

**THE IMPACT OF ELECTRONIC BANKING ON FINANCIAL
PROFITABILITY OF COMMERCIAL BANK OF ETHIOPIA**



**COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE**

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Abstract

This thesis aims to examine the impact of E-banking on Financial Performance of Commercial Banks in Ethiopia. A successful bank in presenting good services to clients and gaining profit is the one using new banking tools. The study has examined the impact of e-banking on return on assets as one of the most fundamental indexes of profitability. The study used secondary data employed purposive sampling technique to select seven banks for the study commercial banks operating in Ethiopia covering the periods from 2010 to 2018. In light of prior literature, 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, GDP-growths, Inflation rate and market share of banks. Result using fixed effect panel least square regression with the aid of stata output 12 application exhibited that numbers of ATM terminals, number of POS terminals and bank market share have positive and significant role on financial performance of commercial banks measured by return on asset. The study shows that increased number of ATM, POS and market share had a positive impact 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. Therefore, this study recommends for enhancing return on asset commercial banks should exert more on awareness creation about e-banking service and timely support for users will cause an increase in e-banking practice in Ethiopia.

Key Words: Electronic Banking; Commercial banks; ROA; Profitability

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CHAPTER ONE

1. INTRODUCTIO

1.1. BACKGROUND OF STUDY

Due to the emergence of integrated global economy E-business has widely become a major component of business strategy and a strong catalyst for economic development. Intense innovation and revolution in Information Technology (IT) has influenced every facet of life, financial sector is not an exception. The development and presentation of electronic banking has revolutionized and redefined the way banks operate now (Eze & Egoro, 2016).

Technological innovations can increase customer demand for services provided by the bank. This great revolution has set a motion in the banking industry for the provision of a payment system that is compatible with the demands of the electronic market (Akhisar, Tunay, & Tunay, 2015). Banking industry has been in a process of significant and exceptional transformation. The force behind the transformation of the banking industry is innovation and adoption of information technologies (Abaenewe, Ogbulu, & Ndugbu, 2013).

Basically banks are the common intermediary between those has excess money (depositors) and those individual and business with viable project and ideas but require finance to made investment (creditors). The banking industry plays a significant role in transforming the economy through accelerating financial services (Dube, Njanike, Manomano, & Chiriseri, 2011).

A successful bank in presenting good services to customers and maximizing profit is the one using new banking tools. E-banking is a quick spreading service that permits clients to utilize the computer to access account-specific information and potentially direct exchanges from a remote area. Accordingly banks are the early users of technology and the main drivers of technological innovation and revolution. E-Banking has become popular because of its convenience, flexibility and simplicity. In addition it creates transaction related benefit like speed, efficiency, simplicity, convenience and accessibility (Eze & Egoro, 2016)

Banking sector provides electronic based service to new age clients and business remotely for year's ago. However, this new technology based application and system bring drastic change to customers in the delivery process of existing products and services.

The most important advantage is every banking product and service is available with lower cost banking operation for 24 hours a day and 7 days a week. Therefore, the dependency to branch is minimized. These and other features motivate banks to take advantage of E-banking services to clients that are moved dramatically day by day (Tunay, Tunay, & Akhisar, 2015). Products and services of electronic based banking was evolved and started in the world during 1970s. After that Banks began to use new system and replace the traditional banking functions dramatically. As technology evolves, financial sector adopt many ways of e-banking system.

Each new system brings a new dimension to the interaction between user and bank (Liao & Cheung, 2008). They contain ATM Machine, POS terminal; mobile and Internet banking, electronic fund transfer, direct bill payments and card banking (Vekya, 2017). Demand becomes intensely increased for new e-banking systems. These conditions enforce banking sector to innovate new channel and to invest a great deal of investment in this field.

Accordingly innovation of new system is expected to continue in the future. Worldwide acceptance of the internet is increased as means of delivering banking products and services. This creates new and interesting business opportunity for expanding their operation as well as their utilization of banking service for both banks and costumers. This new system and opportunity have their own risks and benefits for banks and customers (Liao & Cheung, 2008).

Compared with traditional banking system through physical branches, e-banking uses the internet and telecom (SMS) to deliver banking services to customers. The main services include cash withdrawal, foreign currency exchange, transferring funds, balance inquiry, electronic bill payment, applying for letter of credit, downloading bank statement, cheque book request, cheque stop payment request, account alerts, security alerts and reminders (Abebe, 2016).

E-banking plays a crucial role in the banking sector through creating value for banks and customers. E-banking enables banking institutions to compete more intensely in the global market by extending their products and services beyond the restriction of time and space (Almazari & Siam, 2008). In today's business cash has been replaced by digital cash and digital wallets. Accordingly this system is the fourth stage of evolution after barter, coin \$ currency, paper money and currently digital cash (Ogare & NO, 2013).

Currently, business environment is extremely dynamic and experience rapid changes due to technological improvement, increased demand and awareness of banks to serve their customers electronically. Financial sectors in Ethiopia has not been remain an exception in expanding and adopting the new system in the face of rapid expansion of electronic system throughout the world (Gardachew, 2010). Ethiopian financial sector is undoubtedly the most important in the economic systems. E-payment system provides the necessary lubricant to the economy that keeps the wheel of the industry and used as an engine for economic development(Gardachew, 2010).

However, the Ethiopian banking system is not well developed. Financial sectors in Ethiopia are too late to enter in technological advancement and should device precise polices and strategies for integration and technological innovation. In Ethiopia the first electronic banking service was introduced in 2001 by commercial bank of Ethiopia. The bank introduced ATM service for local customers through opening eight ATMs around Addis Ababa (Abebe, 2016).

Moreover, commercial bank of Ethiopia hade visa membership since November 14, 2005. But, due to limitation of infrastructure the membership was failed to eat the fruit of its membership. Despite, being the pioneer in introducing ATM based payment system and visa membership, commercial bank of Ethiopia continues to introduce new systems like CBE Birr and recently introduce ATM machine that can withdraw and accept deposit. Accordingly the bank worked aggressively to maintain its lead in e-banking system. However, Dashen Bank installed ATM machines at convenient locations for cardholders.

Dawit and Adem (2016), regarding electronic Switch system, a centralized switch system which plans to integrate all real time and online payment systems in Ethiopia, which started by connecting all the Automated Teller Machines (ATMs). Objectively commercial banks are established to earning profits by providing banking services. They seeking to achieve their strategic objectives of profitability and growth in an effective and efficient manner in order to maximizing their market value and increase the wealth of the owners.

This can be done in various ways by improving their performance and increase profits under the new age characterized by competition through technological development and knowledge. They invest huge amount of financial resources on capacity building and electronic system which

promote efficiency of their services and facilitate decision-making process using data and accurate information (Dawit & Adem, 2016).

However, commercial banks in developing country especially in Ethiopia faces many challenges in adopting new services such as poorly developed telecommunication infrastructure, lack of suitable e-commerce legal framework, high rates of illiteracy, low investments and others. Therefore, it is important to study the effectiveness of investing and adopting electronic banking products and services on the profitability of Ethiopian commercial banks

1.2 Statement of problem

In the new world, there is intense competition among financial institutions especially banks. Accordingly, new age customers are more sophisticated and expected new system regarding banking services. However, in developing countries bank performance would be affected by internet infrastructure because of unimproved and old technology (Alam, 2009). The efficiency of payment system and other transaction are perfected in the system for proper functioning and highly contributed for firm profitability.

Electronic banking system has been emerged to achieve the banking system and enable banks for the required vibrancy that is expected. It is expected that with the embrace and application of electronic banking in Ethiopian banking system, the performance and profitability of commercial banks become affected highly. However, the qualification of the exact impact of electronic banking on the bank profitability has proved elusive. Knowledge of the exact contribution of ebanking will inform management investment decisions in technology and to take action for widening the services through different channels (Dawit & Adem, 2016).

There are a number of empirical studies concerning the effect of electronic banking on the performance of banks, some scholars observed positive impact (Aduda & Kingoo, 2012; AlSmadi & Al-Wabel, 1970; Itah & Emmanuel, 2014; D. Karimzadeh, Emadzadeh, & Shateri, 2014; Rauf, Qiang, & ullah Sajid, 2014; Valahzaghhard & Bilandi, 2014), some observed negative effect (Khravish & Al-Sa'di, 2011; Morufu, 2016; Vekya, 2017), while other researchers have drawn both positive and negative (mixed) impact on bank profitability.

Morufu (2016) and Vekya (2017), determined that the effect of the negative performance of electronic banking operation. Since, customers still were depending on traditional distribution channels. However, recent studies on e-banking and banks performance in developing countries reveal that there is relatively lower level of development. (Abaenewe et al., 2013; Farouk, Hassan, & Mamman, 2013) made studies on Nigeria and (Aduda & Kingoo, 2012) made studies on Kenya, they reveals that the e-banking innovations increase profitability of commercial banks.

Hence commercial banks in Ethiopia offer electronic banking services to enable them and to gain competitive advantage in the banking industry. Electronic banking in Ethiopia has emerged as a strategic resource for achieving higher efficiency, control of operations and reduction of cost, replacing paper based and labor intensive methods with new automated process. This leads to higher productivity and profitability for banks. All Ethiopian commercial banks aggressively expand their channel to provide good service and increase profitability.

The recently released National Bank of Ethiopia report shows, the Ethiopian banking sector registered enhanced growth in the year 2018, with a Total capital of 10 percent and reached Birr 85.8 billion by the end of June 2018. The number of electronic banking channels also increased year over year, the sector shows electronic banking Chanel of commercial banks also increased by 11.4% (www.nbe.com).

However, to date researchers have produced little evidence regarding these potential changes. Nonetheless, recent empirical studies indicate that Electronic banking is not having an independent effect on banking profitability, although these findings may change as the use of internet becomes more widespread (Al-Shibly, 2011). Ethiopian commercial banks are at infancy stage to use technology based banking system and training of manpower to handle new technologies. However, the adoption and usage of e- banking is at promising stage not only in banks but also other institutions. So this system may influence the performance and efficacy of commercial banks (Akhisar et al., 2015; Bultum, 2014).

From the review of literature, there is mixed evidence regarding e-banking effect on bank's profitability that it becomes imperative and too necessary to carry out a study in Ethiopian context whether e-banking has effect on profit of commercial banks. It is therefore, important

for bankers, policy regulators, supervisors, financial experts, academicians and researchers to understand and evaluate the effect of E-banking on the profitability of banks.

Therefore, the researcher's main purpose is to fill this significant gap by providing systematic analysis of electronic banking tools on the performance of selected Ethiopian commercial banks. There were less research outputs in the area of e-banking effect on banks profitability in returns on assets and returns on equity which is relevant for different party to make decisions.

Very few previous studies in Ethiopian e-business were made, and they focus on the assessment study and the correlation between e-banking and customer satisfaction (Tafa, 2013). Likewise, (Gardachew, 2010; Gemechu, 2014) evaluated the adoption of e-banking in the context of banks perception. In addition, few research found on the effect of e-banking on profit of banks, Damtew (2016), focus only ATM, debit card and POS. He uses descriptive approach to indicate their effects. The study also does not include all electronic-banking channels.

Youssef, Youssef, Anadol, and Zahrani (2017), studied the effect of e-banking only in commercial bank of Ethiopia in Addis Ababa branch and he used only ROA to measure profitability. The fact that as e-banking is fast gaining acceptance in Ethiopian banking sector, it does not assuredly signify improved bank performance. So using internet as a delivery channel banks need to make it economically viable, productive or profitable.

To the researcher knowledge there is less research outputs and limited empirical evidence on the effect of electronic banking on profitability of Commercial Banks in Ethiopia. This study sought to fill the existing research gap and propose the impact of e-banking channels on bank profit for interested parties to make relevant decisions and to analysed major impact of eelectronic banking in the country.

1.3. Research Hypothesis

In order to be more formal statement of research the researcher used to employs hypotheses. These hypotheses are predictions about the outcome of the results, and they may be written as alternative hypotheses specifying the exact results to be expected.

Hypothesis 1 Transaction of ATM has positive and significant impact on ROA of commercial Banks in Ethiopia,

Hypothesis 2: Growth of GDP growth has a positive and significant impact on ROA of commercial banks in Ethiopia

Hypothesis 3: Transaction of POS has positive and significant impact on ROA of Commercial banks in Ethiopia,

Hypothesis 4: Debit cardhas positive and significant impact on ROA of commercial banks.

Hypothesis 5: Inflation has positive and significant impact on ROAof commercial banks of Ethiopia

6: Market share has positive and significant impact on ROA of commercial Banks in Ethiopia

1.4 Objective of the study

1.4.1 General Objective of the study

The main objective of the study was to investigate the impact of electronic banking on the profitability of commercial banks in Ethiopia

1.4.2 Specific Objectives

The specific objectives of the study were;

To examine the impact of ATM machines on the profitability of commercial banks in Ethiopia.

To investigate the impact of Market share on the profitability of commercial banks in Ethiopia.

To examine the impact of POS terminals on the profitability of commercial banks in Ethiopia.

To examine the impact of Debit cards on the profitability of commercial banks in Ethiopia.

1.5 Significance of study

The study is expected to be significant in various dimensions; the findings of the study are great importance to executives of commercial banks in Ethiopia as they can understand the impact of electronic banking on profitability of commercial banks. 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. This study is significant for the fact that:

It was enlightening Accountant on how best application of e-banking products to generate information needed for profitability, growth and survival of the organization. Students and managers to stand benefit a lot from this research in that it will help keep them in the tract of new technology and trends in business cycle.

It was inform the staffs that the use of e-banking will not lead to job losses but rather it will increase the efficiency in the organization.

The studies also clarify public and private organization on how to use e-banking channels in collaboration with commercial banks for improvement in their operation. The study also significant to bank officials, investors, policy makers and interested customers to develop better strategies that enable commercial banks to provide fast and convenient service

1.6 Scope and limitations of the study

Ultimately this study is delimited to selected Commercial Banks licensed by the national bank of Ethiopia and employed e-banking services. Commercial banks that formed the units of analysis of the study are those were in operation by close of business on 31st of December 2018. Accordingly this paper is delimited to the bank innovations such as automatic teller machine (ATM), point of sale terminals (POS), debit cards (DC) and Market share. And also the study is based on quantitative investigation of variables.

Furthermore, this paper is delimited to examine the profitability of banks majorly measured using return on equity and return on assets. The study was employed secondary data from 7 commercial banks in Ethiopia that applied e-banking service since 2010. Accordingly data available for 9 years in the period of 2010-2018 was used to investigate the impact of Ebanking on the profit of commercial banks.

As the study is primarily based on secondary data, the inherent limitations are expected to affect the study. Data was obtained from national bank of Ethiopia through unbelievable charge. This limits the area and results of the study. The study was limited to surveying and document analysis of the purposively selected commercial banks. The study is highly constrained to the researcher due to the fact that there is not a ready data available to the subject matter.

Owing to the initial stage of e-banking services available in Ethiopia, it is very difficult to get secondary data as well as literature in this area from the country perspective

1.7 Organization of the study

The thesis is organized into five distinct chapters in which the first chapter presents introduction to the study. The literature review part of the study is presented in chapter two which includes theories, empirical evidences, knowledge gaps and conceptual frame work. Chapter three presents the research design and methodology adopted to complete the study effectively and efficiently. Chapter four come with data presentation, analysis and interpretation. The final chapter winds up with conclusion and forwarding recommendation based on the result of the study.

CHAPTER TWO

2. LITERATURE REVIEW

This chapter presents the literature interrelated with e-banking. Accordingly, the review of the literature is divided into two parts. The first part discusses the theoretical foundation for the

study, while the second part presents the empirical studies. Under the theoretical foundation, the definition of e-banking, overview of e-banking in Ethiopia, The review of empirical studies done on the e-banking service related to e-banking in Ethiopia, and the gaps that requires in this this study.

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 adaption 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. The 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, theoretical literature helps the researcher to identify clearly the variables of study; provides a general frame work for data analysis; and helps in the selection of applicable research design (Ajzen 1991)

2.1.1 Innovation diffusion theory

An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. There is a wide gap in many fields, between what is known and what is actually put into use. Many innovations require a lengthy period, often of some years, from the time when they become available to the time when they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation (Rogers 2003).

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 profitability and be used if the capabilities of the IT match the tasks that the user must perform (Goodhue & Thompson 1995). Further, Goodhue & Thompson (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.

2.1.3 Theory of planned behavior

The theory of planned behavior (TPB) started as the theory of reasoned actions in 1980 to predict an individual's intention to engage in a behavior at a specific time and place. The theory was intended to explain all behaviors over which people have the ability to exert selfcontrol. The key component to this model is behavioral intent; behavioral intentions are influenced by the attitude about the likelihood that the behavior will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome.(Ajzen 1991)

2.1.4 Technology acceptance model

User acceptance remains a barrier to the success of new information technologies (IT). In an attempt to explain the idea, Davis (1989) introduced Technology Acceptance Model (TAM) based on the attitude-behavior paradigm from cognitive psychology. Davis (1989, P.35) argues that "people adopt an application primarily because of the functions it performs and secondarily because of the ease or difficulty associated with making the system perform these functions". The model provides a basis for tracking the impact of external factors on internal beliefs, attitude, and behavior (Davis et al. 1989).

2.1.5 Definition of E-Banking

Electronic banking service is the use of electronic and telecommunication networks to deliver a wide range of value added products and services to bank customers. E-banking thus involves collaboration (local and international) on payments systems, cashless transactions, digital cash and other electronic based projects. E-banking refers to electronic banking. It is like e-business in banking industry. E-banking is also called as "Virtual Banking" or "Online Banking". E-banking is a result of the growing expectations of bank's customers. E-banking involves information technology based banking. (Shraddha and Mohsin, 2014)

E-banking is the term used for new age banking system. E-banking is also called online banking and it is an outgrowth of PC banking. E-banking uses the internet as the delivery channel by which to conduct banking activity, for example, transferring funds, paying bills, viewing checking and savings account balances, paying mortgages and purchasing financial instruments and certificates of deposits (Mohammed et. al, 2009) . It is difficult to infer whether the internet tool has been applied for convenience of bankers or for the customers' convenience. But ultimately it contributes in increasing the efficiency of the banking operation as well providing

more convenience to customers. Without even interacting with the bankers, customers transact from one corner of the country to another corner.

Electronic banking is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions remotely through the financial institutions website, ATMS, using an electronic device (mobile phone, tablet, using software usually called an app, provided by the financial institution for the purpose).

Electronic 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). Electronic banking are a high-order construct, which consists of several distribution channels. It should be noted that electronic banking is a bigger platform than just banking via the Internet.

2.1.6 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. Despite being the pioneer in introducing ATM based payment system, CBE lagged behind Dashen Bank, which worked aggressively to maintain its lead in Epayment system. As CBE continued to move at a snail's pace in its turnkey solution for card based payment system, Dashen Bank remained so far sole player in the field of E-banking since 2006 (Gardachew, 2010). By the end of 2008 Wegagen Bank has signed an agreement with Technology Associates, a Kenyan based information technology firm, for the development of the solutions for the payment system and installation of network of ATM. While Zemen Bank, the only Ethiopian bank fastened in the idea of single branch banking, by launching full-blown internet banking in 2010, which is new to Ethiopian banking industry (Asrat 2010).

Binyam (2009), claimed United Bank being the first to introduce telephone and internet banking systems including text messages (SMS) by the end of the year 2008 which continued launching ATM and POS services in collaboration with Awash International Bank and Nib International Bank in the year 2012 later joined by Birhan International Bank, Addis International bank and Cooperative Bank of Oromia.

2.1.7 Types of E-Banking Service

2.1.8.1 Debit card

A debit card (also known as a bank card or cheque card) is a plastic card that provides an alternative payment method to cash when making purchases. Functionally, it can be called an

electronic cheque, as the funds are withdrawn directly from either the bank account or from the remaining balance on the card. In some cases, the cards are designed exclusively for use on the internet, and so there is no physical card (Mavri&Ioannou, 2006). In many countries the use of debit cards has become so widespread that their volume of use has overtaken or entirely replaced the cheque and, in some instances, cash transactions. Like credit cards, debit cards are used widely for telephone and Internet purchases and, unlike credit cards, the funds are transferred immediately from the later date. Debit cards may also allow for instant withdrawal of cash, acting as the ATM card for withdrawing cash and as a check guarantee card.

2.1.8.2. 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&Ioannou, 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.

2.1.8.3 Automated Teller Machine (ATM)

Rose (1999) describes ATMs as follows: it combines a computer terminal, recordkeeping system and cash vault in one unit, permitting customers to enter the bank's book keeping system with a plastic card containing a Personal Identification Number (PIN) or by punching a special code number into the computer terminal linked to the bank's computerized records, 24 hours a day". Once access is gained, it offers several retail banking services to customers. They are mostly located outside of banks, and are also found at airports, malls, and places far away from the home bank of customers. At the outset they were function as cash dispensing machines. However, because of the advancement of technology, ATMs are able to provide a wide range of services, such as making deposits, funds transfer between two or more accounts and bill payments.

2.1.8.4. Point of sale (POS)

POS also sometimes referred to as point of purchase (POP) or checkout is the location where a transaction occurs. A checkout" refers to a POS terminal or more generally to the hardware and software used for checkouts, the equivalent of an electronic cash register. A POS terminal manages the selling process by a salesperson accessible interface. The same system allows the creation and printing of the receipt. POS systems record sales for business and tax purposes (Shittu, 2010).

2.1.8.5 Mobile Banking Service.

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

A mobile money service called M-PESA was introduced into the market by Safaricom, Kenya's largest mobile operator (MO). Within eight months of its inception in March 2007, over 1.1 million Kenyans had registered to use M-PESA, and over US\$87 million had been transferred over the system (Safaricom, 2007). M-PESA registered customers reached 19.34 million by the end of March 31, 2014 (Safaricom , 2014) . The application facilitates a variety of financial transactions through the mobile phone. This includes account balance checks, deposits and withdrawals, bill and merchant payments, airtime purchases, and money transfers (Hughes & Lonie, 2007; Vaughan, 2007, cited in Morawczynski, 2009). M-PESA is designed in such a way that people without bank accounts can use it.

2.1.9. Internet Banking Service

Internet banking is a new age banking concept. It uses technology and brings the bank closer to the customer. Internet banking refers to systems that enable bank customers to get access to their accounts and general information on bank products and services through the use of banks

website, without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations (Thulani et al, 2009) . For those that have access to the internet and a computer all you need to do is proceed to your banks website and login. From there you have access to all of your accounts that you have at that bank. Transfer funds between your accounts with ease. You can also use online banking to see how much money you have in your accounts and where the money you have spent has gone.

Broadly, the levels of banking services offered through internet can be categorized in to three types:

The Basic Level Service is the bank's websites which disseminate information on different products and services offered to customers and members of public in general. It may receive and reply to customers' queries through e-mail.

In the next level are Simple Transactional Websites which allows customers to submit their instructions, applications for different services, queries on their account balances, etc, but do not permit any fund-based transactions on their accounts.

The third level of Internet banking services are offered by Fully Transactional Websites which allows the customers to operate on their accounts for transfer of funds, payment of different bills, subscribing to other products of the bank and to transact purchase and sale of securities.

2.2 Review of Empirical studies

Numerous studies have been conducted on E-banking services and its effect on the performance of banks in general and on their profitability in particular. The empirical experience emerging from country experiences with e-banking services and banks profitability are mixed. In the age of global economy, e-business has increasingly become a necessary component of business strategy and a strong catalyst for economic development. Electronic banking or self-service technology has become popular because of its convenience, flexibility and also transaction related benefits like speed, efficiency and accessibility.

2.2.1 Studies in developed and emerged market countries

The studies in developed countries related to the effect of e-banking product and services on commercial bank's profitability, (Acharya, Kagan, & Lingam, 2008; Bonin, Hasan, &Wachtel, 2005; DeYoung, Spong, & Sullivan, 2001) and (Arnaboldi&Claeys, 2008; Ciciretti, Hasan, &Zazzara, 2009; Weigelt&Sarkar, 2012) reveals that electronic banking application and adoption

required advanced technology that increase the overall profitability of the banks' in the united states and European countries.

These studies conclude that electronic banking has a significant positive contribution to development of competition in the banking sector and banks' profitability. Therefore, electronic banking applications help banks to build the technological innovation up (Arnaboldi&Claeys, 2008). It has been observed that technology based and internet based banking service reduce the operational risk and modify the services of commercial banks (Ciciretti et al., 2009).

Electronic banking applications increase the asset quality of banks and operational performance directly (Acharya et al., 2008) and others studies (Al-Smadi& Al-Wabel, 1970; Gutu, 2014; Khrawish& Al-Sa'di, 2011; Malhotra& Singh, 2010; Sumra, Manzoor, Sumra, & Abbas, 2011) studied in countries such as India, Pakistan, Jordan and Romania. These studies revealed that using and adopting self-service technology of electronic banking leads to diminish operational cost and increasing banks profitability.

Halili (2014), studied the impact of online banking on bank performance, data was collected from 22 commercial banks of five European country covered the period 1999 to 2010 and the study shows internet banking have not significant effect for banks due to social and economic causes and global crisis which also badly hit commercial banks.

Onay and Ozsoz (2013), also studied the effect of e-banking on banks in Turkey; the study revealed that e-banking has a negative impact on ROA due to increased competition in banks regarding interest income. This indicates adoption of internet banking depresses banks profitability and interest income while positively influenced non- interest income. So impact of E- Banking is different in emerging markets than developed market. This situation is encouraging electronic banking activities in developing countries.

2.2.3 Studies in developing countries

In developing countries the lack of ICT block the impact of expected cost effectiveness and profitability (Njogu, 2014). In some developing countries, it is not available strong effects on the profitability of E-banking channels because of inadequate and limited information technology infrastructure of the branch and ATM network. Internet infrastructure based on relatively old technology blocks the achievement of expected performance of banks in developing countries (Alam, 2009; Gutu, 2014).

Recent studies related to e-banking effect on banks profitability in African countries shows there is lower level of development. For example, (Abaenewe et al., 2013; Hassan & Bashir, 2003; NDUNG'U, 2015; Oyewole, Abba, Gambo, & Abam, 2013) made studies on Nigeria, (Aduda&Kingoo, 2012; MOHAMED, 2018) made studies on Kenya. These studies conclude that electronic banking channels increase profitability on banks where in the majority of countries. Ebanking application positively affected banks profitability.

The impact of e-banking on the profitability of a bank in Iran was investigated by (M. Karimzadeh& Reza Sasouli, 2013). By using quarterly data from 2004 to 2012, the study found expansion of e-banking has positive and significant relationship with ROA. Rauf and Qiang (2014), investigate the impact of electronic banking on the profit of Pakistani banks using, ROA and IM with a sample of ten banks data covering from 2002 to 2012.

Empirical investigation revealed that e-banking has positive and significant impact on IM, ROA and ROE for recent adopter. But for early adopter's positive significant impact on IM, ROE and there is no impact on ROA. These study winds up through electronic banking should be considered by banks as of cost minimization strategy and enable them to compete with domestic as well as foreign banks.

Njogu (2014), studied the impact of e-banking on the profitability of Kenyan commercial banks using secondary data in the five years period from 2009 to 2013. The study concludes that there was a positive and significant relationship between commercial banks performance in Kenya and electronic banking. Bank size also found to positively influence Kenyan banks.

Ogare and NO (2013),study the impact of electronic based banking on the performance of Kenyan banks. The study shows the relationship between many E-banking channels and profit after tax. The study was based on secondary data obtained from national bank of Kenya and annual report of commercial banks. The findings of the study showed that electronic banking has a positive and significant impact on the performance of Kenyan commercial banks and play a significant role in Kenyan banking sector that improve the whole banking system.

Iddris (2013), also made studies on the impact of applying electronic banking on the performance of banks. The finding indicate that the main rejection factors in using m-banking technology by customers were m-banking requires knowledge & learning, attracts additional banking charges, and Poor telecommunication technology.

Morufu (2016), studied the effect of electronic banking on the profitability of Nigerian deposit money banks. The study was made based on ten deposit money banks for seven years from 2005 to 2012. The study revealed that mobile banking have negative and significant relation with profit of banks while ATM and POS has positive but insignificant effect on profit and internet banking transactions have negative and insignificant effect with profit of banks.

2.2.4.. Empirical Studies related to Electronic Banking in Ethiopia

Girma (2016), studied the impact of ICT on the performance of Ethiopian commercial banks using secondary data that contain four years from 2010 to 2014. Data analysis was carried out in panel environment. The study used purposive sampling technique to select the required sample of banks from commercial banks operated in Ethiopia.

He measure the Performance only using ROA and the independent variables used were ICT investment, ATM, POS, INF, BRAN and GDP. The findings of the study revealed that ICT, ATM and POS have not significant effect on ROA of Ethiopian commercial banks. In addition POS, ICT and number of branches have negative effect on return on asset of banks.

Zelege (2016), made a descriptive research on the challenges of electronic banking adoption in commercial banks of Ethiopia. The findings of the study propose the common problem in adoption and application of E-banking channels. The main challenges are lack of banking services through the web or other electronic means, 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.

Gardachew (2010), studied on practices, opportunities and challenges of electronic banking in Ethiopia. He described and analyzed the most important opportunities and challenges of Ebanking. After conducting a survey he came up with the challenges being low level of internet penetration to gain the service, very poor telecommunication infrastructure, lack of appropriate legal and regulatory framework, high rate of illiteracy, high cost of internet, absence of financial networks that link different banks, lack of reliable power supply and cyber security issues are Part of key challenges for e-banking application.

A study made by Bultum (2014), on the factors determining E-banking adoption in Ethiopian banks. The study statistically analyzes data obtained from survey of staffs of 4 purposely selected

banks using mixed approach. The study shows E-banking system such as ATM, mobile banking, internet banking and others were not well adopted by Ethiopian banking industry.

He revealed that the main reasons were low level infrastructure to use ICT and lack of suitable legal framework at NBE that motivates the banking industry to implement and adopt the new system. In addition the study also shows that security risk and lack of trust on the use of technological innovations are other major barriers for the system.

Finally the study recommends that the level of security risk related to E-banking product or service pose different challenges to different banks. Therefore improvements are required to ensure client confidence. Lack of competition among commercial banks and foreign banks also another basic challenge to adopt the system in the country. Availability of Technical and managerial skills for the adoption of electronic banking are also limited.

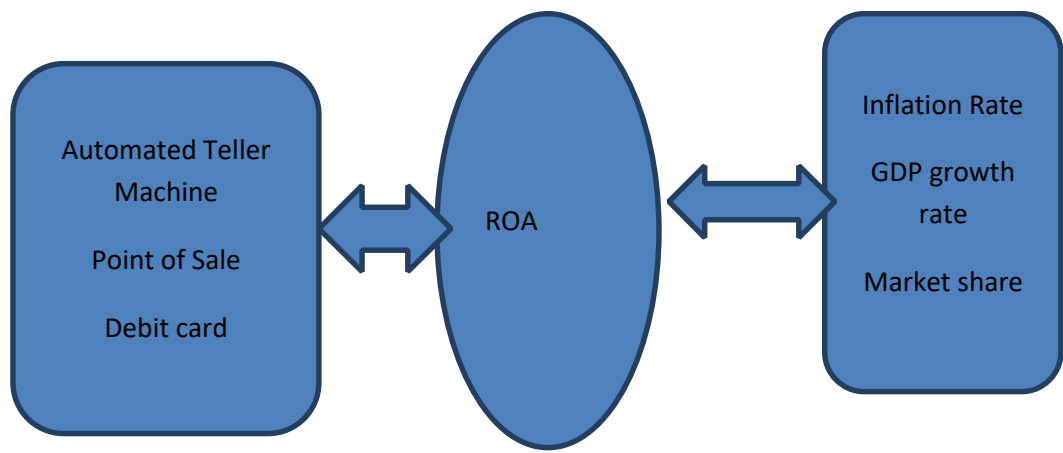
2.3 summary of literature review and knowledge Gap

The literature review shows that research in the area of e-banking has been done but not on the roles of financial profitability of banks. The literature reviewed indicated that previous researchers concentrated on e-banking adoption, Barriers and Benefits, Challenges and Prospect, performance and effect , customer satisfaction and behavior towards e-banking but, this research focused on the roles of e-banking on the financial profitability of banks. This makes the study more relevant. From survey of relevant literature, it has been found that there are a few studies conducted in Ethiopia on the area of e-banking and IT adoption and its impact towards customer behavior of commercial banks. This study therefore intends to fill these relevant gaps in literature by studying the impact of e-banking service on return on asset as a financial profitability indicator of commercial banks in Ethiopia and to identify the effect of electronic banking and relevant factors that impact on financial profitability of commercial bank and will find the general and specific impac

2.2.5 Conceptual framework: The conceptual frame work was the mental picture of the relationship between the independent variables, and dependent variable of the study.

Independent Variable

Dependent Variable



Source: Extensive Literature and Compiled by the Researcher

CHAPTER THREE

3. RESEARCH METHODOLOGY

This chapter deals with research design and methodology used to carry out the research. The chapter is organized in six sub sections. In its introduction part highlight the research paradigms, then the chapter concisely present study design, data type, data collection & sampling technique, data analysis and model specification. The final two sub parts present variables definition & Hypothesis development and operationalization of study variables.

3.1 Research Design

The primary aim of this study is to examine the impact of electronic banking on bank's financial profitability. To achieve this objective explanatory type of research design with a quantitative approach is used. The explanatory type of research design helps to identify and evaluate the causal relationships between the different variables under consideration Marczyk et al., (2005). So that, in this study the explanatory research design have employed to examine the relationship of the stated variables. A panel data study design which combines the attributes of crosssectional (inter-firm) and time series data was used. The advantage of panel data analysis is that more reliable estimates of the parameters in the model can be obtained (Gujarati, 2004).

3.2. Population of the study and Sampling Techniques

The target population of the study is all commercial banks adopting e-banking service in Ethiopia. The annual audited financial statement of selected commercial banks in Ethiopia for a period covering from 2010 -2018 are used as a main source of data to gather important information for the study. However to conduct the research commercial banks operating in Ethiopia, have no complete data of all the e-banking service is available before 2010.

Therefore, banks those having organized e-banking service report to NBE since 2010 are considered as a sample. Due to this reason, by using purposive sampling technique from seventeen Commercial banks operating in Ethiopia this study took ten banks which are the banks that have invested heavily in e-banking based on information available from their annual reports and apply ATM and POS. Those are commercial bank of Ethiopia, Awash International bank, Dashen Bank, Zemen bank, , Nib International bank, Cooperative bank of Oromia,&Oromia International Bankk.

3.3. Source and types of Data

The study underlined quantitative research approach by using secondary data gathered from National Bank of Ethiopia and published annual reports of commercial banks. Financial statements and other published and unpublished documents also will use to construct the literature part of this thesis and cited accordingly. The Panel data involves the pooling of observations on a cross section of units over several time periods and provides results that are simply not detectable in pure cross sections or pure time series studies Brooks, (2008). A multiple linear regression tests used to determine the significance level of each independent and control variable in influencing financial profitability.

3.4. Data analysis

The data collected by using data collection sheet are edited, coded and cleaned. To achieve the broad study objective, the paper was primarily based on panel data, which is collected through structured document review. Thus, the collected panel data is analyzed using descriptive statistics, correlations and multiple linear regression analysis. Mean values and standard deviations are used to analyze the general trends of the data from 2010 to 2018 based on the sector sample of ten banks and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables.

Descriptive statistics including minimum, mean, maximum and standard deviation is used to describe and provide detailed information about selected variables; diagnostics tests of CLRM assumptions including Multicollinearity, Heteroskedasticity and autocorrelation tests are conducted to ensure safe application of least square method; this study also conducted correlation analysis, specifically Pearson correlation to measure the degree of association between the variables under considerations; F-test is used to test more than one coefficient simultaneously different from zero and to check the significance level of all explanatory variables in this research models; and panel data regression analysis (panel least square method) is used to examine the relationship between dependent and independent variables in order to conclude based on the collected data about the roles of e-banking on financial profitability commercial banks in Ethiopia; the P-value is used to determine the significance of the constant term and the coefficients terms for the regressions.

3.5. Model Specification

A regression with only one independent and one dependent variable is a simple linear regression model, used to identify whether the independent variable has an effect on dependent variable.

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

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \epsilon_i \quad (i = 1, 2, 3, \dots, n)$$

Where Y_i is the i th observation of the dependent variable, $X_{1i} \dots X_{ki}$ are the i th observation of the independent variables, β_0, \dots, β_k are the regression coefficients, ϵ_i is the i th observation of the stochastic error term, and n is the number of observations. Hence, the

Where:-

$$ROA = \text{Profit before tax} / \text{Total Asset}$$

DC = Number of Debit Card

NATM= Number of ATM

NPOS = Number of POS

MS = the Market share index of bank

GDP=Growth domestic production assigned to bank i at time t.

INFR=inflation of bank i at time t.

β_0 = Constant term $\beta_1, 2, 3 \dots 7$ are parameters to be estimated;

ϵ = is the error component for company i at time t assumed to have mean zero $E[\epsilon_{it}] = 0$ i = commercial banks $i = 1 \dots 7$; and t = the index of time periods and $t = 1- 3$

3.6. Variables Definition and Hypothesis development

According to Creswell, (2009), to make it is clear to readers what groups are receiving the experimental treatment and what outcomes are being measured, the variables need to be specified in quantitative researches.

3.6.1. Dependent Variable

Return on Asset; bank profitability has often been measured using return on asset (ROA) and profit before tax. Return on asset is defined as net income before tax divided by total assets. This ratio is an indicator of managerial efficiency; it indicates how capable the management of the bank's assets in to net earnings (Adegbaju, 2008). Thus, in this research use return on asset was used as a proxy on banks financial profitability

Return on Asset (ROA) represents efficiency in asset utilization and shows how much net income is generated out of assets. It indicates the ability of bank management to generate profits by utilizing the available assets of the bank. Thus, if the ratio of ROA is high, it indicates that it is better performance in order to generate profit. It is measured by the ratio of net profit to total asset as follows: $ROA = \text{Net Profit before tax} / \text{Total Asset}$ Measurement of bank performance is complicated activity. Researchers used different approaches to assess the performance of banks in various times. However, some of the most reliable yardsticks that have been used in the past to measure financial performance of bank are return on assets (ROA).

3.6.2 Independent other control Variable

Banks profitability is affected by both internal and external factors. The independent variables are number of ATM, , number of POS GDP, Inflation rate, debit Card, and market share of

commercial banks there are also many e-banking service that can be considered as independent variables but due to lack of organized growth the researcher obliged to exclude

3.6.2.1 GDP growth rate

Rao and Lakew (2012) find that GDP growth rate has positive impact on bank profitability. There is also empirical evidence of a negative relationship between the growth in real GDP and NPLs (Salas and Suarina, 2002; Rajan & Dhal, 2003). The explanation provided by the literature for this relationship is that strong positive growth in real GDP usually translates into more income which improves the debt servicing capacity of borrower, which in turn contributes to lower non-performing loans. GDP is a factor affecting bank profitability.

3.6.2.2 Debit Card (DC)

Debit card issues by banks to customers with accounts and they can be at cash machines ATMs to withdraw money from bank account and used to purchase items at stores and online (Nyanamba and Steve 2014). In this section Debit Card is proximate by total number of Debit Card users.

3.6.2.3 Automated Teller Machine terminals (ATM)

Saied et.al, (2014) have done a research entitled the effects of e-banking on banking expansion on profitability of a commercial bank in Iran. For this study, they have used return on asset considering as dependent variables and the number of ATM machines, terminal branches, and point of sales, market concentration and bank size were considered as independent variables covering the period from 2004 to 2012. Results showed that the number of terminal branches, ATMs, POSs, bank size and market concentration have positive effects on the bank profitability; the number of terminal branches had more effect on the bank profitability than other variables has significant and positive effect on profitability of Sepah bank.

Evidence from other empirical studies conducted on the contribution of automated teller machines (ATM) to banks 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 and consequently improves banks Profitability (Abdullah, 1985). In this section ATM is proximate by total number of ATM terminals and value of transaction executed by ATM (VATM).

3.6.2.4 Point of sale terminals (POS)

According to Dietrich (2014), POS covers a variety of services rendered through machines located at retail establishments. POS terminals are generally clerk generated devices located at the checkout or convenience counter or retail establishment. Electronic cash register versions of these terminals have been in operation for several years, maintaining store records on sales, inventories, accounts receivable and the like. Now, POS devices have been linked to financial institution computers, allowing retail customers to receive approval for check cashing and electronically initiate transfers from their accounts to the retailers. In some installations, customers can make deposits to their accounts. POS devices accept either a plastic credit card or a plastic debit card, depending on whether the customer wants to delay payment by charging the purchase deducted directly from customer's account. As electronic POS systems proliferate, their use will probably replace many of the paper transactions at card used as independent variables. External factors are variables that reflect the economic and legal environments where the financial institutions operate.

3.6.2.5 The bank market share (MS)

The market share of each bank is equal to the ratio of bank deposit to the total deposit of selected banks, the researcher employed as a control variable. According to DevinagaRasiah (2010) market share could be included in the profitability model as an external determinant because if commercial banks could be able to expand their market share then they may be able to increase their income as well hence profit. This is because the ability to increase market share requires selling more so in the case of banking if commercial banks are able for example offer more loans to more customers then they stand a greater chance of increasing interest income as well as profits. More over being able to sell more in order to increase your market share requires efficiency and low cost in your operation and Smirlock (1985) structure efficient structure hypothesis advocate that commercial banks that are in the position to ensure superior efficiency and having low cost structures stand the chance of achieving supernormal profits.

3.6.2.6 Inflation rate

Gulati (1997) developed a general case model to identify the impact of inflation on financial profitability. In his study, the inflation was represented by the percentage increase in product prices and production costs and was "adjusted" accordingly to get the impact of inflation. The result indicated that inflation is significantly affecting profitable. In another study, Frank and Goyal (2004), confirmed such a positive relation of inflation rate and debt level. Empirical

studies made in Ethiopia by Tesfaye and Minga (2012) ascertained also that there was a positive relation of inflation rate and debt level. Inflation rate is measured by annual general inflation rate

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATIONS

Introduction

Presentation and discussion of the results from the analysis of data are briefly elucidated in this chapter. The study covered a period of 9 years (from 2010 to 2018) for seven purposively selected commercial banks. These data was collected from central bank of Ethiopia and from audited financial statements of selected commercial banks.

The data was analyzed and interpreted using new Stata software. Descriptive statistics was discussed followed by correlation analysis and a diagnostic test which is necessary to fulfill the assumption of classical linear regression model was adopted. Finally, results of the regression analysis were briefly discussed by supporting empirical studies.

4.1 Descriptive Statistics

Table 1 below shows the summary data for the variables used in the analysis. Descriptive statistics reveals the data analysis that helps to describe and summarize data in meaningful way. It is important to present, summarize and visualize the data. And also descriptive statistics enables us to present data in meaningful way and interpret it simply.

Table 1 indicates the summary of descriptive statistics of explained and explanatory variables for seven commercial banks from the year 2010 to 2018 with 63 observations. These include the mean, minimum, maximum, standard deviation and number of observations for the dependent variable ROA and independent variables and. specifically (Number of ATM, number of debit cards (DC), number of point of sale (POS), GDP, inflation and market share. The descriptive summary of the study is presented as follows:

Table 4. 1. Descriptive Statistics

```
. sum ROA ATM POS DC GDP INFR MS
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	63	4.301941	2.83346	.02	16.65
ATM	63	7.819473	4.391256	.1487142	18.89172
POS	63	46.31576	24.56832	.4	73.80083
DC	63	8.024004	13.56901	.5892526	40.8
GDP	63	1330.947	9853.883	.2026	78300.52
INFR	63	15.8746	10.66445	7.3	46.1
MS	63	29.31202	11.57577	2.706865	55.24131

Source: Output of Stata12

As it is presented in the table, it includes the mean, standard deviation, number of observations, minimum and maximum for the dependent and independent variables of the model. It shows the average indicators of variables computed from the financial statements.

As measured in the above table 4.1, the mean value of ROA, a measure of profitability (dependent variable) which is measured by dividing Net Income by Total asset of the institution has a mean value of 4.3. This result revealed that on average for every birr investment in commercial bank asset would earn a 4.3 birr. The higher ROA shows that the company is more efficient in using its resources and reflects the ability of management to generate profits from the asset. The maximum ROA was 16.65 and the minimum value was 0.02. This means the most profitable banks earn 16.65 birr income and the least profitable bank earns 0.02 cents income for a single birr investment in the firm's total asset. The standard deviation 2.83 reflects the presence of variation in earned profit among across the sampled banks.

The independent variable, ATM, which is measured by total number of ATM of banks have a mean value of 7.8. In addition the maximum and minimum values are 18.89 and 0.148 respectively. And also the standard deviation was 4.39 indicates the value in the data set is farther away from the mean. This informs that the effort among banks for expansion and installation of ATM were highly varied.

The other independent variable, POS measured by number of point of sale of the sampled banks during the study period was 46.31, it reveals that point of sale represents on average 46.31 per birr of total assets of commercial banks. The highest POS for banks in a particular year was 73.8 per birr and in the same way the minimum value of banks in a year was 0.4 cents per birr. And also the standard deviation was 24.56 indicates the value in the data set is farther away from the mean. This informs that the effort among banks for expansion and installation of POS were highly varied.

As it is shown in table 4.1 above, the other variable used in the study was, DC which is measured by number of debit card during the study period of one year. The DC has a mean value of 8.02 per birr. The highest DC for banks in a particular year was 40.8 per birr and in the same way the

minimum value of banks in a year was 0.58 cents per birr. The standard deviation was 13.56, this indicates the values in the data set are farther away from the mean. Debit card adoption and application potential among commercial banks in Ethiopia is highly spread.

Gross domestic product of the sampled banks in the study period has a mean value of 1330.94 per birr. The maximum GDP of banks in a particular year was 78300.52 and the minimum was 2026. The values in the data set are farther away from the mean through 9853.8 (standard deviation) the growth of GDP has important for the adoption and application service of electronic banking among commercial banks in Ethiopia.

As it is shown in table 4.1 above, the other variable used in the study was, INFR which is measured by annual general inflation rate during the study period of one year has the mean value of 15.87 per birr. The highest INFR for banks in a particular year was 46.1 per birr and in the same way the minimum value of banks in a year was 7.3 per birr. In addition the data set is farther away from the mean by 10.66 per birr.

According to descriptive statistics shown in the above table 4.1, MS variable which was represented by deposit of each bank divided to total deposit of studied bank, the mean value was 29.31 per birr. The highest MS for banks in a particular year was 55.24 per birr and in the same way the minimum value of banks in a year was 2.7 per birr. And also the standardization was 11.57 indicate the value of the data set is farther away from the mean.

4.2 Correlation Analysis

Correlation analysis provides the linear relationship between the dependent variable (financial performance) and explanatory variables including both the independent and control variables by using correlation matrix. According to Brooks (2008), correlation between two variables measures the degree of linear association between them. Correlation matrix helps to quantify the extent to which two quantitative variables, dependent and independent variables, go together. Values of the correlation coefficient are always being in between -1 and +1. The sign of the correlation coefficient determines whether the correlation is positive or negative (direct or inverse); whereas, the magnitude of the correlation coefficient determines the strength of the correlation. Accordingly, the closer the correlation coefficient to +1, the stronger the positive correlation

would be and if the correlation coefficient is close to -1, it indicates a strong negative correlation in between considered variables. However, if the coefficient of the correlation approaches to zero (0) it notify us, there would be little or no linear relationship exists among the variables. Hence, the analysis of the relationship between dependent variable (ROA) and independent variables (ATM, DC, POS, GDP, INFR and MS) is detailed in Table 4.2 as follows using the correlation matrix.

Table 4.2. Correlation Analysis

```
. correlate ROA ATM DC POS GDP INFR MS
(obs=63)
```

	ROA	ATM	DC	POS	GDP	INFR	MS
ROA	1.0000						
ATM	-0.4849	1.0000					
DC	0.6730	-0.8924	1.0000				
POS	-0.6413	0.8794	-0.9277	1.0000			
GDP	0.5552	0.3272	-0.0656	0.0711	1.0000		
INFR	0.3029	-0.3970	0.3834	-0.4590	-0.0650	1.0000	
MS	-0.5217	0.6293	-0.6324	0.6286	0.0207	-0.1449	1.0000

Source: Output of Stata12

The result in table 2 above reveals that a positive association existed between DC, GDP, INFR and ROA of banks. And also there was a negative association between ATM, POS, MS and ROA of banks. DC has shown the highest positive coefficient of 0.6730 and POS has shown the highest negative coefficient of 0.6413 with respect to ROA.

4.3 Classical Linear Regression Model Assumptions

There are basic assumptions relating to the classical linear regression model. These were required to show the estimation technique, ordinary least squares had a number of desirable properties. According to Brooks (2019), to maintain the data validity and robustness of the regressed result, the basic classical linear regression model assumptions must be tested for identifying any misspecification.

This helps correcting them to satisfy the quality of research. To use OLS model the data observation should be at least 30 observations in order to perform regression. In this study 63 observations were used which is obtained from ten commercial banks for nine years. To run OLS model the main assumptions that need to be satisfied has been successfully tested. In this study homoscedasticity, autocorrelation, Multicollinearity and normality assumptions are tested that shows the quality of the study.

4.3.1. Heteroscedasticity

According to Brooks (2019), the first assumption of the CLRM is that the error has zero mean. Basically if there is a constant term in the regression equation this assumption will never be violated. In this case the model have constant term which is proved that the line did not pass through the origin.

Test for Heteroscedasticity, can be conducted through the Breusch-Pagan test and the White's general test. Panel data is likely to the presence of out layers. In order to detect hetroskadascity in the data, test was conducted by using Breusch-Pagan test. The researcher develops the general hypothesis to check the presence of heteroscedasticity as:

H0: Homoscedastic error term

H1: Heteroscedasticity error term

Table 4.3. Heteroscedasticity Test: ROA

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
    Ho: Constant variance
    Variables: fitted values of ROA

        chi2(1)      =      10.93
Prob > chi2   =      0.0009
```

Source: Output of Stata12

The figure in the above table showed that, versions of the test statistic give conclusion that there is no evidence for the presence of homoscedastic. Since the p-values are considerably less than 0.05 (Brooks, 2019).

The null hypothesis of homoscedasticity is not rejected at 5% significance level. This implying that there is no significant evidence for the presence of homoscedasticity.

4.3.2. Autocorrelation

Test of autocorrelation can be conducted by using Breusch-Godfrey serial correlation and Durbin Watson test (DW). In this study the Breusch-Godfrey serial correlation were used to test the presence of autocorrelation.

Breusch-Godfrey tests are a joint test for autocorrelation that allow examination of the relationship between errors and several of its lagged values at the same time. According to

Brooks (2019), the Breusch-Godfrey test is the most general test for the existence of autocorrelation. The researcher develops the general hypothesis of Breusch-Godfrey serial correlation test to check the absence of autocorrelation: **Table 4.4.**

Autocorrelation

Another basic assumption of regression model says that the covariance between error terms should be zero. This means that error term should be random and it should not exhibit any kind of pattern. If there exists covariance between the residuals and it is nonzero, this phenomenon is called autocorrelation Brooks, (2008). To test for

The Breusch–Godfrey serial correlation LM test was run. Breusch–Godfrey tests area joint test for autocorrelation that will allow examination of the relationship between \hat{u}_t and several of its

lagged values at the same time. According to Brooks (2008), The Breusch--Godfrey test is a more general test for autocorrelation up to the r^{th} order.

Following the general null hypothesis of Breusch--Godfrey serial correlation LM test, the researcher develops the following hypothesis to check the absence of autocorrelation:

H0 = No autocorrelations errors H1
= Autocorrelations erro

4.3 .3 Test for Multicollinearity

Variance inflation factor (VIF) used to test whether Multicollinearity problem exist between explanatory variables. The result shows that the VIF for explanatory variable is less than 10. According to Gujarati (2009), there is no evidence for the existence of Multicollinearity problem between independent variables if VIF is below 10. Again there is no evidence for the problem of Multicollinearity because the result of mean VIF was 5.52.

Table 4.5. Multicollinearity

```
. estat vif
```

Variable	VIF	1/VIF
DC	9.98	0.100241
ATM	9.24	0.108251
POS	9.03	0.110761
MS	1.86	0.537155
GDP	1.67	0.599058
INFR	1.34	0.743655
Mean VIF	5.52	

Source: (Stata output 12)

4.3.4 Test of normality Assumption.

Brooks (2008) stated also that if the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant. That is, the p-value given at the bottom of the normality test screen should be greater than 0.05 to not reject the null hypothesis normality at the 5% significant level. support the null hypothesis of presence of normal distribution at the 5% level.

Theoretically, if the test is not significant, then the data are normal, so any value above 0.05 indicates normality. Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis close are zero and three respectively.

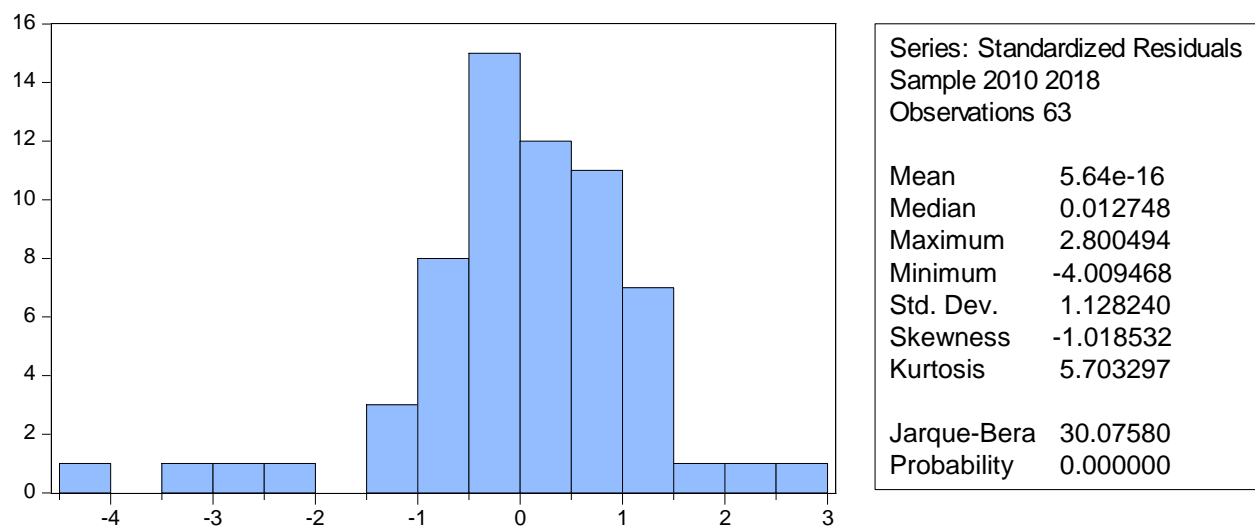
Skewness refers to how symmetric the residuals are around zero.

Perfectly symmetric residuals will have a skewness of zero. Skewness measures the extent to which a distribution is not symmetric about its mean value. Kurtosis refers to the “peakedness” of the distribution. For a normal distribution the kurtosis value is 3. Kurtosis measures how fat the tails of the distribution are, the Jarque–Bera test for normality is based on two measures, skewness and kurtosis. The hypothesis of normality distribution is:

H0= residuals follows a normal distribution

H1 = residuals do not follows a normal distribution

Figure 4.1 Normality Test



From the above figure 4.1 we can conclude that there is a problem of normality. That is, the coefficient of kurtosis was not close to 3, and the Bera-Jarque statistic has a P-value of 0.000000 implying that the data were consistent with a normal distribution assumption. Furthermore, it indicates that the inferences made about the population parameters from the sample parameters tend to be invalid. Beside the shape of distribution, normality can also be inspected by two multivariate indexes i.e. Skewness and kurtosis.

Hence, null hypothesis of the residuals follows not a normal distribution reject at 5 percent of significant level. Hence, it seems that the error term in all of the cases not follows.

4.3.5 Housman test

Statistically fixed effects are always a reasonable thing to do with panel data (they always give consistent results) but they may not be efficient. The random effects model is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population while fixed effect model is more appropriate when the entities in the sample effectively constitutes the entire population (Brooks, 2019).

Fixed effect model Controls for unobserved and time invariant effects that are correlated with error. Often in panels, have an unbalanced panel missing data on some individuals in some years fixed effect regression still works fine. Fixed Effect model is Consistent and usually most efficient, especially with large number of elements and small time likely to require clustered errors to get correct (Bell, Fairbrother, & Jones, 2019).

When a sample exhausts the population, the corresponding model is fixed. When the sample is a small (negligible) portion of the population the corresponding model is random. Choosing between a fixed and random effects specification will follow directly from a researcher's theoretical model. A researcher may have application specific concerns about the appropriateness of the assumptions underlying either model (Clarke, Crawford, Steele, & Vignoles, 2015).

The basic way of selecting fixed and random effects is based on running a Housman test.

The hypothesis developed for Housman test were:

- ☞ H_0 ; Random effect model is appropriate
- ☞ H_1 ; Fixed effect model is appropriate

For this study the appropriate model of panel data for the effect of e-banking on profitability of commercial banks were fixed effect. Table below shows Housman test, the P-value of a model, which is less than 5%. Hence, the null hypothesis is rejected.

Table 4.6. Housman test

random	Coefficients				sqrt(diag(V_b-V_B))
	fixed	(b)	(B)	(b-B) S.E.	
		Difference			
ATM	-.1713447	-.428362		.2570173	.
POS	.0031415	.0501982		-.0470567	.
DC	.0824682	.0813107		.0011575	.0134439
GDP	.0001938	.0002077	-.0000139		.
INFR	.0224485	.0219908		.0004577	.0047718
MS	-.0302744	-.0266392		-.0036352	.0072231
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					

$$\begin{aligned} \text{chi2}(5) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= -2.27 \quad \text{chi2} < 0 \implies \text{model fitted on these} \end{aligned}$$

data fails to meet the asymptotic assumptions of the Hausman test; see suest for a generalized test

Therefore fixed effect model is more appropriate than random effect model, and then a null hypothesis was rejected.

4.4 Analysis of the regression Result

In this study multiple linear regression result with fixed effect model was used to analyze the effect of e-banking on the profitability commercial banks in Ethiopia. According to Brooks (2019), regression analysis is a technique used in statistics and financial econometrics for investigating and modeling the relationship between variables. The relationship between dependent variable (ROA) and six independent variables were regressed using stata out put software 12.

The top section summarizes the input to the regression, the middle section gives information about each regression coefficient, and the lower section provides summary statistics about the whole regression equation. The panel data on OLS model contains 63 observations using five explanatory variables and one dependent variables with a cross sectioned on 7 commercial banks. The regression output is presented in separate table for each model. The study used return on asset as measure to profitability of commercial banks.

The operational panel regression models used to examine the effect of E-banking on the profitability of commercial banks in Ethiopia were;

$ROA_{it} = \beta_0 + \beta_1 NATM_{it} + \beta_2 NPOS_{it} + \beta_3 NDC_{it} + \beta_4 MS_{it} + \beta_5 INFR_{it} + \beta_6 GDP_{it} + \varepsilon_{it}$: Effect of E-banking on return on asset

Table 4.7 Analysis of the regression Result

```
. xtreg roa atm pos dc gdp infr ms, fe
```

```
Fixed-effects (within) regression      Number of obs   =      63
Group variable: id                    Number of groups =       7

R-sq:  within = 0.7993                 Obs per group: min =       9
      between = 0.8187                   avg =           9.0       overall
      = 0.8064                           max =           9

corr(u_i, Xb) = 0.0860                 F(6,50)        =      33.19
                                          Prob > F        =      0.0000
```

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
roa						
atm	-.4326515	.1844127	-2.35	0.023	-.8030553	-.0622477
pos	.0507798	.0287114	1.77	0.083	-.0068887	.1084483
dc	.0815831	.032694	2.50	0.016	.0159152	.1472509
gdp	.000208	.0000204	10.20	0.000	.000167	.0002489
infr	.0211134	.0158181	1.33	0.188	-.0106582	.0528849
ms	-.0263262	.0163754	-1.61	0.114	-.0592171	.0065647
_cons	4.832678	1.318078	3.67	0.001	2.185241	7.480115
sigma_u	.83733712	sigma_e	1.0877675			
rho	.37207811	(fraction of variance due to u_i)				

Source: (satata output)

The above table shows the results of the regression analysis on the impact of the dependent variable (ROA) which was measured by the net income to total asset and the independent variables for Ethiopian commercial banks. The value given in this model was, R-squared of 0.8064 and Adjusted R-squared of 0.8187, which means 80.64 percent of variation of Ethiopian commercial banks return on asset (ROA) can be explained by the variation on DC, POS, MS, INFR. GDP and ATM.

The remaining 19.46% of changes was explained by other determinants which are not included in this model. Thus, the explanatory power of the model is very high. The value of F-statistics is 33.19 with p-value of 0.0000 which is used to measure the overall significance of the model. Thus, the p-value of F-statistics is zero at six digits, the alternative hypothesis is rejected and the model is significant even at 1% significant level.

As it is shown on table above, DC and GDP had a positive and statistically significant factors affecting at 5% level on Ethiopian commercial banks profitability, which is measured by ROA.

The above table also depicts that, POS and INFR had positive and statistically insignificant influence on Ethiopian commercial banks ROA. On the other hand, the coefficient sign of all explanatory variables was in-line with our expectations.

However, the above table also depicts that, ATM had a negative statistically significant and MS had also negative statistically insignificant impact on banks profitability.

4.5. Discussion of the regression result

The preceding section presents the overall results of the study, and this section discusses the general result of each explanatory variables based on fixed effect regression results indicated in the table 4.6 above.

Automated Teller Machine

The result in table shows that there is negative and significant relationship between ATM and ROA. The regression coefficient of Automated teller machine is -0.04326515 and its p-value is 0.023 . A decrease in ATM machine leads to an increase in bank profitability (ROA). The p-value is less than 0.05 ; therefore ATM has significant impact on the profitability of commercial banks. This reveals that Banks get more return in the form of charge fee and other benefits related to deposit by customers. The bank customers can easily access their account at any time irrespective of banking hours for withdraw or transfer of money.

ATM is a modern as well as a convenient electronic channel that seems to be on street corner, in retail store, universities, hotel and attached to every bank buildings. This crates good relationship with the banking operation and able to generating profit for commercial banks. Commercial Bank needs working aggressively to expand the services and marketing themselves by showcasing their ATM network across the country.

Banks also work with an objective to provide excellent services to customers and eventually contribute to bank profit in the long run. Some banks in Ethiopia have further invested in intelligent ATMs to attract more customers which have deposit acceptance capabilities (specifically commercial bank of Ethiopia).

Point of Sale.

The result in table shows that there is positive and insignificant relationship between POS and ROA. the regression coefficient of point of sale is 0.0507798 and its p-value is 0.083. T This reveals that an increase in number of POS terminal leads to an increase in ROA. The p-value is greater than 5%, so it has insignificant impact on profitability of commercial banks relative to other electronic banking channels.

The finding shows that bank customers in Ethiopia can easily access their account to transfer money from cardholder to the merchant's bank account at market centers, supermarkets, hotels universities, colleges and restaurants. Commercial banks should increase the POS terminals for its insignificance impact to boost the profit because it has positive contribution to ROA.

In Ethiopia most POS terminals found at the door side of banks and customers can get the service from the bank. The use of POS has been insignificant but it is recommended the POS should be installed far from banks where there are no bank services and where the marketing are highly concentrated areas. If POS terminals installed in supermarkets, customers can easily transact the finance in to the account of the supermarket, the supermarket easily deposit its finance on its account and the bank charge fee also increased.

The findings of this research are similar with the results of (Abaenewe et al., 2013; M. Karimzadeh& Reza Sasouli, 2013; Kemppainen&Putkuri, 2005) and (Nofie, 2011). These results depicted that POS terminals has a positive impact on the profitability of banks. **Debit card**

The result in table indicates that there is a positive and significant relationship between number of debit card and ROA. the regression coefficient of Debit card is 0.0815831 and its p-value is 0.016. This means an increase in debit card is attractive and leads to an increase in ROA (bank profitability). The p-value is less than 0.05; this indicates DC has significant impact on the profitability of commercial banks (ROA).

The positive results indicate that debit cards are well applied and utilized effectively in Ethiopian commercial banks and it has good contribution to return on asset. Customers of commercial banks have not used debit cards and not well adopted in Ethiopia. However, these innovative technologies pave the way to access the customers wherever they are at hotels, supermarkets and shops to transfer money from their account to the seller. These kinds of finance transaction increase the profit of bank from service charge and make the transaction convenient for the customer.

The findings of this study are contradicted with the results of (Agboola, 2006; Ngumi, 2014; Nofie, 2011) these studies conclude that debit card affect the profitability of banks positively via bringing services closer to customer needs and hence improved bank performance.

GDP growth rate

The result in table indicates that there is a positive and significant relationship between GDP growth and ROA. This means an increase in growth is attractive and leads to an increase in ROA (bank profitability). the regression coefficient of GDP growth is 0.000208 and its p-value is 0.000. As already explained, theoretically, it is believed that good macroeconomic performance raises overall income level and business performance which ultimately improves bank financial sector profitability. the p value is less than 5%. The positive association of GDP with bank profitability growth is consistent with the expectation. It is also consistent with the study finding of Laidroo(2012) and Hsieh 2015. **Inflation rate**

The result in table indicates that there is a positive and insignificant relationship between inflation rate and ROA. This reveals that an increase in inflation rate leads to an increase in ROA the regression coefficient of inflation rate is 0.211134 and its p-value is 0.1888. In this study, inflation was predicted to have a positive correlation to profitability of the banking. The result indicated that inflation has insignificant positive relation with the profitability of the banks resulted in a p value of (0.1888). Results of this study are consistent with empirical studies conducted by Mohammedamin (2014) which implies inflation affects banks profitability. This can be explained from the results that the increase in the inflation rate actually increases the value of insurable properties which ultimately increase the bank's profitability which is a significant source of income of banks profitability

Market share

The result in table shows that there is negative and insignificant relationship between MS and ROA. A decrease in MS share leads to an increase in bank profitability (ROA). The p-value is greater than 0.05; therefore Market share has insignificant impact on the profitability of commercial banks. the Regression coefficient of market share is -0.0263262 and its P-value is 0.114 Market share of banks from the fixed regression result reveals that insignificant negative relationship with return on asset of sampled commercial banks. This variable has been included to provide information on the impact of the size or market share of the banks and profitability.

Empirical evidences shows that this variable has an impact on profitability. A negative relationship implies that the bank suffers from diseconomies of scale when it expands to a larger size; Sufian et al. (2008). Therefore, the study found that decreased market share had a negative impact on the financial performance of commercial banks with many banking institutions indicating that decreased market share did not allow a company to achieve greater scale in its operations which generally improved its profitability.

Table 4.8 Comparison of the Test Result With Expectation.

<i>Independent variables</i>	<i>Expected relationship with ROA</i>	<i>Actual result</i>	<i>Statistical significance test</i>	<i>Hypothesis status</i>
<i>Value of transaction ATM</i>	+	-	<i>Significant</i>	<i>Rejected</i>
<i>Value of transaction POS</i>	+	+	<i>insignificant</i>	<i>Failed to reject</i>
<i>Debit card</i>	+	+	<i>Significant</i>	<i>Failed to reject</i>
<i>GDP growth</i>	+	+	<i>Significant</i>	<i>Failed to reject</i>
<i>Inflation rate</i>	+	+	<i>Significant</i>	<i>Failed to reject</i>
<i>Market shares of Bank</i>	+	-	<i>Insignificant</i>	<i>Rejected</i>

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

On this chapter based on the finding of the study conclusions were drawn and possible recommendations were forwarded. Accordingly, the first section presents the conclusion part and the second section presents the possible recommendation.

5.1 Conclusion

This study invented from the researcher's aim of investigative the Impact of e-banking service on financial profitability of commercials banks in Ethiopia. Using a non-random sampling method (purposive sampling) selected ten commercial Banks in Ethiopia for the period covering 2010 to 2018, the study was carried out by constructing a balanced panel regression model based on OLS and random effects estimates of the secondary data obtained from the financial statements, mainly Annual Audited report of the commercial Banks in Ethiopia under the study.

Accordingly, the roles of e-banking service (such as value or price of transaction of ATM, value or price of transaction of POS, debit card, inflation rate ,GDPgrowth and market share of banks) as an independent variable on financial impact measured by return on asset (dependent variable) on commercial banks in Ethiopia were carefully analyzed. The regression result showed that automated teller machine(ATM) point of sale(POS)debit card, inflation rate, GDP growth and bank market share have significant and positive impact on financial profitability of commercial banks measured by return on asset. The researcher summarized that increased number of ATM, POS and market share had a positive roles on the financial profitability 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 financial profitability.

The result from the F-statistic and R-square show that the model is stable over the study period thus become a formidable policy reference point in banking reform planning To sum up the e-banking fuelled the Commercial Banks of Ethiopia a great deal of cash capital flow that increase the ROA of the banks. Although the result indicated some negative influences by the selected variables, it is very clear that e-banking is promising activity to increase the profitability of Ethiopian Commercial Banks. Further, although evidences from previous studies on whether

E-banking influence bank performance showed that there was mixed results based on the operating environment and the level of adoption. In Ethiopia where there is a low level of adoption of e-banking service in the banking sector the results on performance of banking is not controversial and confusing.

5.2 Recommendations

E-banking is an important current issue and also it has a great impact on the whole system and affects the banks return. E-banking system is a new financial evolution in Ethiopia. These recommendations are able to support banking sector in Ethiopia and others. The leading bank in terms of profitability was mostly the fast movers in adoption of new technologies. Based on the finding and conclusion of the study, the researcher forwards the following recommendation.

Based on the finding the first recommendation goes to the official of banks which are slow in innovation adoption. Management personnel should too move and adopt various ebanking innovations in their operations and evaluate their impacts to increase profitability. Commercial banks in Ethiopia should increase their ATM networks, encourage the use of payment cards at POS terminals, motivate customers to adopt and apply transactions using mobile banking and follow an income diversification strategy.

Commercial banks should also ensure active and proper maintenance of ATM outlets to ensure quality service delivery to their clients. ATM channels would be installed strategically to make accessible for many customers and to boost the income from it.

Ethiopian commercial banks should also form partnership with different parties such as retail outlets, hotels, universities, petrol stations, companies and other service providers to increase the use of banking services at POS terminals and bank debit cards. And also it is recommended that all commercial banks should inform their customers to use the channels on the retail outlets and anywhere on they are available. Therefore, they can use their cards and mobile device to perform payment for goods and services.

Banks should invest more on new electronic banking system for automating their banking system like CBE Birr and it is imperative to devise strategies that involve alliances and collaborations between private and public banks.

To enhance the introduction of modern technology in the banking sector, the government should consider the liberalization of the financial sector for foreign bank entry and permit the new system application. In addition, frequent connectivity failure in telephone line and electricity should be drastically improved.

Banks should increase awareness regarding all e-banking channels by organizing seminars and workshops to their clients. This help client to adopt quickly too and boost positive impact on financial performance.

Finally, the study recommended national bank of Ethiopia to prepare various capacity building activities for banks regarding e-banking operation and provide incentives for banks to invest more on ICT and electronic banking by banks and customer's.

5.3 Areas for Further Study

This study becomes an important contribution to the literature. The findings of this study will help policy makers to develop new policy and bank officials to invest more on ebanking innovations. The studies related to the effect of e-banking in relation to bank profitability are almost null in Ethiopia. So professionals and academicians can study in this untapped area to support the banking industry.

Variables not included (control variables) are suggested for further research. Researchers may be validating the result and provide supplementary results for this study by including other macro-economic variables (GDP, Inflation, knowledge and trade balance). Study can add recent innovations like agency banking and internet banking on the impact of Ethiopian banking profitability.

Qualitative study, why commercial banks in Ethiopia have not well organized system of transaction. Why transfer and Payment between commercial banks have not arranged by the national bank of Ethiopia.

sStudy can be made on investigating the effect of electronic banking on Deposit growth of commercial banks.

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APPENDIX

A .Descriptive Statistics

```
. sum ROA ATM POS DC GDP INFR MS
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	63	4.301941	2.83346	.02	16.65
ATM	63	7.819473	4.391256	.1487142	18.89172
POS	63	46.31576	24.56832	.4	73.80083
DC	63	8.024004	13.56901	.5892526	40.8
GDP	63	1330.947	9853.883	.2026	78300.52
INFR	63	15.8746	10.66445	7.3	46.1
MS	63	29.31202	11.57577	2.706865	55.24131

B. Correlation anlysis

```
. correlate ROA ATM DC POS GDP INFR MS
(obs = 63)
```

	ROA	ATM	DC	POS	GDP	INFR	MS
ROA	1.0000						
ATM	0.4849	1.0000					
DC	0.6730	0.8924	1.0000				
POS	0.6413	0.8794	-0.9277	1.0000			
GDP	0.5552	0.3272	-0.0656	0.0711	1.0000		
INFR	0.3029	0.3970	0.3834	-0.4570	-0.0650	1.0000	
MS	0.5217	0.6293	-0.6324	0.6256	0.0297	-0.1449	1.0000

C. Multicollinerrity

```
. estat vif
```

Variable	VIF	1/VIF
DC	9.91	0.100241
ATM	9.24	0.108251
POS	9.13	0.110761
MS	1.90	0.537155
GDP	1.67	0.599058
INER	1.34	0.743655
Mean VIF	5.52	

D .Autocorrelation

```
. xtgls rca atm fcs dc gdp infr ms, panels(tid) corr(independent) coll(1) coll2(1)
```

Cross-sectional time series FGLS regression

Coefficients: generalized least squares

Panel: nonoskedastic

Correlation: no autocorrelation

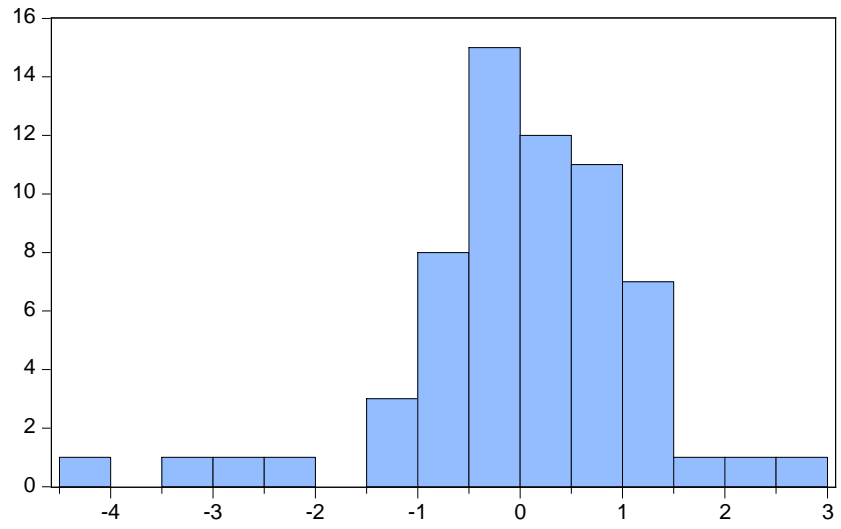
```

estimated covariances   =          1      Number of obs   =          42
estimated autocorrelations =          0      Number of groups  =          14
estimated coefficients   =          7      Time periods      =          3
                                                    Wald chi2(6)      =          104.00
log likelihood          = 96.49065       Prob > chi2      =          0.0000

```

	rca						
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]		
	atm	.1713447	.0983845	1.74	0.082	.3641747	.14411
	fcs	.0031415	.0173845	0.18	0.859	-.0309314	.0371141
	dc	.0824682	.0330872	2.49	0.013	.0176165	.14732
	gdp	.0001938	.0000186	10.40	0.000	.0001573	.0002304
	infr	.0224485	.0154564	1.45	0.146	-.0078454	.0527464
	ms	-.0302744	.0167545	-1.81	0.071	-.0631127	.0025639
	_cons	6.107599	1.237819	4.93	0.000	2.681519	9.533679

E. Normality test



Series: Standardized Residuals
Sample 2010 2018
Observations 63

Mean 5.64e-16
Median 0.012748
Maximum 2.800494
Minimum -4.009468
Std. Dev. 1.128240
Skewness -1.018532
Kurtosis 5.703297

Jarque-Bera 30.07580
Probability 0.000000

F. Regression analysis

```
. xtreg roa atm pos gdp intr ms, fe
```

```
Fixed effects (within) regression      Number of obs      =      63
Group variable: ia                    Number of groups   =       7

R-sq:  within = 0.1223
      between = 0.1117
      overall  = 0.1104

Obs per group: min    =       9
                  avq   =      9.0
                  max    =       9

F(6,50)                =      33.19
Prob > F                =      0.0000

corr(u_i, Xb)          = 0.0000
```

roa	coef.	Std. Err.	t	P> t	[95% Conf. Interval]
atm	.0636616	.01644127	2.35	0.023	-.0030553 .0622477
pos	.0027781	.00257114	1.07	0.083	-.0068887 .1084483
gdp	.0000000	.00000204	0.00	0.000	-.000167 .0002489
intr	.0000000	.00156161	0.00	0.188	-.0106582 .0528849
ms	.0000000	.0003754	0.00	0.114	-.0592171 .0065647
cons	-.0360000	1.318078	-3.07	0.001	2.185241 7.480115
sigma_u	1.0000000				
sigma_e	1.0000000				
rho	.0000000	(fraction of variance due to u_i)			

G. Commercial banks in Ethiopia

No.	Commercial Banks in Ethiopia	Year of Establishment
1	Commercial Bank of Ethiopia	1963

2	Awash International Bank	1994
3	Dashen Bank	1995
4	Bank of Abyssinia	1996
5	Wegagen Bank	1997
6	United Bank	1998
7	Nib International Bank	1999
8	Lion International Bank	2006
9	Oromia International Bank	2008
10	Buuna International Bank	2009
11	Zemen Bank	2009
12	Abay Bank	2010
13	Berhan International Bank	2010
14	Addis International Bank	2011
15	Cooperative Bank of Oromia	2011
16	Dehub Global Bank	2012
17	Enat Bank	2012

