 quarterly.

Polatoglu and Ekin (2001) identified that users of debt cards were more satisfied with the cost saving factor of electronic banking including train reservations, energy bills, taxes and investment in stocks (Wise, 1995). The increased usage of debit cards has significantly reduced transaction costs and enhanced convenience among credit and debit card users. This has attracted prospective customers leading to increased sales and profitability.

A study conducted by Josiah, A. and Nancy, K. (2012) on the Relationship between Electronic Banking and Financial Performance among Commercial Banks in Kenya from 2006 to 2010 using ROA as dependent variable and investments in e-banking, number of ATMS and number of debits cards issued to customers as proxy for e-banking. The study result revealed that number of ATMs, Debit Card have significant influence on performance of banks by bringing services closer to its customers and hence improved industry performance. Thus, there exists positive relationship between e-banking and bank performance.

Similar studies were conducted by Njoroge, M. N. & Mugambi, F. (2018) on the effect of electronic banking on financial performance in Kenyan commercial banks. The study revealed that taking all other independent variables at zero, a unit increase in debit cards leads to an increase in the Bank performance in Kenya. Further the study established that Increase in debit card usage enhances the profitability of banking industry in form of ROA and increased usage of debit cards has significantly reduced transaction costs and enhanced convenience among credit and debit card users.

Debit Card is considered in terms of total number of Debit Card users

3.3.2.3 Number of Mobile Banking Users (NMOBU)

According to Rose, P.S. (1999) Mobile banking allows customers with busy lives to conveniently do their banking using their phones anytime. It is about getting banking services to the unbanked, those who do not have bank access or bank accounts, and those who are at the bottom of the economic pyramid, often living in remote areas. They receive the benefits of banking services such as being able to save and borrow in a cost-efficient and secure way.

According to the German mobile operator Mobilcom, mobile devices, especially smart phones, are the most promising way to reach the masses and to create "stickiness" among current customers, due to their ability to provide services anytime, anywhere, high rate of penetration and potential to grow. A study conducted by Hernando and Nieto (2007) on the effect of mobile banking and financial performance of Spanish commercial banks. It was concluded that banks that implemented mobile banking were able to attract more customers and this led to increased access to customer deposits leading to financial performance.

Kathuo S., (2015) studied the effect of mobile banking on the financial performance of banking institutions in Kenya. The study used (ROA) and (ROE) as a measure of financial performance while the overall operating cost as well as other Bank specific factors in form of ratios as independent variables and applied descriptive research design. The target population included the 42 commercial banks operating in Kenya as at December 2014. The study established that the number of mobile banking transactions has tremendously increased in the last five years since the introduction of M-banking, thus concludes that, banks that have adopted M-banking services have to a large extent increased their customer outreach, and hence have improved their financial performance.

Donner, J. and Tellez, C.A. (2008) did a study on mobile banking and economic development where they sought to link adoption, impact, and use. The study established that through offering a way to lower the costs of moving money from place to place and offering a way to bring more users into contact with formal financial systems, m-banking/m-payments systems could prove to be an important innovation for the developing world.

Tiwari, R., Buse, S. and Herstatt, C. (2006) studied mobile banking as business strategy: impact of mobile technologies on customer behavior and its implications for banks. The study sought to

examine the opportunities for banks to generate revenues by offering value added; innovative mobile financial services while retaining and even extending their base of technology-savvy customers

Mobile banking is considered in terms of total number of Mobile banking users and value of transaction executed by mobile banking (VMOBT)

3.3.2.4 Value of Transaction of Automated Teller Machine (VATMT)

Joseph M.V. (2017) studied the Impact of Electronic Banking on the Profitability of Commercial Banks in Kenya and Data collected from 43 commercial banks from January 2007 to June 2015 (34 Quarters). The study concluded that ATM Transactions and POS transactions have positive and significant effect on ROE whereas mobile banking transactions have negative and insignificant effect on bank profitability.

Price of transaction of ATM was considered as independent variable by Hamed et al.2016, the results of study showed that the effect of price of ATM and POS transaction on ROA of selected banks in Iran was positive and significant. The effect of POS on bank ROA was higher than that of ATM transaction.

Automated Teller Machines Transactions (ATMT), Point of Sales Transactions (POST), Call Center Banking Transactions (CCT) and Mobile Banking Transactions (MOBT) were used to examine their impact on aggregate Return on Equity (ROE) of Pakistani banking industry by Kashif, M. ,Kamboh, M. & javaid, M. (2016). Results showed that POST and MOBT were positively significantly related to ROE, CCT and ATMT were negatively significantly associated with profitability (ROE)

3.3.2.5 Value of Transaction of Mobile Banking (VMOBT)

Number of registered mobile banking customers by the banks, investment in mobile banking measured in Kenya shillings and the number of mobile banking transactions by the banks were considered as the factors of m-banking by Mwange, A. J (2011) to examine the impact of mobile banking on financial performance of commercial banks in Kenya using ROA as factor of profitability. The study results showed that the investment in mobile banking measured in Kenya shillings and the number of mobile banking transactions by the banks have a positive relation to

the ROA in that a unit increase in each / or all would result in an increase in the performance indicator ROA, while on the other hand the number of mobile banking registered customers by banks has an inverse relation to the ROA in the model meaning a unit increase in it would result in a decline in the performance indicator ROA.

Wadhwa. S (2016) studied the Impact of m-Banking on Profitability of Scheduled Commercial Banks in India. The study has considered Volume of transactions and Value of transactions performed through m-banking as the factors of m-banking and Profitability has been considered in terms of Return on Assets (ROA) and Return on Equity (ROE), for the period from 2012 to 2016. It was found in the study that although the usage of m-banking has tremendously increased during the period of study, it has not played any significant role towards improvisation in the profitability of these banks. It has been opined in the paper that if all the banks could proceed to the path of m-banking in a proper manner, the overall profitability due to m-banking will improve in coming years.

The study conducted by Rachael W.M. (2011), examined the effects of mobile banking on the financial performance of commercial banks in Kenya considered ROA as measure of bank performance and total amounts transferred via the mobile (value of transaction executed by mobile banking) number of mobile banking users as the factors of m-banking for five years period from 2007 to 2011 using Monthly data analysis. During the study period, the amount of money transacted through the mobile money transfers increased steadily from 0.06 billion in 2007 on its launch to 118.08 billion by the last month of the analysis. The growth was motivated by the convenience offered by the service. The study however found that there exist a weak positive relationship between mobile banking and the financial performance of commercial banks in Kenya.

Controlled Variable

In order to isolate the effects of e-banking on bank performance, it is needed to control for other factors that are expected to have some influence on profitability. The control variable which is expected to influence bank's profitability included in this study is bank size, Although there are other variables that affect bank performance the study focus on the below variable only:

3.3.2.6 Bank Size (BS)

Bank size which is measured by the natural log of total assets (Smirlock, M. 1985) is one of the control variables that determine the financial performance of the commercial banks. Studies conducted on determinants of bank profitability took bank size, as an important determinant variable of bank performance (Kosmidou K., 2008). In the literature, mixed relationships are found between size and profitability. Increasing bank size can increase bank profitability by allowing banks to realize economies of scale. For example, increasing size allows banks to spread fixed costs over a greater asset base, thereby reducing their average costs. Increasing banks' asset size can also reduce risk by diversifying operations across product lines, sectors, and regions (Mester 2010). Lower risk can promote profitability directly by reducing losses or indirectly by making liability holders willing to accept lower returns, thereby reducing banks' funding costs. Furthermore, as the scale of operations increases, banks may be able to better use specialized inputs such as loan officers with expertise in commercial and industrial business lines, resulting in greater efficiency. Realizing economies of scale may lead to a healthier banking system by eliminating inefficiencies and reducing risks (Rao & Tekeste, 2012 and Alper and Anbar, 2011). On the other hand, in the diversification of bank branches, for instant, the operational expense may get higher and due to possible bureaucratic bottlenecks and managerial inefficiencies the variable may exhibit negative effects Ameur, I. and Mhiri, G. (2013) and Sufian, F. and Chong, R. 2008.

There are two opposing arguments both theoretically as well as empirically regarding to the relationship between bank performance and size. The effect of size could therefore be nonlinear; meaning that banks' performance is likely to increase up to a certain level by achieving economies of scale and decline from a certain level. Hence, the expected sign of the coefficient of bank size is unpredictable based on academic literature.

The researcher used the natural logarithm of total Assets as a proxy for bank size.

Both Njogu, J.N (2012) and Karimzadeh, D.S. (2014) studied the effect of electronic banking on profitability of commercial banks in Kenya and Iran respectively, considering size of the bank as one of the control variable. The results of these studies found that Bank Size has a positive and significant impact on the profitability of banks.

Macroeconomic variables

3.3.2.7 Inflation (INF)

Inflation is used to represent the changes in the general price level or inflationary conditions in the economy and it is measured by annual country inflation rate. It is an important macroeconomic condition which may affect both the costs and revenues of banks.

In this regard, some authors introduce the issue of the relationship between bank profitability and inflation, stating that the effect of inflation on bank profitability depends on how inflation affects both salaries and the other operating costs of the bank. In this context, Staikouras, C. & Wood, G. (2003) point out that as inflation may have direct effects, that is, increase in the price of labor, and indirect effects, that is, changes in interest rates and asset prices, on the profitability of banks. Perry (1992) also suggests that as the effects of inflation on bank performance depend on whether the inflation is anticipated or unanticipated. In the anticipated case, the interest rates are adjusted accordingly, resulting in revenues to increase faster than costs and subsequently, having positive impact on bank profitability. On the other hand, in the unanticipated case, banks may be slow in adjusting their interest rates resulting in a faster increase of bank costs than bank revenues and consequently, having negative effects on bank profitability. Thus, the expected sign of the inflation is unpredictable based on prior research.

Girma .A (2016) on his study on: "The Impact of Information and Communication Technology on Performance of Commercial Banks in Ethiopia." Considered inflation as one of the macroeconomic variable

3.4 Operationalization of Study Variables

Table 3.1 Definitions, Notation and Expected Sign of the Study Variables

	Variables	Notation	Measurement	Used by (source)	Expected result
Dependent Variable	Return on equity	ROE	Net income after tax /Average shareholder's equity	Al-Smadi, M. and Al-Wabel, S. (2011)	
Independent variables	Number of ATM terminals	NATM	Natural log of number of ATM deployed	Gambo.J, Arikpo, I. (2013)	+
	Debit Cards issued	DC	Natural log of number of debit card users	Josiah, A. and Nancy, K. (2012)	+
	Number of Mobile banking users	NMOBU	Natural log of number of MOB users	Hernando, I. and Nieto, M.J. (2007) & Kathuo S., (2015)	+
	Value of ATM transaction	VATMT	Natural log of Value of ATM transactions	Joseph M.V. (2017)	+
	Value of MOB transaction	VMOBT	Natural log of MOB transactions	Wadhwa,S. (2016)	+
	Bank size	BS	Natural log of total assets	Ameur, I., and Mhiri, G. 2013 and Sufian, F. and Chong, R. 2008	+/-
	Inflation	INF	Annual inflation rate	Demirguc-Kunt, A. & Huizinga, H. (1999).	+/-

Source: Compiled by researcher

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and presentation of the results of the study. The data were analyzed by using Stata 13 econometric software package. The descriptive statistics and the correlation analysis were discussed. Followed by the diagnostic test, which is necessary to fulfill the assumption of the classical linear regression model. Then, econometric analysis and discussion of the main finding of the study were presented. Finally, the results of the regression analysis were discussed by supporting empirical evidence.

4.1. Descriptive Statistics

Table 4.1 provides a summary of the descriptive statistics of the dependent and independent variables for ten commercial banks from the year 2015 to 2018 with a total of 40 observations. The table demonstrates the mean, minimum, maximum, standard deviation and number of observations for the dependent variable Return on equity (ROE) and independent variables: Number of ATM terminals (NATM), Number of debit cards (DC), Number of mobile banking users (NMOBU), Value of ATM transactions (VATMT), Value of mobile banking transactions (VMOBT), Bank size (BS) and Inflation (INF).

Table 4.1 Descriptive Statistics

```
. summarize ROE LOGNATM LOGNDC LOGNMBU LOGVATMT LOGMOBT BS INF
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	40	25.20588	12.64938	14.28244	67.65142
LOGNATM	40	1.997273	.5613843	.90309	2.930449
LOGNDC	40	4.586585	.4990001	3.635584	5.799755
LOGNMBU	40	4.253152	.6472651	2.230449	5.670032
LOGVATMT	40	7.292866	.8464141	5.098342	8.594332
LOGMOBT	40	6.940605	.8345564	4.354358	8.667292
BS	40	10.38414	.4873338	9.620344	11.75246
INF	40	105.825	12.57151	92	125.2

Source: STATA13 result descriptive statistics

Table 4.1 above presents the descriptive statistics of the dependent and independent variables of the study. Basically, a small standard deviation means that the values in a statistical data set are close to the mean of the data set, on average, and a large standard deviation means that the values in the data set are farther away from the mean, on average. It is a measure of the average distance between the values of the data in the set and the mean. A low standard deviation indicates that the data points tend to be very close to the mean; a high standard deviation indicates that the data points are spread out over a large range of values.

As shown in the table 4.1 above, the mean value of ROE of commercial banks was around 25.21 percent for the sampled commercial banks in Ethiopia. This implied that, the sampled banks on average earned 25.21 percent of each birr invested in equity. It could be noticed that the banks ROE growth fluctuates on average between 14.3 and 67.7percent. That means the most profitable bank among the sampled banks earned 67.7% of profit after tax for a single birr invested in the equity of the firm. On the other hand, the least profitable bank of the sampled banks earned 14.3 % of profit after tax for each birr invested in the Equity of the firm. The standard deviation statistics for ROE was (0.126) which indicated that there were higher variations of performance growth among commercial banks during the study period. The result implied that these banks need to optimize the use of their equity to increase the return on their equity.

Regarding the explanatory variables of the model, the mean value of the number of ATM installed was 2 percent; the standard deviation was 0.56 percent, while 2.9% and 0.9% were the maximum and minimum numbers of ATM installed, respectively, which exhibited a lower dispersion to the mean value. That means there was lower difference among banks with regard to number of ATM terminals. This implied that there was competition between commercial banks to attract customers with a motive of ATM under the study period.

The mean value of the banks' debit cards (DC) over the study period was 4.59 percent; the standard deviation was 0.5 percent with the maximum and minimum number of debit cards 5.8 % and 3.6 % respectively. There was a lower dispersion in DC towards its mean value. This implied that there was lower difference among banks regarding debit cards issued.

The mean value of the banks' number of mobile banking users (NMOBU) over the period under study was 4.3 percent; the standard deviation was 0.65 percent with maximum (5.7 %), and

minimum (2.2 %) number of mobile banking users. This implied that there was a lower dispersion in NMOBU towards its mean value.

The average value of ATM transactions was 7.3 percent while the average value of mobile banking transactions was 6.9 percent.

4.2 Correlation Analysis

Table 4.2 Correlation Matrix of Dependent and Independent Variables

```
. corr ROE LOGNATM LOGNDC LOGNMBU LOGVATMT LOGMOBT BS INF
(obs=40)
```

	ROE	LOGNATM	LOGNDC	LOGNMBU	LOGVATMT	LOGMOBT	BS	INF
ROE	1.0000							
LOGNATM	0.3605	1.0000						
LOGNDC	0.6168	0.5444	1.0000					
LOGNMBU	0.5390	0.5925	0.6495	1.0000				
LOGVATMT	0.3997	0.5707	0.4157	0.5761	1.0000			
LOGMOBT	0.5386	0.7171	0.6240	0.7283	0.8015	1.0000		
BS	0.7745	0.7376	0.7954	0.7065	0.6042	0.7885	1.0000	
INF	-0.0716	0.2551	0.2115	0.3113	0.3155	0.2376	0.2639	1.0000

Source: STATA13 result for correlation matrix

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The most widely used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which was used in this study. Before the regression result, it is important to check the correlation between variables that are used in the regression. Correlation analysis is the statistical tool used to study the closeness of the relationship between variables Gujarati (2004). This section of the study deals with the correlation analysis of the studied variables. The purpose of undertaking correlation analysis is to check whether there is multicollinearity problem in the model and to indicate whether the variables move together or not in the same direction and the correlation coefficient indicates the strength of a linear relationship between two variables. The correlation coefficient ranges between +1 and -1. +1 indicates the strongest positive correlation possible, and -1 indicates the strongest negative correlation possible. Therefore the closer the coefficient to either of these numbers the stronger the correlation of the data it represents. On this scale 0 indicates no

correlation, hence values closer to zero highlight weaker/poorer correlation than those closer to +1/-1.

The above correlation matrix table 4.2 showed the relationship between the dependent variable and independent variables, and also between the independent variables each other used in this study. Based on the correlation matrix ROE had a positive correlation with number of ATM installed, number of debit cards, number of mobile banking users, value of ATM transactions, value of mobile banking transactions and bank size which indicated when those variables increased ROE would also be increased with different correlation coefficient. Moreover inflation was negatively correlated with ROE. The negative correlation figure implied if this independent variable increased ROE would be decreased.

4.3 Classical Linear Regression Model (CLRM) Assumptions and Diagnostic Test

As noted in Brooks (2008), CLRM is based on sets of assumptions: Such as the errors have zero mean, the variance of the errors is constant and finite over all variables of Xt, the errors are linearly independent of one another, there is no relationship between the error and corresponding X-variate, and the error terms are normally distributed. Hence, if these CLMR assumptions hold, the estimators determined by OLS will have a number of desirable properties that is consistent, unbiased, and efficient. Thus In order to determine the validity of the model, it should pass diagnostic tests such as; heteroscedasticity, autocorrelation, multicollinearity and normality tests.

4.3.1 Test for Average Value of the Error Term is Zero (E (ut) = 0)

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

4.3.2 Test for Heteroskedasticity Assumption (var(ut) = $\sigma 2$)

It has been assumed that the variance of the errors is constant. This is known as the assumption of homoscedasticity (Brook, 2008). If the errors do not have a constant variance, they are said to

be heteroskedastic. This study used white test to examine the presence of hetroskedasticity across the range of explanatory variable. In table 4.3 below the p-value in white's test of heteroskedasticity was 0.2826, since the *p*-value was considerably in excess of 0.05 we couldn't reject the null hypothesis of homoskedasticity. Implying that, there was no significant evidence for the presence of heteroskedasticity.

Table 4.3 Heteroskedasticity Test

```
. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(35)     =     39.32
         Prob > chi2  =    0.2826

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	39.32	35	0.2826
Skewness	10.80	7	0.1478
Kurtosis	0.68	1	0.4110
Total	50.79	43	0.1936

Source: STATA13 result for white's test

4.3.3 Test for Multicollinearity

Multicollinearity indicates a linear relationship between explanatory variables which may cause the regression model biased (Gujarati, 2004). If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS Brooks (2008). When independent variables are multicollinear, there is overlap or sharing of predictive power. This might lead to the paradoxical effect, whereby the regression model fitted the data well, but none of the explanatory variables (individually) had a significant impact in predicting the dependent variable Gujarati, (2004).Perfect multicollinearity will usually be observed only when the same explanatory variable is inadvertently used twice in a regression. This assumption does allow the independent variables to be correlated but they cannot be perfectly correlated. How much correlation causes

multicollinearity however, is not clearly defined. While Hair et al (2006) argue 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.Although there is no one unique method of detecting multicollinearity, or measuring its strength, among several indicators variance inflation factor (VIF) and the explanatory variables correlation coefficients (CC) were used for this particular study (Gujarati, 2004). Therefore, in examining the correlation matrix of the independent variables shown below in table 4.4 the highest correlation was 0.8015 which was between value of ATM transactions and value of mobile banking transactions.

Table 4.4 Correlation Matrix between Independent Variables

```
. corr LOGNATM LOGNDC LOGNMBU LOGVATMT LOGMOBT BS INF
(obs=40)
```

	LOGNATM	LOGNDC	LOGNMBU	LOGVATMT	LOGMOBT	BS	INF
LOGNATM	1.0000						
LOGNDC	0.5444	1.0000					
LOGNMBU	0.5925	0.6495	1.0000				
LOGVATMT	0.5707	0.4157	0.5761	1.0000			
LOGMOBT	0.7171	0.6240	0.7283	0.8015	1.0000		
BS	0.7376	0.7954	0.7065	0.6042	0.7885	1.0000	
INF	0.2551	0.2115	0.3113	0.3155	0.2376	0.2639	1.0000

Source: Stata 13output

The other test used for the presence of multicollinearity was the variance inflation factor (VIF) or tolerance value (1/VIF).Variance inflation factor (VIF) or tolerance value is used interchangeably. According to Gujarati (2004), if the variance inflation factor (VIF) is more than 10 and tolerance level is less than 0.10 it indicates a serious multicollinearity problem. The tolerance value is between zero and one if it approaches zero it indicates collinearity problem and when it approaches 1 no multicollinearity problem. According to Table 4.5 the variance inflation factor (VIF) was less than 10 for both the model (mean VIF) and for each independent variable. This test confirmed the presence of lower degree of collinearity among explanatory variables.

Table 4.5 Multicollinearity Test:

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
      LOGMOBT |      5.66    0.176733
           BS |      5.19    0.192744
    LOGVATMT |      3.06    0.326389
      LOGNDC |      3.00    0.333268
     LOGNMBU |      2.58    0.388065
     LOGNATM |      2.50    0.399521
         INF |      1.18    0.846209
-------------+----------------------
    Mean VIF |      3.31
```

Source: STATA13 result for Variable inflation factor test

4.3.4 Test For Normality Assumption (ut ~ N(0, σ2)

It is assumed that the distribution of residuals is normal. 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. This means that the *p*-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% level (Brook, 2008). The test result for the model provides a p-value of greater than 5% evidencing that residuals were normally distributed. As per table 4.6 below the Jarque-Bera statistic had a P-value of 0.3806 and both the probability of skewness and kurtosis was above 5% which implied that there was no evidence for the presence of abnormality in the data. Thus, the null hypothesis that the data was normally distributed was failed to reject since the p-value exceeded 0.05.

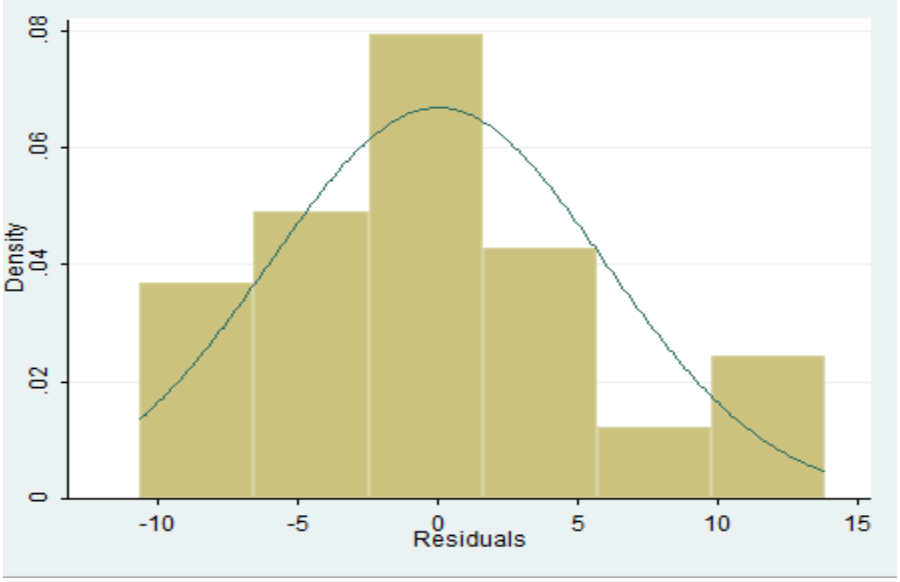
Table 4.6 Test for Normality Assumption: Jarque–Bera

```
. sktest uhat

                    Skewness/Kurtosis tests for Normality
                                                              ------- joint ------
    Variable |   Obs   Pr(Skewness)   Pr(Kurtosis)  adj chi2(2)     Prob>chi2
-------------+-------------------------------------------------------------------
        uhat |    40        0.1841         0.8216         1.93          0.3806
```

Source: STATA13 result for Skewness/Kurtosis test

Figure 4.1: Histogram for Residual



4.3.5 Test for Choosing Random Effect (RE) Versus Fixed Effect (FE) Models

The econometrics model used to identify the effect of bank specific factors on the financial performance of commercial banks in Ethiopia was panel data regression model which should be either fixed effects or random effect model. In order to analyze this panel data there are broadly two classes of panel data estimator approaches that can be employed in empirical research: fixed effects models and random effects models. The first issue is, therefore, that choosing between fixed effects (FE) and a random effects (RE) model based on the Hausman test where the null hypothesis says that random effects model is appropriate than the fixed effects model. If p value is higher than 0.05 (insignificant) random effects is preferable and if p value is lower than 0.05 (significant) fixed effects model is appropriate than the random effects model

Hausman Test of Hypothesis

H0: Random effect model is appropriate

H1: Fixed effect model is appropriate

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

Table 4.7 Choosing Random Effect (RE) Versus Fixed Effect (FE) Models Using Hausman Test

```
. hausman fe re

                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
     LOGNATM |  -7.666339    -2.789806       -4.876533                .
      LOGNDC |   3.005092     7.307035       -4.301943                .
     LOGNMBU |   6.572297     1.847295        4.725002                .
    LOGVATMT |   3.249763     1.472203         1.77756                .
     LOGMOBT |  -.9697811    -1.364823        .3950418                .
          BS |  -58.69584     12.22153       -70.91737         13.30188
         INF |   .4313605    -.2660256         .697386         .1393252
------------------------------------------------------------------------------
                     b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test:  Ho:  difference in coefficients not systematic

                chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =       20.29
              Prob>chi2 =      0.0050
              (V_b-V_B is not positive definite)
```

Source: STATA13 result for Hausman test

According to Hausmantest shown in Table 4.7, the model was better off if fixed effect model was used since the p value for the model was 0.0050 which was lower than 0.05.

4.4 Result of the Regression Analysis

This section presents the overall results of the regression analysis on the role of electronic banking on financial performance of commercial banks in Ethiopia. In the study ROE was used as a financial performance indicator. The relationship between the dependent and independent variables will be discussed on the basis of the findings on this empirical study of fixed effect model. Under the following regression results the beta coefficient may be negative or positive; beta indicates each variable's average level of influence on the dependent variable. The positive beta coefficient indicates that the variable has on average a positive impact on the dependent variable; and negative beta indicates a negative impact on the dependent variable. Specifically it shows that when independent variables increase/decrease by one percent the dependent variable will increase/decrease by beta amount on average but the independent variables should statistically have significant impact on the dependent variable. P-value indicates at what percentage or precession level each variable is significant.

4.4.1 Operational Model

ROE= β0+β1 (NATMi,t) + β2(DCi,t) +β3(NMOBUi,t) + β4(VATMTi,t) + β5(VMOBTi,t)

+β6(BSi,t) +β7(INFi,t)+ Є i,t

The output of the econometrics model by fixed effect regression showed the explanatory power of the model based on the result of R^2. The R^2 measured the success of the regression in predicting the values of the dependent variable in the sample. In standard settings, it could be interpreted as the fraction or percentage of the variance of the dependent variable explained by the independent variables collectively. The statistic would equal one if the regression fitted perfectly, and zero if it fitted no better than the simple mean of the dependent variable. As it said before, R^2 value indicated the explanatory power of the model and adjusted R^2 value which took into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models.

Table 4.8: Fixed Effect Model Regression Results

```
. xtreg ROE LOGNATM LOGNDC LOGNMBU LOGVATMT LOGMOBT BS INF, fe

Fixed-effects (within) regression               Number of obs      =        40
Group variable: ID                              Number of groups   =        10

R-sq:  within  = 0.6170                         Obs per group: min =         4
       between = 0.7064                                        avg =       4.0
       overall = 0.5950                                        max =         4

                                                F(7,23)            =      5.29
corr(u_i, Xb)  = -0.9778                        Prob > F           =    0.0010

------------------------------------------------------------------------------
         ROE |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     LOGNATM |  -7.666339   3.538264    -2.17   0.041    -14.9858   -.3468812
      LOGNDC |   3.005092   2.741292     1.10   0.284    -2.665703    8.675888
     LOGNMBU |   6.572297   1.854977     3.54   0.002     2.734984    10.40961
    LOGVATMT |   3.249763   1.896495     1.71   0.100    -.6734368    7.172962
     LOGMOBT |  -.9697811   1.754322    -0.55   0.586    -4.598873    2.659311
          BS |  -58.69584   15.01736    -3.91   0.001    -89.76162   -27.63005
         INF |   .4313605   .1593929     2.71   0.013     .1016311    .7610898
       _cons |   545.6695   138.6192     3.94   0.001     258.9139    832.4251
-------------+----------------------------------------------------------------
     sigma_u |  38.282271
     sigma_e |  3.0229256
         rho |  .99380331   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(9, 23) =    14.32                 Prob > F = 0.0000
```

Source: STATA13 result for fixed effect regression

ROE= β0+β1 (NATMi,t) + β2(DCi,t) +β3(NMOBUi,t) + β4(VATMTi,t) + β5(VMOBTi,t)

+β6(BSi,t) +β7(INFi,t)+ Є i,t

ROE= 545.67–7.67NATM + 3DC+6.57NMOBU +3.25VATMT – 0.97VMOBT– 58.7BS + 0.43INF + Є i,t

Table 4.8 above showed fixed effect estimation on 40 observations taken from 10 commercial banks over four year's period from 2015 to 2018 with a balanced panel data. The R^2, goodness of fit of the model for the model was 61.7% which was fairly good. This means variation in return on equity (ROE) of commercial banks in Ethiopia was 61.7% explained by number of ATM's installed (NATM), number of debit cards issued (DC), number of mobile banking users (NMOBU), value of ATM transactions (VATMT), value of mobile banking transactions (VMOBT), Bank size (BS) and annual inflation rates (INF).The rest 38.3% variation in return on equity (ROE) of commercial banks in Ethiopia was not explained by either bank specific or macroeconomic variables used in this model. This means that the remaining 38.3% of the changes was explained by other variables which were not included in the model. In addition over all test of significance (Prob> chi2 was 0.0000) which showed joint statistical significance of the coefficients and linearity in parameters. So this implied that the overall model was statistically significant since p-value was 0.000 which was below 5%.

According to fixed effect estimation of the model out of seven explanatory variables five of them had statistically significant impact on profitability. Among the significant variables, number of mobile banking user and bank size were significant at 1% since the p-value for these variables were 0.002 and 0.001 respectively. Inflation and number of ATM installed were significant at 5% with p-value 0.013 and 0.041 respectively. Whereas value of ATM transactions was significant at 10% with p-value=0.10.

While assessing coefficients of correlation, number of debit cards issued, number of mobile banking users, value of ATM transactions and inflation had a positive or direct relationship with return on equity (ROE) of commercial banks, which suggested that, an increase in these independent variables would result in an increase in ROE and a decrease in these explanatory variables would result in a decrease in ROE of commercial banks in Ethiopia. Whereas the rest variables such as: number of ATM installed, value of mobile transactions and bank size had a negative coefficient, that means these explanatory variables had an inverse relation with return on equity (ROE) of commercial banks in Ethiopia.

The panel fixed effect estimation regression result in the above table 4.8 also showed that, the coefficient intercept (β0) was 545.6695. Implying that, when all explanatory variables took a value of zero, the average value ROE would take 545.6695 unit and statistically significant at 1% level of significance.

4.4.2 Interpretations on Regression Results and Research Hypothesis

This section discusses in detail the analysis of the results for each explanatory variable and their importance in determining financial performance. Furthermore, the discussion analyzes the statistical findings of the study in relation to the previous empirical evidences.

4.4.2.1 Number of ATM Terminal and Return on Equity

The proxy used to measure number of ATM terminals is natural logarithm of number of ATM deployed. The result of fixed effect regression model in table 4.8 above indicated that number of ATM terminals was statistically significant with P-value 0.041 and had coefficient of -7.67. Holding other variables constant, when number of ATM terminals was increased by one percent, return on equity (ROE) of sampled commercial banks would be decreased by 7.67 percent on average and statistically significant at 5% level of significance. In other words, there was significant negative relationship between ATM terminals (NATM) and return on equity (ROE) of sampled Ethiopian commercial banks. Therefore, the researcher rejected the null hypothesis that there was a positive relationship between NATM and ROE, as there was no sufficient evidence to support the positive relationship between NATM and ROE.

In contrary to the hypothesis of this research, NATM showed a negative relationship with return on equity (ROE) of sampled Ethiopian commercial banks. The result was consistent with other researchers' findings: Kashif, M., Kamboh, M. & javaid, M. (2016) and Uchechukwu, N.; Chubuzor, E.E (2017), who reported a negative relationship between the cost of building ATM locations on bank profit. The negative effect found by these studies were attributed to the increased in investment spending as a result of the high cost of building up an ATM stand i.e. the physical mounting of the ATM machines and cost of building of ATM locations were significant and reduced the performance of banks. According to Simon, O., Mohammed A., & Elmaude, J.G. (2013) it was reported that in the first year of adoption, a negative impact was observed but

e-banking contributed positively to bank performance after two years of adoption in terms of ROA and ROE due to financial cost of adopting E-Banking.

4.4.2.2 Debit Card Issued and Return on Equity

The proxy used to measure debit cards issued is natural logarithm of number of debit card users. The result of fixed effect regression model in table 4.8 above indicated that debit card had coefficient of 3.00 and its P-value was 0.284. Holding other variables constant, when number of debit card users increased by one percent, return on equity (ROE) of sampled commercial banks on average would be increased by 3.00 percent but statistically insignificant i.e. even if the coefficient of debit card issued was positive as expected, it was not statistically significant even at 10% significance level (p-value= 0.284), suggesting that its influence was negligible. The hypothesis that stated there was a positive significant relationship between debit cards and profitability (ROE) would be rejected as data did not support the hypothesis. Therefore, the researcher failed to accept the null hypothesis that debit card had a positive significant role on return on equity of commercial banks in Ethiopia. Referring to previous studies, result was consistent with the findings of Sujud, H. & Hashem, B. (2017), Ongare, H.O (2013), Josiah, A. and Nancy, k. (2012), Fu-Qiang and Sajid (2014) and Polatoglu and Ekin (2001) that increased in debit card usage enhanced the profitability of banking industry in form of return on banks equity. Therefore, conclusion about the impact of debit cards on financial performance (ROE) remained ambiguous and further research was required.

The possible reason for the insignificant association between DC and ROE could be attributed to the fact that, the increased number of inactive cardholders' and lack of efficient delivery mechanism of cards to customers because after production cards would not be delivered to customers immediately.

4.4.2.3 Number of Mobile Banking Users and Return on Equity

The proxy used to measure number of mobile banking users (NMOBU) is natural logarithm of number of mobile banking users. The result of fixed effect regression model in table 4.8 above indicated that the coefficient of number of mobile banking users was 6.57 and its P value was 0.002. Holding other variables constant, when number of mobile banking users (NMOBU) increased by one percent, return on equity (ROE) of sampled Ethiopian commercial banks on

average would be increased by 6.57 percent and statistically significant at 1% level of significant. This means that, commercial banks with large number of mobile banking users were more profitable than commercial banks with low number of mobile banking users. Therefore, the researcher failed to reject the null hypothesis that NMOBU had a positive effect on ROE, as there was no sufficient evidence to support the negative relationship between ROE and NMOBU.

The relationship was positive as expected and this positive relationship between NMOBU and ROE could be attributed to the fact that mobile banking can made basic financial services more accessible by minimizing time and distance to the nearest retail bank branches (CGAP, 2006) as well as reduced the bank‘s own overheads and transaction- related costs and had the potential to extend the limited nature and reach of the formal financial services to various customers thereby increasing their profitability (Lee, Lee and Kim, 2007). In addition with mobile banking customers could control their bank account at any location around the country with the use of mobile internet. This finding was consistent with previous studies of Kathuo S., (2015), Donner and Tellez (2008), Tiwari, Buse and Herstatt (2006), Mwange, A. (2013), Rachael W.M. (2013) & Mustapha, S.A. (2018). According to those researchers banks that had adopted M-banking services had to a large extent increased their customer outreach, and hence had improved their financial performance. Their findings revealed that many mobile banking products were being offered by banks such as Fund Transfer between Accounts/ E-funds transfer, Bill Payment, order for cheque books and bank statements and therefore concluded that the financial performance of the banks that provide these mobile banking products had improved because they ensured efficiency of the banking services.

This empirical finding was also consistent with the findings of Ngumi, M.P (2013), which pointed out that bank innovation had significant influence on income, ROE, Profitability and Deposits of commercial bank in Kenya. It was found that bank innovations had the highest positive influence on mobilization of consumer deposits.

4.4.2.4 Value of ATM Transactions and Return on Equity

The proxy used to measure value of ATM transactions (VATMT) is natural logarithm of the value of ATM transaction. The result of fixed effect regression model in table 4.8 above indicated that the coefficient of value of ATM transactions was 3.25 and its P value was 0.10.

Holding other variables constant, when value or price of transactions of ATM (VATMT) increased by one percent, return on equity (ROE) of sampled Ethiopian commercial banks would be increased by 3.25 percent on average and statistically significant at 10% level of significant. Therefore, the researcher failed to reject the null hypothesis that value or price of transactions of ATM had a positive role on return on equity, as there was no sufficient evidence to support the negative relationship between VATMT and ROE.

The relationship was positive as expected and this positive relationship between VATMT and ROE could be attributed to the fact that more transactions of ATM led to have more return on equity. This finding was consistent with previous studies of Joseph M.V. (2017), Itah and Emmanuel (2014), Cook, Seiford and Zhu (2004). According to those researchers value of ATM transactions had a positive and significant role on return on equity.

The possible reason for the significant positive relationship could be that, the more transactions executed by ATM, the more commission would be generated by commercial banks. Moreover as more transactions were processed by ATM, banks would benefit from transaction related costs. According to Allen and Hamilton (2002), an estimated cost of providing the routine business of a full service branch in USA was $1.07 per transaction, as compared to 54 cents for telephone banking, 27 cents for ATM banking and 1.5 cent for internet banking. On the other hand, the advantages for the customers were significant time saving and reduced costs in accessing and using the various banking products and service, increased comfort and convenience.

4.4.2.5 Value of Mobile Banking Transactions and Return on Equity

The proxy used to measure value of mobile banking transactions (VMOBT) is natural logarithm of the value of mobile transactions. The result of fixed effect regression model in table 4.8 above indicated that the coefficient of the value or price of transactions executed by mobile banking was -0.97 with p-value (0.586). In other words, there was insignificant negative (indirect) relationship between value of mobile banking transactions (VMOBT) and return on equity (ROE) of sampled Ethiopian commercial banks. Therefore, the researcher rejected the null hypothesis that there was positive relationship between VMOBT and ROE, as there was no sufficient evidence to support the positive relationship between VMOBT and ROE.

In contrary to the hypothesis of this research, VMOBT showed a negative relationship with return on Equity (ROE) of sampled Ethiopian commercial banks. The result was consistent with the findings of Wadhwa. S (2016) and Ene, (2017) that value of mobile banking transaction had no significant relationship with return on equity. In contrast, many previous studies for instance Kashif, M., Kamboh, M. & javaid, M. (2016), Uchida, Ahmed, and Ahmed (2011) and Rauf and Qiang 2014, stated that VMOBT had significant positive effect on ROE.

The possible reason for the negative association between VMOBT and ROE could be attributed to the fact that, commercial banks recruited mobile banking customers for the sole purpose of providing bank account information via test message and might not encourage their customers to transact through mobile banking, which enabled them perform banking transaction, hence resulted in a decrease in the value or price of transactions performed by mobile banking, which in turn resulted to be negatively correlated with profitability. In addition many individuals could have been skeptical with regard to the functionality of mobile banking, as a result of the increased number of unsuccessful mobile banking transactions due to network interruption which discouraged customers from using the medium, thus resulted to be negatively associated with profitability (ROE).

4.4.2.6 Bank Size and Return on Equity

The proxy used for bank size is natural logarithm of total asset. The result of fixed effect regression model in table 4.8 above indicated that the coefficient of bank size was -58.7 and its P-value was 0.001. Holding other variables constant, when bank size (BS) increased by one percent, return on equity (ROE) of sampled commercial banks would be decreased by 58.7percent and statistically significant at 1% level of significance.

The result indicated that a negative (indirect) size-profitability relation had existed which implied that smaller commercial banks tend to earn higher profits than larger commercial banks. It supported the studies of (Kosak & Cok, 2008) and Jonghe (2010), Barros, Ferreira and Williams (2007) who argued that small banks were more likely to get good performance and less chances of getting bad performance. Conversely, large banks were less likely to obtain good performance and a greater chance of getting bad results.

The result was consistent with the previous studies Ameur, I. and Mhiri, G. (2013) ,Sufian, F. and Chong, R. (2008) and Athanasoglour et at 2008 who suggested that in the diversification of bank branches operational expenses (rent, payroll, marketing etc) might get higher and the variables might exhibit a negative effects. Moreover size and profitability of banks might show a negative relationship due to bureaucratic bottlenecks and managerial inefficiencies. In contrast, Rao & Tekeste, (2012) and Alper and Anbar, (2011) found positive relationship between bank size and performance, suggesting that Large banks were likely to had an advantage of engaging in higher investment diversification than small banks. Since this diversification reduced risks and economies of scale led to increase operational efficiency through minimizing costs.

The possible reason for the negative association could be due to the fact that, Small banks might be able to form stronger relationships with local businesses and customers than large banks, which allowed them access to proprietary information useful in setting contract terms and making better credit underwriting decisions (Berger and others). Indeed, these informational and pricing advantages might fully offset any loss of scale economies.

4.4.2.7 Inflation and Return on Equity

Annual inflation rate is used as a proxy to measure inflation. The result of fixed effect regression model in table 4.8 above indicated that the coefficient of inflation was 0.43 and its P-value was 0.013. Holding other variables constant, when inflation (INF) was increased by one percent, return on equity (ROE) of sampled commercial banks on average would be increased by 0.43 percent and statistically significant at 5% level of significance. The result indicated that inflation (NF) was positive and statistically significant to bank profitability (ROE). This implied that during the period of the study, inflations was anticipated which gave banks the opportunity to adjust the interest rates accordingly, resulting in revenues that increased faster than costs, with a positive impact on profitability.

Referring to previous studies, results concerning inflation were mixed. Demirguc-Kunt, A. & Huizinga, H. (1999) found a positive relationship between inflation rate and bank profitability. However, Pasiouras & Kosmidou (2007) found a negative relationship between inflation rate and bank profits.

Thus, this study accepted the hypothesis which stated that there was a positive relationship between inflation and bank performance in Ethiopia.

Table 4.9: Summary of Variables, Hypothesis Test and Decisions

Explanatory Variables	Expected Signs	Actual Sign	Decision
Number of ATM terminals	Positive and Significant	Negative and Significant	Rejected
Debit cards issued	Positive and Significant	Positive and Insignificant	Rejected
Number of mobile banking users	Positive and Significant	Positive and Significant	Accepted at 1%
Value of transactions of ATM	Positive and Significant	Positive and Significant	Accepted at 10%
Value of transactions of mobile Banking	Positive and Significant	Negative and insignificant	Rejected
Bank size	Positive/negative and Significant	Negative and Significant	Accepted at 1%
Inflation	Positive/negative and Significant	Positive and Significant	Accepted at 5%

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

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

5.1 Conclusion

The main objective of this research was to examine the roles of e-banking service on financial performance of commercials banks in Ethiopia for the period 2015 to 2018. A balanced panel data of ten purposively selected commercial banks with 40 observations have been used for analysis. The sample data of ten commercial banks have been analyzed using descriptive statistics and fixed effect panel regression model. The dependent variable used as a financial performance indicator was return on equity. ROE represented net income after tax divided by average stockholders' equity. The dependent variable, i.e ROE is regressed with independent variables such as: number of ATM's terminals, number of debit cards, number of mobile banking users, value of ATM transactions and value of mobile banking transactions from bank specific variables which were used as a proxy of electronic banking service. Whereas bank size (BS) was the other control bank specific variable and inflation rate (INF) from macroeconomic variables included in this study.

The finding of the study confirmed that from bank specific variables number of mobile banking users and value of ATM transaction had significant and positive roles on financial performance of commercial banks in Ethiopia measured by return on equity. This indicated that increasing the number of mobile banking users and increasing the value or price of transactions executed by ATM had positive roles on the financial performance of commercial banks in Ethiopia, as these made basic financial services more accessible by minimizing time and distance to the nearest retail bank branches as well as reduced the bank's own overheads and transaction- related costs and had the potential to extend the limited nature and reach of the formal financial services to

various customers thereby increasing their profitability. In the contrary number of ATM terminals and bank size had significant negative impact on financial performance at 5% and 1% level of significance respectively. This implied that as those explanatory variables increased, financial performance of commercial banks measured by ROE would be decreased. The negative association between bank size and performance suggested that the more banks getting bigger in its asset size, the lesser profitable it became.

With respect to macroeconomic variables, inflation (INF) was positive and statistically significant to bank profitability (ROE). This implied that during the period of the study, inflations was anticipated which gave banks the opportunity to adjust the interest rates accordingly, resulted in revenues that increased faster than costs, with a positive impact on profitability.

The rest variables number of debit cards and value of mobile banking transactions were not powerful variables to influence financial performance of commercial banks in Ethiopia.

To sum up although the result indicated some negative influences by the selected variables due to financial cost of adopting e-banking, in general, it could be concluded that the effect of electronic banking on the financial performance of commercial banks in Ethiopia was positive.

The adoption of E-banking by commercial banks had a high potential of improving financial performance in the long run and hence better returns to the shareholders. The versatility of e-banking has made their adoption rate to be high among both the banks and their customers.

5.2 Recommendations

The findings of the study showed that number of mobile banking users, value of ATM transactions, bank size and inflation were the significant drivers of financial performance of commercial banks in Ethiopia during 2015 to 2018. Hence, focusing and taking the necessary action on these indicators could further enhance financial performance of commercial banks in Ethiopia. Based on the findings of the study the following possible recommendations were forwarded:

- Mobile-Banking is one of the biggest social changes being witnessed by current generation. It has eventually affected the modes of trade and payment systems keeping in

mind the convenience, demands and lifestyle of the current generation. However, the concept of mobile banking is still in the infant stage and yet unable to explore its potential in order to increase the profitability of commercial banks in Ethiopia. Thus, commercial banks should focus on communicating information that emphasizes the relative advantage and usefulness of mobile banking compared to traditional branch-based banking and should encourage their customers to transact via mobile banking in order to maximize the full effect of these innovations.

- It is evident that the increase of regularity of mobile users is cumulating at very high speed but the regularity of banks account holder is very less. Therefore, mobile banking is a new technological platform to the banks to increase their customers. Thus the study further recommend that commercial banks should keep adopting and using mobile banking in their operations aggressively as a way of moving to a cashless society which is a key driver towards achieving economic growth of a country because the number of people with access to a mobile hand set is increasing every day.
- With regard to ATM transactions, commercial banks should improve their ATM transaction reconciliation process, either by assigning more personnel or by automated means, as it creates customer dissatisfaction and discouragement. Because, ATM transactions processed but not paid to customers will take more time to be credited to customers' bank account.
- Commercial banks should also ensure proper maintenance of ATM outlets to ensure quality service delivery to their clients. ATM outlets should also be strategically selected to be accessible to as many clients possible.
- Commercial banks in Ethiopia should avoid overexpansion in its asset size, as it may affects profitability negatively due to higher operational expenses, bureaucratic bottlenecks and managerial inefficiencies.
- Commercial banks in Ethiopia should properly anticipate the future inflation rates to avoid its negative impact on banking profitability.

5.3 Further Research Consideration

This study demonstrated that electronic payment systems had positive effects on financial performance (profitability) of commercial banks in Ethiopia. However, not all financial

performance factors related with e-banking were studied. It is therefore recommended that future studies be carried out on:

- The effect of e-banking on the financial performance of Micro- Finance institutions that have adopted these innovations
- The roles of digital finance of commercial banks in Ethiopia on financial inclusion
- The effect of agency banking on either financial performance of commercial banks or on financial deepening in Ethiopia.
- Investigation of the effect of e-banking on Ethiopian commercial banks Deposit

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Appendix I

Data for E- Banking and Financial Performance

ID	BANKS	YEAR	LOGNATM	LOGNDC	LOGNMBU	LOGVATMT	LOGMOBT	BS	INF	ROE
1	CBE	2015	2.42	5.80	5.67	8.01	8.00	11.48	92.0000	67.65142
1	CBE	2016	2.59	5.71	5.42	8.47	8.24	11.59	98.9000	62.85195
1	CBE	2017	2.89	5.53	5.11	8.59	8.40	11.69	107.2000	55.95181
1	CBE	2018	2.93	5.44	5.09	8.10	8.67	11.75	125.2000	50.62306
2	AIB	2015	2.22	4.68	4.14	7.06	7.20	10.40	92.0000	27.2453
2	AIB	2016	2.36	4.67	3.95	7.34	7.01	10.49	98.9000	22.98288
2	AIB	2017	2.48	4.28	3.87	7.39	7.32	10.62	107.2000	21.53997
2	AIB	2018	2.61	4.66	4.02	7.66	7.17	10.74	125.2000	24.23246
3	DB	2015	2.34	4.81	4.44	7.92	7.35	10.39	92.0000	30.68855
3	DB	2016	2.44	4.52	4.17	7.93	7.57	10.46	98.9000	26.41065
3	DB	2017	2.51	4.09	4.08	7.80	7.38	10.56	107.2000	23.14819
3	DB	2018	2.68	4.89	4.65	8.01	7.66	10.66	125.2000	30.86426
4	BOA	2015	2.30	4.18	4.95	7.01	6.87	10.14	92.0000	33.93929
4	BOA	2016	2.39	4.04	4.52	6.36	7.18	10.23	98.9000	17.47207
4	BOA	2017	2.46	4.17	4.82	7.40	7.11	10.40	107.2000	18.32639
4	BOA	2018	2.47	5.04	4.84	7.61	7.57	10.50	125.2000	19.19908
5	WB	2015	2.09	4.46	4.01	6.67	6.66	10.14	92.0000	15.34223
5	WB	2016	2.13	4.56	4.33	7.72	6.80	10.21	98.9000	15.46304
5	WB	2017	2.28	4.32	4.51	7.70	7.16	10.32	107.2000	14.39106
5	WB	2018	2.30	4.81	4.51	7.73	7.27	10.44	125.2000	16.08412
6	UB	2015	1.95	4.79	4.51	6.72	6.69	10.16	92.0000	14.28244
6	UB	2016	1.94	4.98	4.40	7.91	7.40	10.24	98.9000	17.25079
6	UB	2017	2.14	5.14	4.58	7.91	7.60	10.34	107.2000	18.03888
6	UB	2018	2.14	5.24	4.56	8.01	7.49	10.45	125.2000	22.28332
7	NIB	2015	1.48	4.26	3.39	6.96	5.64	10.12	92.0000	16.38269

7	**NIB**	2016	1.80	4.39	3.70	7.06	6.45	10.20	98.9000	16.27725
7	**NIB**	2017	1.97	4.42	4.00	7.31	6.55	10.32	107.2000	16.60335
7	**NIB**	2018	2.05	4.74	3.98	7.40	6.87	10.43	125.2000	17.26749
8	**BB**	2015	1.60	4.11	2.23	5.10	4.35	9.62	92.0000	17.94643
8	**BB**	2016	1.08	4.34	3.28	5.15	5.42	9.86	98.9000	22.52117
8	**BB**	2017	1.08	4.48	4.52	5.40	5.20	10.02	107.2000	22.88561
8	**BB**	2018	1.75	4.43	4.70	6.55	6.48	10.15	125.2000	21.45526
9	**OIB**	2015	0.90	4.25	3.13	5.71	6.22	9.98	92.0000	23.74333
9	**OIB**	2016	1.43	4.77	3.79	6.37	6.88	10.05	98.9000	24.86786
9	**OIB**	2017	1.30	4.33	4.47	7.01	6.96	10.21	107.2000	19.2519
9	**OIB**	2018	1.30	4.68	4.52	7.33	6.47	10.38	125.2000	23.30493
10	**ZB**	2015	1.00	3.64	3.41	7.70	6.57	9.69	92.0000	31.97765
10	**ZB**	2016	1.08	3.79	3.65	7.78	6.97	9.87	98.9000	21.57258
10	**ZB**	2017	1.11	4.00	3.88	7.84	6.69	9.99	107.2000	22.95733
10	**ZB**	2018	1.90	4.01	4.33	8.00	6.15	10.09	125.2000	22.95733

Appendix II

1. Heteroskedasticity Test: white's test

```
. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(35)     =     39.32
         Prob > chi2  =    0.2826

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	39.32	35	0.2826
Skewness	10.80	7	0.1478
Kurtosis	0.68	1	0.4110
Total	50.79	43	0.1936

Appendix III

Correlated Random Effects- Hausman Test

```
. hausman fe re
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LOGNATM	-7.666339	-2.789806	-4.876533	.
LOGNDC	3.005092	7.307035	-4.301943	.
LOGNMBU	6.572297	1.847295	4.725002	.
LOGVATMT	3.249763	1.472203	1.77756	.
LOGMOBT	-.9697811	-1.364823	.3950418	.
BS	-58.69584	12.22153	-70.91737	13.30188
INF	.4313605	-.2660256	.697386	.1393252

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

              chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       20.29
            Prob>chi2 =      0.0050
            (V_b-V_B is not positive definite)
```

Appendix IV

Fixed Effects Test Result

```
. xtreg ROE LOGNATM LOGNDC LOGNMBU LOGVATMT LOGMOBT BS INF, fe

Fixed-effects (within) regression               Number of obs      =        40
Group variable: ID                              Number of groups   =        10

R-sq:  within  = 0.6170                         Obs per group: min =         4
       between = 0.7064                                        avg =       4.0
       overall = 0.5950                                        max =         4

                                                F(7,23)            =      5.29
corr(u_i, Xb)  = -0.9778                        Prob > F           =    0.0010

------------------------------------------------------------------------------
         ROE |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     LOGNATM |  -7.666339   3.538264    -2.17   0.041    -14.9858   -.3468812
      LOGNDC |   3.005092   2.741292     1.10   0.284    -2.665703   8.675888
     LOGNMBU |   6.572297   1.854977     3.54   0.002     2.734984   10.40961
    LOGVATMT |   3.249763   1.896495     1.71   0.100    -.6734368   7.172962
     LOGMOBT |  -.9697811   1.754322    -0.55   0.586    -4.598873   2.659311
          BS |  -58.69584   15.01736    -3.91   0.001    -89.76162   -27.63005
         INF |   .4313605   .1593929     2.71   0.013     .1016311   .7610898
       _cons |   545.6695   138.6192     3.94   0.001     258.9139   832.4251
-------------+----------------------------------------------------------------
     sigma_u |  38.282271
     sigma_e |  3.0229256
         rho |  .99380331   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(9, 23) =    14.32                 Prob > F = 0.0000
```