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THE EFFECT OF ELECTRONIC BANKING ON BANKS PERFORMANCE

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DECLARATION

Students's Declaration

I, Margaret Larbiokor Annan hereby declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged is entirely my own original work, and that it has not been submitted, either in part or whole, for another degree elsewhere.

Signature ……..…….

Date……..……..……

Supervisor's declaration

I hereby declare that the preparation and presentation of this dissertation were done in accordance with the guidelines for supervision of thesis laid down by the University of Education, Winneba.

Name of Supervisor:

Signature ……..……..

Date …….

DEDICATION

This thesis is dedicated to my family.

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ABBREVIATIONS

ATM	Automated Teller Machine
BKS	Size of Bank
CIR	Cost to Income Ratio
EXP	Expenditure
E- BANKING	Electronic Banking
GhIPSS	Ghana Interbank Payment and Settlement System
GRT	Growth
ICT	Information Communication Technology
IM	Internet Banking & Mobile Banking
POS	Point of Sale System
ROA	Return on Asset
ROE	Return on Equity
T	Time

ABSTRACT

Electronic banking has gained prominence in the banking sector following the introduction of the Ghana Interbank Payment and Settlement System. Today universal banks have adapted their banking operations and have introduced designated electronic banking as one of their business models. This study focused on effect of mobile and internet banking on banks performance using the performance and profitability ratios. The study was conducted using panel data extracted from the annual reports and financial statements of the selected commercial banks in Ghana. The objectives of the study were achieved using quantitative research design and deductive research approach. The study examined the relationship between electronic banking and banks' performance, the effect of electronic banking on banks profitability and the impact of electronic banking on the efficiency of banks in Ghana. The study revealed that profitability of banks (return on assets and return on equity) has significant positive association with electronic banking variables (ATM, EXP and Internet banking). The study also revealed that electronic banking in the form of internet banking, automated teller machines have significant positive effect on the profitability of the selected banks. The study concluded that electronic banking and the profitability of banks has significant association and there is causal effect running from electronic banking to the profitability of banks. The study recommended that banks should increase the number of automated teller machines and also improve their internet banking to allow more of their clients to use them since they have significant influence on their performance.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The revolution of information technology over the years has influenced almost every aspect of life, especially the banking sector. Introduction of electronic banking has transformed and redefined the ways banks were operating (Sumra, Manzoor, Sumra, and Abbas, 2011). Electronic services have been delivered to consumers and businesses by banks for years. Among these services are funds transfer, payments and corporate cash managements systems, as well as publicly accessible automated machines for withdrawals and retail account management, which are global fixtures. However, the increased world - wide acceptance of the internet as a delivery channel for banking products and services provides new business opportunities for banks as well as for customers (Addai, Ameyaw, Ashalley, & Quaye, 2015).

E-banking is more like a traditional payment, inquiry, and information processing systems, differing only in the utilization of a different delivery channel. The Basel Committee on banking supervision defined e-banking as "the provision of retail and small value banking products and services through electronic channels such products and services can include deposit taking, lending, account management, the provision of financial advice, electronic bill payment and the provision of other electronic payment products and services such as electronic money"(2003,p.6).

According to the Charity-Commission (2003), electronic banking refers to the use of information and communication technology by banks to provide services and manage customer relationship more quickly and most satisfactorily. Burr (2016) describes it as "an electronic connection between the bank and the customer in order to prepare,

manage and control financial transactions". Electronic banking covers both computer and telephone banking; the term e-banking is technically and intricately complex to define as it may be interpreted differently from different accessing viewpoints (Addai, et al, 2015).

The versatility of e-banking as delivery multi-channel increases the intricacy of being precisely defined in the literature. Nonetheless, several attempts have been made to offer succinct and all -inclusive meaning of e-banking (Auta, 2010; Furst, Lang, & Nolle, 2000; Kirk, 2009). For example, Furst, Lang, & Nolle (2000) viewed e-banking or internet banking as the employment of more delivery channel in performing banking services. The term e-banking is defined as automated delivery of new and conventional banking products and services directly to customers through electronic, interactive channels (Kirk 2009).

According to Nathan (2019), electronic banking services have provided numerous benefits for both banks and customers. The first benefit for the banks offering electronic banking service is better branding and better response to the market. Those banks that offer such service are perceived as leaders in technology implementation. As a result, they enjoy a better brand image. The other benefits can be measured in monetary terms. The main goal of every company is to maximize profits for its owner and other stakeholders. An estimated cost of providing the routine business of a full-service branch in USA is $1.07 per transaction, as compared to 54 cents for telephone banking, 27 cents for ATM banking and 1.5 cents for internet banking (Allen and Hamilton 2002).

Commercial banks in Ghana have for the past years changed their banking style to more sophisticated electronic banking and almost all commercial banks in Ghana have in one way adopted an easy banking for all practices. For many people, electronic banking

means 24-hour access to cash through an automated teller machine or direct deposit of pay cheques into current or savings account (Federal Trade Commission, 2014). Electronic banking is fast growing and the application of information and communication technology concepts, techniques, policies, and strategies to banking services has become a subject of importance and concerns to all banks and also a prerequisite for local and global competitiveness (Federal Trade Commission, 2014). Electronic banking uses computer and electronic technology in place of cheques and other paper transactions (Tharanikaran, Sritharan & Thusyanthy, 2017).

Why the sudden increase in electronic banking in Ghana? There is continuing financial deepening of the Ghanaian banking sector with the sector always rising to the occasion on new developments in the global financial markets (Tharanikaran, et al., 2017). Many of the commercial banks are now venturing into complex financial products and electronic banking is one of the effective and efficient ways of engaging and promoting such services (Schaechter, 2002). Electronic banking makes it possible to offer banking services around the world 24 hours a day (Schaechter 2002).

Federal Reserve Bank (2006) also posited that while relationship banking may still be a valid part of today's business model, evolving electronic banking technologies reduce consumers' dependence on personal interactions and that electronic banking processes such as direct deposit, automatic withdrawals and online banking, enable bank customers to obtain services from their financial service providers without entering the banking hall.

The International Monetary Fund (2001) pointed out that the digitalization of transactions can reduce costs for banks and increase efficiency. Electronic banking increase transparency and can lead to higher competition among banks, and most

important thing through lowering cost, penetrating new markets and expanding the geographical reach. Commercial banks in Ghana have also maintain certain standards with respect to electronic banking in the world. The growing trend of electronic banking in Ghana needs to be examined thoroughly. Bakare (2015) observed that the global banking industry has undergone tremendous changes with the introduction of information technology and stated that electronic banking is a new paradigm in banks' product and service delivery and wonder the effect of information and communication technology on the performance of banks in general.

Bakare (2015) further pointed out that online banking which is one of the components of electronic banking has become the preferred way for many Ghanaians to conduct financial activities. Muhammad (2016) observed that electronic banking may also not be a substitute for bank offices because, although many financial transactions can be conducted via online banking, a large percentage of the Ghanaian population still chooses not to use electronic banking technologies.

Schaechter (2002) stated that the dependence on technology for providing services with the necessary security, and the cross-border nature of transactions involve additional risks for banks and new challenges for banking regulators and supervisors. Despite the growing trend in electronic banking in Ghana, the challenges also keep on increasing. Hussain and Muhammed (2016) stated that issues such as security, network failures, non-technical staff and technological drawbacks are some of the difficulties which confront electronic banking services. Tharanikaran et al. (2017) did a survey on the Ghanaian banking industry and pointed out that commercial banks are not as well prepared for the surprises that maybe sprung by technologies.

Over the past five years, electronic banking products have transformed the financial services industry. The use of electronic banking products has become more widespread and while some electronic banking methods appear to be reaching maturity in the advanced world, others are still gaining ground in Ghana. Some of the electronic products used by commercial banks in Ghana include but not limited to internet banking, debit cards, automatic payments machines, and direct deposit (Bank of Ghana, 2015). The Ghana banking industry is fast growing and saturated comprising more than 25 universal banks. The application of technological innovation aimed at improving delivery systems in the country has been embraced within the industry. Technological innovation is fast increasing after the introduction of the gh-link mobile Ghana Interbank Payment and Settlement System (GhIPSS). Almost every Commercial bank in Ghana in one way or the other uses the electronic banking system. Is electronic banking reducing cost and hence improving the performance of commercial banks?

1.2 Statement of the Problem

Banking has traditionally been a brick-and –mortar business that required face-to-face interaction. Customers are required to visit a bank's physical location to complete transactions, such as deposits, withdrawing cash, or applying for loans (Federal Reserve Bank, 2006). From time to time, commercial banks in Ghana are moving from relationship banking to electronic banking.

Majority of banks in Ghana have introduced electronic banking to enhance delivery of service to clients. Hussain and Muhammad (2016) argued that the usage of e-banking significantly affects the customer trust due to unavailability of cyber security. The new way of banking is becoming an important factor in future development of financial services and hence banks should not necessarily adopt electronic banking but should examine its impact on their performance. Addae-Korankye (2014) posited that

electronic-banking has impacted positively on customer service despite the numerous challenges facing electronic banking.

Many of the studies conducted on electronic banking and banks performance rely mostly on descriptive survey with varying conclusions. For example, Hussain and Muhammad (2016) reviewed empirical studies on electronic banking and banks performance and concluded that the survey research design does not significantly test the effect of electronic banking on banks performance. Hussain and Muhammad (2016) findings contradicted Khrawish and Al-Sadi (2011) who found no effect of electronic banking on banks' performance.

Bakare (2015) studied the varying impact of electronic banking and banks performance and concluded that all the reviewed articles had varying conclusions and it is important to examine the effect of electronic banking on banks' performance geographically and industry specific. In his earlier remarks. The study discovered that qualitative research method dominates the reviewed articles and recommended that quantitative research approach should be adopted.

Yahiya (2011) did a case study using SG-SSB Bank Limited to examine the electronic banking on banks performance in Accra. Yahiya (2011) findings suggested that electronic banking enhance customer satisfaction but did not examine its impact on performance. Despite the high risk associated with electronic banking, commercial banks continue to increase their electronic banking products and services. This study examined the impact of electronic banking on the performance of selected commercial banks in Ghana.

1.3 Purpose of the Study

This study examined the impact of electronic banking on the performance of commercial banks in Ghana.

1.4 Research Objectives

The specific research objectives to be achieved were to;

1. examine the relationship between electronic banking and the performance (ROE) of selected Universal banks in Ghana.
2. examine the impact of electronic banking on the profitability(ROA) of selected Universal banks in Ghana,
3. examine the impact of electronic banking on the efficiency of selected Universal banks in Ghana.

1.5 Research Hypotheses

1. $H_0$1 There is no significant relationship between electronic banking and the performance of selected commercial banks in Ghana,
2. $H_0$2: Electronic banking does not have any significant effect on the profitability of selected commercial banks in Ghana,
3. $H_0$3: Electronic banking has no significant effect on the efficiency of selected commercial banks in Ghana?

1.6 Significance of the Study

This study would help commercial banks to intensify their electronic banking if there is positive effect of electronic banking on performance. Also, as more bank customers adopt electronic banking products and services, one would expect the importance of a bank's location to decline and hence promote efficiency. Commercial banks would find it refreshing to be more optimistic in providing more transformation in the electronic

banking services to curb the challenges that relationship banking pose to customers. The study would also help to improve the performance of commercial banks with respect to capital adequacy and electronic banking if it is found to have positive effect on capital adequacy and performance of banks. The study would also contribute to literature and provide insight into electronic banking and commercial banking performance.

1.7 Delimitation of the Study

The study covered fifteen commercial banks in Ghana for a period of five years starting from 2017 to 2021. The study would use panel data from these commercial banks. The fifteen selected commercial banks are the banks that have operated for the past ten years and these can be domestic or foreign banks. The study is also influence by the introduction of the Ghana Interbank Payment and Settlement Systems. The study is basically influence by the Technology Acceptance Theory which explains the significance of the sudden increase in the use of electronic banking in the world. The study is also structured on the model of performance using return on equity and return on assets as the key measure of banks performance. The independent variables will be measured based on empirical evidence and research theories.

The study focused on selected commercial banks in Ghana. Currently there are more than 25 universal banks in Ghana. The study did not include the other banks because they do not have the selected operating years chosen for the study. Balance score card approach analysis was adopted since all the other studies have adopted case study and descriptive survey analyses.

1.8 Limitations of the study

This study relied solely on the financial disclosures provided by the banks of which the researcher does not have control over. Moreover, some of the bank level variables were calculated from the financial statement of banks which also have their own inherent risk such as fraudulent reporting, understatement and overstatement of income and expenses. Due to limited data, the findings of the study will be related to the sampled banks. The data from these financial institutions can be influenced by these inherent risks. To avoid most of this inherent risk, the study used audited financial statements form these banks and also statements send to Bank of Ghana.

1.9 Organization of the Study

This study is grouped into five main chapters. The first chapter provides the general introduction comprising the background to the study, statement of the problem, objectives, research questions and significance of the study, delimitation, limitations and the organization of the study. Chapter two review related literature and also provides information on the conceptual framework, related theory and empirical evidence on the impact of electronic banking on banks performance. The third chapter focuses on the research methods used in the study. It assesses the panel data properties of the variables, model specification, data sources and methods used in analyzing the data. Chapter four concentrates on the presentation of results and discussion. The last chapter which is Chapter five also provides summary account of the main findings of the study, conclusions and recommendations for policy consideration, limitation and provides suggestions for further study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter presents literature on related theories of the research topic and also presents literature that are significant to the study. The chapter is organized as follows; theoretical framework of electronic banking and information system, empirical review, relationship between electronic banking and performance of commercial banks, impact of electronic banking on the performance of commercial banks, impact of electronic banking on the performance domestic commercial banks and the conceptual framework of the study. Finally, a chapter summary is presented to end the chapter.

2.1 Theoretical framework

Concept of Electronic Banking

The Federal Financial Institutions Examination Council (2003), describes electronic banking as "the automated delivery of new and traditional banking products and services directly to customers through electronic, interactive communication channels. Electronic banking includes the systems that enable financial institution customers, individuals or businesses, to access accounts, transact business, or obtain information on financial products and services through a public or private network, including the internet". It should be noted that electronic banking is a bigger platform than just banking via the Internet.

However, the most general type of electronic banking in our times is banking via the Internet, in other words Internet banking. The term electronic banking can be described in many ways. In a very simple form, it can mean the provision of information or services by a bank to its customers, via a computer, television, telephone, or mobile

phone (Daniel, 2014). Burr (2016), for example, describes electronic banking as an electronic connection between bank and customer in order to prepare, manage and control financial transactions. Electronic banking (e-banking) has been purported by academic and practitioner-oriented literature as one of the means in which ICTs can and is impacting the banking sector (Boateng & Molla, 2009; Bradley & Stewart, 2003; Gurau, 2002; Shih & Fang, 2004). Electronic banking has allowed banks and financial institutions to provide services by exploiting an extensive public network infrastructure (Ternullo, 1997).

Electronic banking in Ghana (current development)

Internet banking (e-banking) refers to the use of the internet as a delivery channel for banking services (Frust, Lang, & Nolle, 2000). When first introduced, internet banking was used mainly as an informational medium in which banks marketed their products and services on their websites. Now, customers can access traditional banking services such as balance enquiry, printing statements, fund transfers, bills payment and electronic bill presentation and payment. Customers benefit from being able to execute their banking business whenever and wherever they have access to the internet.

The evolution into the internet and electronic banking era is set to be the most fundamental transformation that the banking industry would have ever had to undergo. E-banking services and products distribution ranges from different values through electronic channels. There is continuing financial deepening of the Ghanaian banking sector with the sector always rising to the occasion on developments in the global financial markets (Tharanikaran, et al, 2017). Many of the bankers consider that technological factors will have the greatest influence on the future business of banking. Key drivers of informing decisions about the industry uptake and deployment of

technology for the provision of banking services will be increasingly wealth, demand for convenience, cost –efficiency, and increased banking penetration.

Pursuant to the mandate of the Bank of Ghana under the Payment Systems Act 2003 (Act 662) to promote and supervise electronic and other payment, funds transfer, clearing and settlement systems and exercising its powers under section 51 (A) (3) of the Banking Act, 2004 (Act 673) and section 4(1)(d) and (e) of the Bank of Ghana Act 2002 (Act 612), the Bank of Ghana issued some guidelines with respect to electronic banking in Ghana. Continuing technological innovation and competition among existing banking organizations and new entrants have allowed for a much wider array of banking products and services to become accessible and delivered to retail and wholesale customers through an electronic distribution channel collectively referred to as electronic banking. The rapid development of electronic banking capabilities in Ghana carries risks as well as benefits (Bank of Ghana, 2015).

In Ghana, no person shall issue electronic money other than a financial institution regulated under Act 673 and authorized under the new guidelines. Also, any financial institution regulated under Act 673 wishing to issue electronic money shall make an application to the Bank of Ghana for authorization. Commercial banks in Ghana have been delivering electronic services to consumers and businesses remotely for years. Electronic funds transfer, including small payments and corporate cash management systems, as well as publicly accessible automated machines for currency withdrawer and retail account management and some of international best practices that have been currently adopted in Ghana. The use of the world-wide acceptance of the internet as delivery channel for banking products and services provided new business opportunities for banks as well as services benefits for customers.

2.1.0. Technology Acceptance Theory

Electronic banking is said to be influenced by the Technology acceptance theory. Technology acceptance theory was developed by F. D. Davies in 2014 following his terminal paper on technology and innovations. The idea about the theory was coined to explain further the concept of reasoned action. The significance of the theory was based on the fact that individual behavior is motivated by behavioral objectives and these are functions of an individual's attitude toward the behavior and subjective norms surrounding the performance of the behavior (Surendran, 2012). Davies (2014) emphasized that technology acceptance theory has been used to explain and further scrutinize individual technology acceptance behavior in various types of information systems. The technology acceptance theory has been used to predict use and acceptance of information systems and technology by individual users.

The technology acceptance theory explains two fundamental principles guiding the use of technology in banking today. According to Davies (2014), the two principles are perceived usefulness and perceived ease of use and that these factors are relevant in computer use behaviours. For Davies (2014), peoples' perceived usefulness is the prospective user's subjective probability that using a specific application system will enhance his or her job or life performance while perceived ease of use is the degree to which the prospective user expects the target system to be free of effort (Davies, 2014).

These two factors, according to Surendran (2012) are the most important determinants of actual system use. Why this theory? Davies (2014) stressed further that the wide range of electronic services being employed in transacting businesses are influenced by these two factors which are also affected by external variables such as social factors, political factors and economic factors. The use of technology in banking falls under the

economic factors with the rationale that the attitude to use a particular technology is concerned with the user's evaluation of the desirability of employing a particular information system application. Surendran (2012) pointed out that the technology acceptance theory is one of the most popular theories used widely to explain information usage globally.

The Technology acceptance theory has been widely used to explain the current development in the use of information technology in doing businesses across the globe. For example, their earlier paper, Horst, Kuttschruter and Guttering (2017) explained the theory further and linked it to state department of Netherlands on how the government should serve the public with e-government services. Their argument was that people have accepted information technology as the main basis of doing effective and efficient services as a result the government should implement information technology in their services.

Horst et al., (2017) were not alone, Lui and Arnett (2000) also examined the use of information technology acceptance behavior to initiate an online business which expanded beyond rapidly concluding that people have now accepted the use of information technology as the basic way of doing businesses and providing essential services to clients. Recently, Chovanova (2016) indicated that acceptance and the use of modern technology is a characteristic feature of clients uninterrupted round-the-clock account access, independent of banking business hours and the ability to execute local and international payments directly from the comfort of the home or office leading to reduction in cash handling and transport costs, lowers the risk of theft or accepting counterfeit bank notes, increases speed and enhances the comfort of making payment.

2.2. Social Systems Theory

Social system theory is one of the theories underpinning knowledge and information management. Critical social theory has been applied extensively in information management. The foundation of critical systems approach to organizational studies owes much to the work of Churchman (2011), which was built on foundations laid by Singer, and has been continued by Ackoff and other adherents to the systems. For example, in the earlier work, they offered potentials as a way forward for information management. The social system theory tries to provide functionalism from objective to the most subjective margin of paradigm.

They argued that the relevance of this e-banking goes back to the earlier arguments for e-banking as a human-centred domain. Their objectives were to construct a critical systems framework for e-banking. The social system theory further stated that the design and development of information systems has been traditionally dominated by technical, problem-solving approaches when the system to be developed is more user based. The need for discovering the requirements for users seems not to be disputed by information systems developers, but is typically achieved by including a user analysis stage within an existing problem-solving approach.

This approach, according to Shah and Clarke (2019) is inherited from computer systems development, which relies primarily on the systems development life cycle. That is to say that the system theory requires stage by stage completion of e-banking. Based on this theory, a number of methodologies have been developed to adhere to these principles, through which information systems development is perceived largely as a technology-based, problem solving, engineering task, geared to engineering the best solution to meet a given requirement specification within the known or anticipated

constraints. The intuition of this theory was that information systems as a purely technological domain is an inadequate one. Such a perspective reduces the complexity of the system and attempt to define it in terms of rules and procedures by which given inputs can be turned into predictable output.

2.3. Empirical Review

The use of electronic banking among commercial banks and its significant among the performance of banks have been studied differently and widely across the globe. Previously, banking in the world use to be the normal manual style of banking with too many human interfaces. This type of banking for example has been said to have delayed banking services and also inefficient. The fast-advancing global information infrastructure including information and communication technology enable the development of electronic commerce at a global level. This transformation of business from an old to a new agile electronic corporation (banks) is not easy and requires a lot of innovative thinking, planning and investment (Shah & Clarke, 2019). There have been significant developments in the e-banking services in the past 30 years and until the early 1970s functional demarcation was predominant with many regulatory restrictions with heavy reliance on traditional branch-based delivery of financial services and little pressure for change (Shah & Clarke, 2019). Over the years commercial banks in the world and for that matter Ghana have improved their services with current development and the welcoming of electronic banking services. Majority of the studies conducted in the era of vast growing electronic banking have varying views with the adoption of electronic banking in Ghana. The section particularly reviews empirical studies based on the research objectives and the research questions and also tries to review it geographically.

2.4. Relationship between electronic banking and profitability of banks

Sadekin and Shaikh (2016) conducted a study on the electronic banking with respect to banks' profitability in Bangladesh. They used a survey research design and purposive sampling and tried to establish the relationship between profitability and electronic banking. Sadekin and Shaikh (2016) found a positive association between electronic banking and banks' profitability. Their study also indicated that, ATM booths in Bangladesh were not situated in a safe space.

In India, Ranjan, Bhalala, Parul (2014) also conducted a similar study on electronic banking relationship with profitability of banks, Rajan et al. (2014) concluded that electronic banking enhanced the profitability of banks suggesting that there is a significant positive relationship between the two variables. The different between the two studies was that, Sadekin and Shaikh (2016) used survey research designed, but Ranjan et al. (2014) adopted an explanatory design and a balance score card approach analysis. The inherent advantage of the two studies is that e-banking save time and magnificent efficiency leading to commercial banks performance. Turning the attention to the UK, Ahmed, Razaul and Rahman (2015) examined the impact of electronic banking on banks' performance adopting review of related literature on banks' performance and electronic banking. Their study was aimed at literatures regarding the impact of electronic banking on banks' performance. They later concluded that banks' performance and electronic banking have some sort of relationship but such relationship differ in significance. While majority were pointing toward positive relationship, others found no significant relationship and with few concluding on a negative relationship. Ahmed et al (2015) suggested that electronic banking has huge impact on consumer satisfaction which necessitates an improvement in banks' performance.

Also, Halili (2014) stated that the adoption of online banking is negatively related with three bank performance indicators such as return on equity, return on asset and net margin (net profit percentage). Halili (2014) employed data from 22 commercial banks in the UK and did a cross-sectional analysis which resulted with three banks having their electronic-banking showing a negative relationship with the profitability of the said banks. In elsewhere China, Wang and Wang (2015) used personal interview style to collect data from commercial banks in China. Their results showed that the internet is a convenience tool available for efficient banking in the country and later concluded that the internet has an important positive relationship with banks' profitability. With the varying views and methods used to achieve these results suggest that electronic-banking is an important variable in banks' profitability.

In Sub-Saharan Africa various studies have also been conducted following the emergent of electronic banking in some of Africa emerging markets. Okoro (2014) study revealed that there is no significant relationship between electronic banking and the performance of the Nigeria economy. He however, suggested that the insignificant contribution of electronic banking to the economy might due to user ignorance. Okoro (2014) result contradicted the findings of Abdullahi (2012) who emphasized that electronic banking has positive, strong and significant relationship with performance of money deposit banks in Nigeria. Musa, Abubakar and Hassan (2015) also posited that commercial banks performance is directly related to their performance and advised that commercial banks should improve their electronic banking style to improve their performance. Using a cointegration and causality approach, Amu and Nwezeaku (2016) examined the impact of electronic banking on commercial banks, performance. Their results show that POS is not cointegrated with banks' performance.

Drawing our attention to Ghana, Attah-Botchwey (2014) used Ecobank as a unit of analysis to examine the electronic banking challenges and the Ghanaian business environment. He used self-administered questionnaires and his findings showed that electronic banking though has some challenges, has significant relationship with the performance of banks and it was recommended that education on marketing of e-banking products should be encouraged in the bank to attract more customers. On similar studies, Annan and Perkins (2013) followed the technology acceptance theory to examine the factors affecting the adoption of electronic banking in Ghana. Annan and Perkins found that there is no significant association with respect to electronic banking and banks' performance.

Amponsah (2016) also investigated the role of electronic banking in banks growth strategies using United Bank of Africa (UBA) as the reference point for the study. Amponsah (2016) remarks was that the introduction of electronic banking affects and continues to impact on the performance of banks in Ghana. In his study, he asserted that the bank has recorded significant growth in revenue and overall profitability since the e-banking products and services were introduced by the bank. This conclusion means that electronic banking has significant relationship with the performance of UBA. Amponsah (2016) used both qualitative and quantitative approaches by collecting data using structured interviews and questionnaires. Following the literatures reviewed on electronic banking and profitability of banks, the debate still ranges on as to whether electronic banking has some sort of relationship with banks' profitability. There are lot of varying results and more researches needed to be conducted.

2.5. Impact of electronic banking on the profitability of banks

The impact of electronic banking on the profitability of commercial banks has also been examined across the world. Scholars who have examined the relationship between electronic banking and banks' profitability have also gone to the extent of examining their impact on the profitability of banks. For some of the studies, though they may exist some kind of relationship, its effect on the profitability on banks cannot be established significantly. In Asia, Ehsan and Kamboh (2016) multiple regression analysis revealed that electronic banking components such as point of sales transactions, call centre banking transactions and automated teller machines transactions had significant relationship with return on assets used as a measure of profitability. On their impact on profitability, point on sale transactions and mobile banking transactions revealed a positive effect on profitability while automated teller machines transactions, however, showed a negative effect on profitability.

Bakare (2015) did a simple review of research methodologies used to examine the impact of electronic banking on banks performance. In his conclusion, Bakare (2015) stated that the various methods used to examine such impact have some limitations and insisted that most of the recent studies should focused on how to use both qualitative and quantitative design in arriving at their results since one of the approaches dominate the various studies.

Kagan, Vinod, Rao and Acharya (2015) used a structural equation model to develop an online banking index and the index was used in an econometric model to examine whether the index explains differences in community bank performance. Kagan et al. (2015) findings revealed that banks that provide extensive online banking services tend to perform better than those who lag behind and that online banking helps community

banks improve their earnings ability as measured by return on equity and improve asset quality by reducing the proportion of overdue or under-performing assets.

Dinh, Le and Uyen (2015) measured the impact of internet banking which is also a component of electronic banking to bank performance taking evidence from Vietnam. Dinh et al. (2015) used random effect model and fixed effect model in attempt to estimate the relationships between internet banking indicators and banks performance. The estimate from the regression model showed that internet banking had an impact on banks profitability through an increase of income from service activities. They also realized that the impact level is very low and had a lag time of over 3 years longer than the findings of Meihami, Varmaghani and Meihami (2017) who had a lag of one year.

Lawrence, Karels and Krishnan (2018) took evidence from the US financial service industry while examining the internet banking services and credit union performance. Lawrence et al. (2018) concluded based on their findings and pointed out that the return on assets show that the credit unions with web accounts have similar average profitability to those credit unions that do not have internet services. Singh and Wadhe (2015) found that there is a positive effect of electronic banking on the performance of electronic banking in India. Singh and Wadhe (2015) study suggested that increase in the number of ATMs affects the profitability positively while branch banking, insignificantly showed a positive effect on the profitability of banks. All the empirical reviewed earlier in this section had their root outside Africa and for that matter Ghana. On the continent of Africa and Sub-Saharan Africa to be specific, scholars have also examined the same impact on banks' profitability. In Kenya, Kombe and Wafula (2015) adopted a descriptive survey design and test the hypothesis of no significant effect of internet banking on the financial performance of Kenyan commercial banks. Their results per their research design used revealed that the adoption of the internet banking

mainly refer to the time reduction, and quality improvements, rather than cost reductions as reported by many authors.

In the same jurisdiction, Ogare (2001) used secondary data from annual report of commercial banks and used descriptive and inferential statistics in his data analysis and found that electronic banking has a strong and significant effect on the profitability of commercial banks in Kenya. His findings further explained that the influence of bank innovations on bank profitability was statistically significant in explaining the profit of commercial banks Kenya.

Olalekan and Ajayi (2016) adopted a census study technique and collected data from 128 top bank management to test the impact of electronic banking on banks' performance. Olalekan and Ajayi (2016) findings showed that the R-squared captured 0.560 of the relationship between automated teller machines, internet banking and mobile banking on the bank performance suggesting the significant effect of electronic banking on banks' performance.

In Rwanda, Ngango (2015) revealed a significant relationship between E-banking and performance of banks and also E-banking contributes to positive effect on the performance of banks as witnessed by bank of Kigali. Ahmad (2015) measured performance of banks by the extent of which customers are satisfied in Nigeria and tried to examine the effect of electronic banking on customers' satisfaction. His findings showed that most customers in Nigeria are fully satisfied with the electronic banking activities organized by the various commercial banks. Ahmad findings also showed that electronic banking activities have some lacking and challenges with respect to delivering customers' services.

Chikochi and Chirima (2016) adopted a different variable to measure performance by using competitiveness of commercial banks and examining the impact of electronic banking on it. Using data from staffs of commercial banks in Zimbabwe, their analysis from descriptive research design revealed that the convenience of e-banking services is the major reason for customer satisfaction and further revealed that ATMs and integrated mobile telecommunication services have improve the performance of banks. Worku, Tlahun and Tafa (2016) did a survey study and concluded that electronic banking has no significant effect on the performance of banks defying the earlier findings explained above.

Worku et al. (2016) study was done using customer satisfaction as the variable for measuring banks performance in the Ethiopian banking industry. Ngoma and Nuwagaba (2014) also investigated the e-banking as a tool improve banking services in Zambia and found that there is no active correlation with electronic banking the improvement of banking services. Electronic banking has been seen to be the most effective and efficient tool of providing better banking services to clients.

In Ghana, few studies have been done in attempt to establish the impact of electronic banking on the performance of commercial banks using secondary data and a panel data analysis. Almost all the reviewed related literature in Ghana have adopted a case study type of analysis for only one commercial bank and their research methods have been the use of descriptive survey method with few trying to do inferential analysis (correlation test).

Ofori-Dwunfuo and Dankwah (2013) provided a literature on the adoption of internet banking in Ghana by reviewing related literature with no statistical test. From their findings, they discovered that there are numerous benefits to the banks in adopting

internet banking just as there are challenges and barriers suggesting that the benefit of electronic banking outweigh the challenges and further encourage banks to adopt internet banking since its affect the performance of banks positively. Reviewing this earlier study, the methodology adopted was simple to review empirical study in other to back the adoption of internet banking in Ghana.

Mensah (2012) did a case study analysis using Guaranty Trust Bank Ltd and examine the adoption of electronic banking in Ghana. Mensah's findings indicated that electronic banking adoption was a business strategy taken by the banking industry in attempt to improve performance and efficient delivery of services. The study further pointed out that their tremendous benefits such as revenue generation, improvement in productivity and efficiency in services delivery and cost savings were derived from the use of electronic banking. Following the findings of Mensah, it is obvious to conclude that electronic banking has some significant effect on the performance of banks, though he did not test such hypothesis.

Appiah, Frimpong and Domeher (2014) investigated the factors influencing electronic banking in Ghana and its effect on performance using logistical regression. The results amongst other things indicated electronic banking in Ghana has improve the performance of commercial banks in Ghana. Appiah et al later pointed out that commercial banks should focus on designing both useful and easy-to-use e-banking products that will attract potential and existing customers. This means improving the performance of banks.

2.7. Impact of electronic banking on the efficiency of commercial banks

Commercial banks efficiency has been measured by the use of cost to income ratio estimated by commercial banks themselves as part of their quantitative disclosures. While electronic banking has been assessed to have significant effect on their performance, to the best of our knowledge, few statistical tests have been done to test the impact of electronic banking on the efficiency of commercial banks. In Ghana for example, there is no empirical evidence pointing to the fact that electronic banking has some significant effect on the efficiency of commercial banks.

In elsewhere Nigeria, Agwu and Taiwo (2017) published a research paper on the role or electronic banking on operational efficiency of banks in Nigeria. Agwu and Taiwo (2017) objectives was that with proliferation of the internet, coupled with the world increasingly addicting to electronic banking businesses, there is the need to examine the electronic banking on the efficiency of commercial banks. They used primary data in the form of self-administered questionnaires to staff of selected banks and run a Pearson correlation test to examine the role of electronic banking on the efficiency of commercial banks in Nigeria.

In their findings, Agwu and Taiwo (2017) observed that banks' operational efficiency in Nigeria since the adoption of electronic has improved compared to the era of traditional banking. The improvement was seen in the strength of banks revenue and capital bases as well as the cost of transacting businesses. They later concluded that the introduction of new channels into their e-banking operations drastically increased bank performances and that the more active customers are with their electronic transactions the more profitable it is for the banks. On their methodology, they used descriptive survey research design and questionnaires were the instrument for data collection which

also have some lacks. The current study tries to use secondary data and run panel regression to examine such effect if any. While it is not easy estimating the efficiency of banks, the study used cost to income ratio estimated by the banks as a measure of banks efficiency.

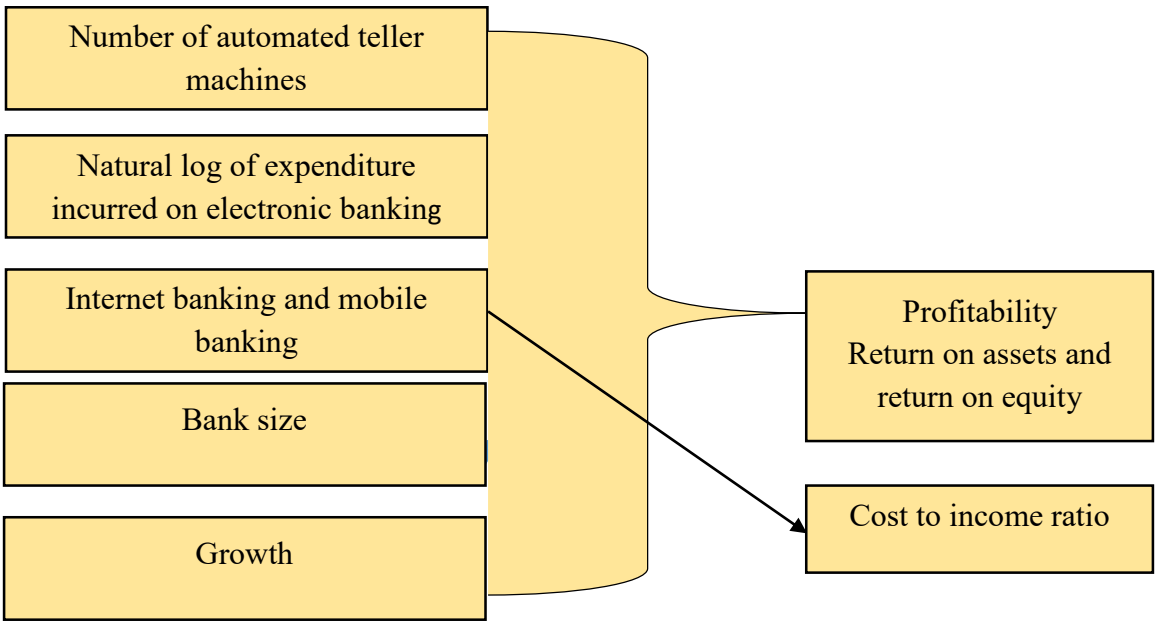
Abbasi and Hans (2017) also did a similar study on the impact of digital financial services on firm's performance and efficiency. They classified the methodologies and approaches that researcher have used to predict the effect of digital financial services on the financial growth and profitability. For, Abbasi and Hans (2017) the various digital financial services provided by banks help them to remain competitive in the financial sector and also assists in increasing market share to grow their profitability and improve financial position. One of the gaps they identified from their review of related literature was that most of the studies conducted used qualitative approach in trying to examine the effect of electronic banking of profitability and efficiency and also stated that the have been little progress in the use of balance score card approach analysis in establishing such effect.

2.8. Conceptual framework of electronic banking and profitability of banks

Electronic banking is the application of computer technology to banking especially payment aspect of banking. Electronic banking has also been defined as a system of banking with an electronic communication network which permits on-line processing of the same day credit and debit transfers of funds between members institutions. Electronic banking has also been defined as a system by which transactions are settled electronically with use of electronic gadgets such as ATMs, POS, and GSM phones etc.

Electronic banking as the delivery of banking products and services to the customers and general public electronically through the use of electronic banking instruments or products like ATM, mobile phones, internet, point of sales and among others. This study strategically uses these definitions as the basis for identifying electronic banking activities of commercial banks. The conceptual framework tries to provide a vivid linear relationship between electronic banking and the performance of banks.

Electronic banking is measured by these variables' natural logarithm of number of ATMs the banks have at a particular year, natural logarithm of the expenditure incurred on electronic banking, IM (internet banking and mobile banking). The other control variables include cost to income ratio, banks' size and growth. The control variables have been tested to have some relationship with the profitability of banks. The cost to income ratio is used to measure the efficiency of commercial banks. The conceptual framework is designed in such a way that all the variables used will have some sort of linear relationship. Profitability of banks is measured by return on assets and return on equity.



Source: Adapted from Worku, Tlahun and Tafa (2016).

2.9. Chapter Summary

This chapter reviewed literature related to electronic banking and banks performance. Two theories were reviewed which have significant influence on the rapid growing of electronic banking in Ghana. These were the technology acceptance theory and the social system theory. The chapter also provided some empirical literature with respect to the research objectives. From the empirical review, it was seen that many of the studies did not find any relationship between profitability and electronic banking. Others to have positive and negative positive relationship, but differ in significance.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the research methods adopted for the study. The accepted research methods used for the study is specified based on this outline: research approach, research design, study population and sample, empirical model, measurement and justification of variables, procedure and method of analysis, and chapter summary.

3.1 Research Approach

This study technically adopted quantitative research approach to help test the null hypotheses to either approve or disapprove it. In the work of Yin (2013), he stated that there are two main research approaches to choose from when conducting scientific research (qualitative or quantitative). Yin (2013) also stipulated that the approach to use depends on the characteristics of the gathered information and that the difference between the two approaches is how numbers and statistics are used. The quantitative approach relies on numbers and statistical data that are presented and crunched into meaningful figures while qualitative approach is not (Marshall & Roseman, 2014).

The current study sought to examine the impact of electronic banking on the profitability of selected banks in Ghana as a result, quantitative research approach could provide better understanding and analytical tools for the achievement of the research objectives. Moreover, the study used research hypotheses which needed to be tested. Also based on the research problem and research hypotheses quantitative research approach is appropriate to help examine the effect of electronic banking on the profitability of the selected banks.

3.2 Research Design

While the research approach is known it is also appropriate to discuss the research strategy or the study design. The study design is based on the research objectives and hypotheses. The current study adopted the explanatory and the descriptive research designs to help test the research hypotheses. The descriptive research design describes the state of affairs as they exist at present. It also formulates the problem for more precise investigation and in this case was to explore the impact of electronic banking on profitability of the selected commercial banks. After the descriptive analysis, the study would further examine the relationship between the variables under investigation as a result the explanatory research design would be used. The explanatory research design is concerned with determining the causal link between variables that pertain to the study (Churchill, 1991). The study is also based on panel data as a result the explanatory research design and the descriptive research design best fit the research approach.

3.3 Study population and sample

The population of the study consists of the 31 commercial banks in Ghana. The number of the banks operational in Ghana were taken from the Bank of Ghana database. As at the year 2016 31 commercial banks had been granted license to operate universal banks in Ghana. Purposive sampling is used to select 20 commercial banks for the study. The selection was done based on the number of years the banks have been in existence. Also, the study selected a period of five years from 2017 to 2021. The period used is appropriate because most of the banks started electronic banking from that period. Hence, the period will provide enough information about the profitability of the banks with respect to electronic banking.

3.4 Empirical model

Inferential analysis was utilized to examine the effects on electronic banking on the profitability of the selected banks. To establish the relationship between the independent variables and the dependent variable a multiple regression approach was used. The linear relationship between the profitability of banks and electronic banking is established based on the empirical findings of previous studies. The study adopted two main dependent variables as a measure of banks' profitability and six independent variables that empirical findings have stated to have significant effect on the profitability of banks. The main independent variables included number of automated machines, natural log of expenditure incurred on electronic banking and a dummy variable of internet and mobile banking. The control variables include cost to income ratio, bank's size, and growth.

The study adopted the model of Khwarish and Al-Sadi (2011) which was a development of Demirguc-Kunt and Huizinga (2014). The model has been used by many scholars in different jurisdictions and context including Saksonova and Solovjova (2011). To examine the impact of electronic banking on the profitability of banks, the model was specified as follows:

$$ROE_{it} = \beta_{0i} + \beta_1 ATMs_{it} + \beta_2 EXP_{it} + \beta_3 IMB_{it} + \beta_4 BKS_{it} + \beta_5 CIR_{it} + \beta_6 GRT_{it} + \beta_7 \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \beta_{0i} + \beta_1 ATMs_{it} + \beta_2 EXP_{it} + \beta_3 IMB_{it} + \beta_4 BKS_{it} + \beta_5 CIR_{it} + \beta_6 GRT_{it} + \beta_7 \varepsilon_{it} \quad (2)$$

The first equation used return on equity as a measure of bank's profitability in the period in questions. The second equation also adopted return on assets as a measure of banks profitability. Banks profitability have been measured by different variables in different studies. The most used variables as measure of banks profitability are the return on assets and return on equity as a result the current study adopted the two variables. ROA

represent return on assets for bank i at time t, ROE also represent return on equity for bank i at time t.

ATM is the number of automated teller machines for bank i at time t, EXP is the expenditure incurred on electronic banking for bank i at time t, IMB represent internet and mobile banking for bank i at time t. This include BKS which is the size of bank i at time t, GRT is the growth of bank i at time t and CIR is the cost to income ratio of bank i at time t. he above stated equation is estimated using balance score card approach estimation techniques via either fixed effects or random effects model which take into account the heterogeneity across banks by allowing variable intercepts.

Table 3.1 provide details of the variables used for the study. Dependent variables are represented by return on equity and return on assets for the first and second objectives. The third objective has efficiency measured by the cost to income ratio of banks as the dependent variable. The main independent variables were automated teller machines, expenditure on electronic banking, and internet and mobile banking. The control variables were growth in interest income, banks' size. The expected signs show the expected relationship between the dependent variables and the independent variables.

Table 3. 1: ***Model variables***

Variable	Explanation	Expected Sign
ROE	Return on equity	Dependent
ROA	Return on asset	Dependent
ATM	Automated teller machine (ln of number of teller machines)	+
EXP	Natural log of expenditure on electronic banking	+
IMB	Internet and mobile banking	+

BKS	Bank' s size (natural log of total assets)	+
CIR	Cost to income ratio	-
GRT	Growth in interest income	+

Source: Author, 2022

3.5 Measurement and justification of variables

3.5.1 *Return on equity*

The return on equity is measured as the net profit of the firm divided by the shareholders' fund. The use of the return on the equity as a performance measurement was appropriate due to the fact that return on equity represents the return that goes to the owners (shareholders) of the firm. The study specifically distinguished it from the return that belongs to the firms than the owners of the firm. Previous study has used this variable as a measure of the performance of the firm

3.5. 2 Return on asset

This is a financial performance variable measure and it calculated as the net profit for the year divided by average operating assets of the firm. The study used this type of variable because several empirical studies have used it. It is said to be one of the measurements of performance otherwise profitability of corporate entities. The same variable was used by the study of Morten et al. (2018) who studied the effect of corporate governance on the performance of firms in the United States. Moreover, the return on assets also measured directly the returns generated form the use of the assets of the business. It is important to understand that firms' performance and corporate governance can be associated with firms' performance.

3.5.3 Automated teller machines

In Ghana, ATM is the extensive and most widely utilized e- banking services. The ATM has been the most successful delivery medium for consumer banking in this county. Customers consider it as important in their choice of banks. An automated teller machine or automatic teller machine (ATM) is an electronic computerized telecommunications device that allows a financial institution's customers to directly use a secure method of communication to access their bank accounts, order or make cash withdrawals (or cash advances using a credit card) and check their account balances without the need for a human bank teller. It is a component of electronic banking and this study uses the natural log of the number of teller machines as the measure of electronic banking.

3.5.4 Expenditure on electronic banking

Every year commercial banks publish their annual reports with new innovation and ways of making banking easier for everyone. From the counter cash carrying transactions to cashless transactions, banks do incur some cost/expenditure in providing innovative services to customers. In other to know that cost of providing electronic banking to customers actually have effect on the profitability of banks, this study uses natural log of the expenditure/expenses that banks incurred on electronic banking to measure expenditure on electronic banking. The use of natural log is preferable because the coefficients on the natural log scale are directly interpretable as approximate proportional differences.

3.6 Internet and mobile banking

This variable is measured on a rating scale of three and from zero to three in a particular year under consideration within the study period as explain below;

Electronic banking indicators	
No internet and mobile banking	0
Has either internet banking or mobile banking	1
Both internet and mobile banking	2
Telebanking, internet and mobile banking	3

3.7 Cost to income ratio (efficiency)

Cost to income ratio is important for determining the profitability of a bank. The ratio gives clear view of how efficiency the bank is being run- the lower the ratio, the more profitable and efficient the bank and vice versa. Changes in the ratio also highlight potential problem- if the ratio rises from one to the next, it means that costs are rising at higher rate than income. Thus, there is inverse relationship between the cost-to-income ratio and banks profitability. Knowing the important of the cost-to-income ratio and banks profitability, this study measure cost-to-income ratio by dividing the operating expenses by the operating income generated that is, net interest income plus other income.

3.8. Bank's Size

This study uses natural log of total assets of banks to measure their size. The size of firms is measured by the use of a natural logarithm of the total asset of the companies and others use log of sales as a measure of firm size. The use of logarithm enables us to obtain the real total assets of the firms due to its capabilities to standardize values thus, bringing them on the same platform for a more efficient analysis to be done. The relationship between firm size and profitability is expected to be positive.

3.9. Growth (GRT)

Many business executives seeking to create shareholders' value also rely on intuition in selecting statistics. The metrics companies use most often to measure, manage, and communicate results often called key performance indicators including financial measures such as sales growth and earnings per share growth in addition to non-financial measures such as loyalty and product quality. All these are in connection help in achieving the value of the firm. This study uses changes in interest income as a measure of growth.

3.10. Data and Data Collection Procedures

The sample of this study is 20 banks operating as universal banks in Ghana. The population of this study is specifically selected because the main objective of the study is to examine the impact of electronic-banking on the profitability of the selected commercial banks. Under the secondary source, the data were collected from the published financial statements of the sampled banks covering the period of five (5) years (2017-2021). The period is selected for two reasons. Firstly, this is the period when electronic banking industry experienced tremendous reforms. The data were calculated using Microsoft Excel to remove human errors. The data were also organized in excel to filter out incomplete figures and also remove extreme numbers that may distort the analysis and the interpretation of the results.

3.11. Procedure and Method of Analysis

The analyses of the data were based on the research questions and the research objectives of the study. The panel data were first tested for the stationarity or panel unit root test. Levin, Lin and Chu (2002) used a pooling cross-section time series data for testing the unit root hypothesis. The degree of persistence in individual regression error,

the intercept and trend coefficient are allowed to vary freely across individuals. The study also employed Pearson correlation test to determine the degree of relationship between the variables. To estimate the effect of electronic banking on profitability, the study adopted the ordinary least square methods. To overcome some of the limitation of the ordinary least square methods, Huasman (2004) specification test was run to choose between fixed and random effect estimation. The results of the analyses were presented in tables and graphs and then discussed. Table 3.2 summarizes the analytical procedures.

Table 3.2: ***Research objectives, research hypotheses and test method adopted***

Research Objectives	Research Hypotheses	Test Method
Examine the relationship between electronic banking and the profitability of banks.	There is no significant relationship between profitability and electronic banking of banks?	Pearson correlation test
Examine the effect of electronic banking on the profitability of commercial banks in Ghana.	Electronic banking has no significant effect on the profitability of banks?	Ordinary least square regression test
Examine the impact of electronic banking on the efficiency of banks	Electronic banking has no significant impact on the efficiency of banks	Ordinary least square regression test

Source: Author, 2022

3.12. Chapter Summary

The methodology of the study was presented in this chapter. The study used a quantitative research approach and an explanatory research design in attempt to test the research hypotheses. The chapter also identified the empirical model with the variables to be tested. Finally, the data and the test analysis for each of the research objectives

have also been stated in this chapter. More importantly, the chapter provided a description of the research methods employed to achieve the research objectives.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter highlights the analysis and presentation of the data and also discusses the research findings. The chapter is grouped into sections according to the research objectives. The first section discusses the descriptive statistics of the data which is the univariate analysis of the variables. The second section also throws light on the first objectives of the study which is the examination of the relationship between the variables also known as the bivariate analysis (relationship between electronic banking and the profitability of selected commercial banks in Ghana). The third section focuses on the diagnosis of the empirical equation before examining the impact of electronic banking on the profitability of banks. The fourth section also examines the impact of electronic banking on the efficiency of commercial banks. The chapter is then concluded by a summary of the entire discussion.

4.1. Descriptive Statistics

Univariate analysis is done to examine the individual variables used for the study. The analysis focused on the central tendency, the variation among and within the variables, consistency and the skewness of the variables. Table 4.1 provides the summary of the descriptive analysis. From Table 4.1, the main independent variables are automated teller machines (ATM), internet and mobile banking (IMB) and expenditure incurred on electronic banking (EXP). Bank size, growth, cost to income ratio are the control variables while return on equity and return on asset are the main dependent variables used to measure profitability of the selected banks. The use of these variables and their

measurement was as a result of the empirical review and the research gap identified by the current study.

Table 4.1: Descriptive statistics of the variables

Variables	ATM	BKS	GRT	ROA	ROE	CIR	IMB	EXP
Mean	3.527	21.269	0.389	0.032	0.197	0.593	2.800	13.61
Median	3.520	21.370	0.340	0.040	0.220	0.530	2.000	13.920
Maximum	5.260	22.810	1.260	0.070	0.490	1.470	3.000	17.850
Minimum	1.110	19.230	-0.160	-0.040	-0.570	0.310	1.000	8.720
Std. Dev.	0.979	0.803	0.260	0.0238	0.178	0.217	0.240	1.895
Skewness	-0.904	-0.613	1.168	-0.895	-1.459	1.572	0.142	-0.155
Kurtosis	3.774	2.999	4.809	3.661	6.505	5.969	0.321	2.859
Observations	83	83	83	83	83	83	83	83

Source: Field Survey (2022)

From Table 4.1 return on asset showed an average of 0.032 which represent 3.2 percent while return on equity recorded an average of 0.197 which also represents 19.7 percent. Profitability of banks in Ghana is still below an average of 5 percent when return on asset is used and 20 percent when return on equity is used to measure profitability. Potential investors and existing investors who are much interested in the performance of banks will focus on these two variables in assessing the profitability of banks. Return on equity and return on asset have been used widely to assess the performance of corporate entities. For instance, Abdullahi (2012) used these variables to measure the performance of banks in Nigeria, Dogarawa (2006), in Zaria also adopted the use of return on asset and return on equity to measure banks profitability and Zakaria (2006) in Jordan, also assessed the role of the electronic banking services on profitability of Jordanian banks.

Putting emphasize on profitability, return on assets recorded a minimum of negative 4 percent. This explains the fact that during that period the bank made a loss and as a result reported a negative return on assets. During the same period under examination, maximum return on asset was 7 percent indicating a wide variation within the variables. Return on equity also showed a maximum of 49 percent and a minimum of negative 5.7 percent. Profitability of the selected banks seems to be low as compared to banks in Nigeria. Banks profitability deteriorated during the 2015/2016 financial year (Bank of Ghana, 2016). The reasons Bank of Ghana (2016) were the power crisis, increasing non-performing loans and deteriorating asset quality of banks. While it is evidence that banks profitability depends on their asset quality, many empirical studies have also advocated for the role of innovation and technology in banks efficiency and profitability. This study adopted return on asset and return on equity to make it possible to examine the effect of electronic banking on the profitability of the selected banks.

Electronic banking variables were measured by the use of natural log of the number of automated teller machines, the use of internet banking and mobile banking and the natural log of expenditure incurred on electronic banking. From Table 4.1, the average number of automated teller machines is 3.527 which represent 34 in number as per the number of branches with automated teller machines. The average number of 34 indicate that banks still need to increase their number of automated machines to support the financial inclusion advocates. While the average is 34 the maximum is 192 automated teller machines. Banks do not always use automated teller machines, but internet and mobile banking have also been introduced. As at the date of this study, almost all the selected banks use both internet and mobile banking which is the main innovative banking exercise. There is no bank in Ghana who still do not use internet banking and mobile banking.

Following the introduction of Ghana Interbank Payment and Settlement System (GIPSS), banks have improved their electronic banking services and it is time to examine their impact on their performance. What banks have to also be careful of is their expenditure they incur in attempt to make implement electronic banking. Though expenses on electronic banking in absolute terms might have some negative association on banks profitability, the current study is of the view that, an efficient management of such expenditure can improve the performance of banks (Ehsan & Kamboh, 2016; Dinh, 2015; Dogarawa, 2006).

The study also used control variables such as banks size, growth and cost-to-income ratio. These variables have been tested to have some significant effect on the profitability of banks. Cost-to-income ratio showed an average of 0.593 which is 59.30 percent. The implication of this is that among the banks, their operational cost as a percentage of the net income is 59 percent within that period.

However, the minimum is 0.310 which is 31 percent. What this suggests is that a 31 percent cost-to-income ratio signals the efficiency of that bank. The bank was able to reduce its operational cost. A maximum of 1.47 which is 147 percent indicate the level of inefficiency of such bank. While it is important to examine banks efficiency on their performance, it is also important to test the effect that banks' size have on the profitability of banks. Bank size is measured by the use of natural log of total assets of banks and the average is 21.269 which represent GHS1,725,874,991.00. Banks in Ghana are gradually improving their sizes as indicate by Bank of Ghana (2016) financial stability report.

Relationship between electronic banking and profitability

The first objective of the study is to examine the relationship between electronic banking and profitability of banks. The main electronic banking variables are automated teller machine, internet and mobile banking and expenditure incurred on innovation and electronic banking. Addae-Korankye (2014) studied the impact of electronic banking on customer service and profitability of banks in Ghana descriptive survey analysis.

Addae-Korankye (2014) stated that electronic banking in Ghana has improved the performance and profitability of banks. The respondent who are 80 percent of the staffs believed that electronic banking has increase the performance of banks. This implied that electronic banking has positive relationship with profitability of firms. From Table 4.3, automated teller machines recorded a coefficient of 0.249 and very significant (0.022) with return on asset and 0.369 (0.000) with return on equity. The relationship is positive which confirm the findings of Addae-Korankye (2014). The implication of this finding is that banks which increase their automated teller machines are likely to increase their profitability, all other things being equal.

Abaenewe, Chibueze and Osondu (2013) examined the impact of electronic banking on the performance of Banks in Nigeria. Unlike Addae-Korankye (2014), Abaenewe et al. (2013) used continuous variables such as return on assets, return on equity and the number of teller machines in their analysis. From their findings, they recommended banks operations are improved by the adoption of automated teller machines because they found a positive association between return on assets, return on equity and automated teller machines. The findings of Abaenewe et al. (2013), Nkem and Akujinma (2017) and Addae-Koramkye (2014) attest to the fact the automated teller

machines improve the profitability of banks thus confirm the findings of the current study.

Not only in Ghana and Nigeria that automated teller machines have improved the profitability of firms, Abbasi and Weigand (2017) adopted a literature review to determine the impact of electronic banking and firms' performance and concluded that during the last ten years, digital financial services have been predicted to have a positive effect on the profitability of banks and on their financial growth. The current result of the study accepts the alternative hypothesis that electronic banking has a positive relationship with the profitability of banks measured by the use of return on assets and return on equity.

Internet banking and mobile banking are also determinants of electronic banking. The use of internet and mobile banking as electronic banking variables was also used by Ankrah (2016) when he did a case study using United Bank of Africa Ghana Ltd. Ankrah (2016) hypothesis was that there is no relationship between the performance of the bank and e-banking products which internet and mobile banking were the variables and found that the bank has recorded significant growth in revenue and overall profitability since the e-banking products and services were introduced by the bank.

Ankrah (2016) findings were limited to only the United Bank of Africa, but this current study also finds a significant positive association between internet and mobile banking on the profitability of the selected banks. From Table 4.3, IMB showed a positive and significant relationship with profitability (return on equity), with a coefficient of 0.319 and a statistical significance 0.015, the study confirms that there is a significance positive relationship between profitability and mobile and internet banking. The study

also discovered that return on asset also has significant relationship with internet and mobile banking.

Nuamah-Gyambrah and Offei (2016) posited that internet banking brings efficiency in the operations of the bank, Ghana Commercial Bank, Koforidua and that satisfaction brought about by internet banking has improved the performance of the branch. Again, Nuamah-Gyambrah and Offei (2016) study was a case one and pertain to the branch of the bank alone. The finding of the current study confirms the study of Nuamah-Gyambrah and Offei (2016) but at broader scope.

One of the indicators of electronic banking is the expenditure incurred on electronic and innovative banking. Following the review of the related literature, there was no study that suggest that the expenditure incurred on electronic banking has significant association with the profitability of banks. The current study adopted a natural log of the total expenses incurred on electronic banking to examine its relationship with profitability of banks. The current study did not find any significant association between expenditure incurred on electronic banking and profitability of banks. With a coefficient of 0.180 and a statistical significance of 0.103, there is no significant relationship between them.

Table 4.2: Correlation matrix of variables

	ATM	BKS	GRT	ROA	ROE	CIR	EXP	IMB
ATM	1.000							
BKS	0.480	1.000						
	0.000	-----						
	-							
GRT	0.055	-0.269	1.000					
	0.619	0.013	-----					
ROA	0.249	0.322	0.093	1.000				
	0.002	0.002	0.401	-----				
ROE	0.369	0.378	0.075	0.924	1.000			
	0.000	0.000	0.494	0.000	-----			
	-							
CIR	0.207	-0.256	-0.167	-0.825	-0.832	1.000		
	0.059	0.019	0.129	0.000	0.000	-----		
EXP	0.167	0.362	0.156	0.173	0.180	-0.253	1.000	
	0.125	0.000	0.158	0.117	0.103	0.020	------	
IMB	0.121	0.342	0.081	0.124	0.319	0.114	0.082	1.000
	0.087	0.000	0.145	0.051	0.015	0.094	0.104	------

Source: Field Survey (2022)

The current study also examined the relationship between profitability and banks size, cost to income ratio and growth in interest income. Return on assets recorded a positive coefficient of 0.322 and p-value of 0.002. In relation to the s size of the bank, also influences the profitability of banks. The positive relationship shows that as banks increase in size (total assets), their performances are likely to increase. Apart from banks' size, banks efficiency also contributes to their performance. From Table 4.2, cost to income ratio is negatively related to the profitability of firms and direct. The

implication is that as banks cost to income ratio increases, the profitability of banks decreases.

This finding is one of the studies that has found a significant negative relationship between cost to income ratio and profitability. According to Bhaduri (2002), Titman and Wessels (2017), size of a firm is one of the main factors while devising profitability of the firm, especially when financing decisions are taken after the consideration of transaction costs. There exists a positive relation between size of a firm and profitability. The results of Rajan and Zingales (2015) are indicating that there is positive relation between size and performance. The large firms can easily raise their funds and hence can support electronic banking to improve their performance when compared to small firms.

The study adopted an ordinary least square regression to test for the second and third objectives. As one of the requirements for least square regression, it is important to test for the stationarity of the variables used in the model. The stationarity or otherwise of a series can strongly influence its behavior and properties. If the variables in the regression model are not stationary, then it can be proved that the standard assumptions for asymptotic analysis will not be valid. In other words, the usual t-ratio will not follow a t-distribution, so we cannot validly undertake hypothesis tests about the regression parameters. Hadri developed a more comprehensive theory of unit root for stationarity

Hadri test that a variable has a no unit root (stationary). The null hypothesis is that the variable contains a no unit root and the alternative is that the variable was generated by a stationary process. The current study accepted the null hypothesis of no unit root and reject the alternative hypothesis of unit root at the levels. To lay emphasize on the test,

the data are stationary and fit for the analysis. The interpolated critical values differed because of the sample size. Because the data are stationary, the ordinary least square estimation technique can now be used to examine the effect of electronic banking on the profitability of banks in Ghana.

4.2 Hausman specification test

Kabaila, Mainzer and Farchione (2015) posited that in the analysis of panel data that include a time-varying covariate, a Hausman pretest is commonly used decide whether subsequent inference is made using the random effects model or the fixed effects model. If the Hausman test rejects the null hypothesis of no correlation between the random effect and the time-varying covariate then the fixed effects model is chosen for subsequent inference, otherwise the random effects model is chosen.

Hausman (1978) proposed the Hausman specification test to detect fixed effects in the individual-specific effects model. The general set up can be described as follows: suppose that there are two estimators for a certain a parameter and one of the parameters is robust that is consistent under both the null hypothesis and the alternative, the other is efficient and consistent under the null hypothesis but inconsistent under the alternative hypothesis. The difference between the two is then used as the basis for testing. Hausman (1978) showed that, under appropriate assumptions, under the null hypothesis, the statistics has a limiting chi-squared distribution.

Table 4.3: The Hausman specification test (ROE)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.219	5	0.0602

Source: Field Survey (2022)

Using the Hausman specification test to choose between random effects and fixed effects, it can be said that if there is no correlation between regressors and effects, then the fixed effect and random effect are both consistent, but fixed effect is inefficient, however, if there is correlation, fixed effect is consistent and random effect is inconsistent. Under the null hypothesis of no correlation, there should be no difference between the estimators. Table 6 and Table 7 represent the statistical test results for the Hausman specification test.

Table 6 used return on equity as the dependent variable for the test and from the chi-squared and the p-values, the null hypothesis of no correlation is rejected between the regressors and effects as a result the fixed effect is inefficient and hence, the random effect is accepted for the estimation. Furthermore, when the return on asset was also used as the dependent variable, the current study failed to reject the null hypothesis of no correlation between regressors and effects, hence the fixed effect is also inefficient. Table 7 has the test result of the Hausman specification test.

Table 4.4: The Hausman specification test (ROA)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.094	5	0.5359

Source: Field Survey (2022)

4.3 The effect of electronic banking on the profitability of banks

Okoro (2014) examined the impact of selected e-payment instruments on the intermediation efficiency of the Nigerian economy using a time series data and a multiple regression technique. Okoro (2014) used automated teller machine, mobile and

internet services are the independent variables. Okoro (2014) findings were that, automated teller machine has a significant positive effect on the efficiency and profitability of banks and stated that internet banking and mobile banking are the main instrument used by customers in Nigeria in transacting banking businesses.

Ehsan and Kamboh (2016) also conducted a similar study on the impact of cashless banking on profitability using the Pakistani banking industry. Ehsan and Kamboh (2016) findings were that automated teller machines, mobile banking and internet banking has significant effect on the profitability of banks in Pakistan. The current study also used automated teller machine, internet and mobile banking to examine their impact on their profitability of banks in Ghana.

Table 8 provides details statistical result when return on equity was used to measure banks profitability. Automated teller machines used by banks has significant positive effect on the profitability of banks. With a coefficient of 0.240 and a p-value of 0.010 at a 5 percent significance level, the study failed to accept the alternative null hypothesis that electronic banking as measured by automated teller machines has no significant effect on profitability (return on equity) of banks in Ghana. The implication of the current finding is that, unit increase in the number of teller machines will lead to an increase in the return on equity of the selected banks by 0.240. The impact is positive attesting to the fact that automated teller machines improved the performance of banks by way of increasing their profitability.

Like Ehsan and Kamboh (2016) there is significant positive effect of teller machines on the profitability (return on equity) of banks. Bakare (2015) did an empirical review on the varying impacts of electronic banking on the banking industry and concluded that automated teller machines are one of the factors which is contributing to the

performance and efficiency in the banking industry of emerging markets. Mohammad (2015) findings appeared to be consistent with the current study when he posited that electronic banking (automated teller machines) is one of the most demanded and latest technologies in the world banking sector.

Table 4.5: Random effect estimation the effect of electronic banking on profitability

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.383	0.429	0.887	0.378
ATM	0.240	0.086	2.791	0.010
IMB	0.212	0.071	2.985	0.006
EXP	0.008	0.029	0.300	0.764
GRT	0.169	0.043	3.930	0.000
BKS	0.182	0.041	4.439	0.000
CIR	-0.730	0.073	-9.903	0.000
R-squared	0.867	Mean dependent var		0.197
Adjusted R-squared	0.822	S.D. dependent var		0.178
S.E. of regression	0.075	Akaike info criterion		-2.116
Sum squared resid	0.344	Schwarz criterion		-1.474
Log likelihood	109.815	Hannan-Quinn criter.		-1.858
F-statistic	19.054	Durbin-Watson stat		2.272
Prob(F-statistic)	0.000			

Source: Field Survey (2022)

What about internet and mobile banking? From Table 8, the coefficient of the internet and mobile banking is 0.212 and positive. The positive coefficient implies that there is positive effect from internet and mobile banking to return on equity. Due to this significance findings, the study again fails to accept the null hypothesis that internet banking and mobile banking do not have significance effect on the profitability of the

selected banks. With p-value of 0.006 and comparing it to a 5 percent significance level means that the findings of the current study is so significance that we conclude that internet and mobile banking has significant positive effect on the profitability of the selected banks (return on equity). The implication of this finding is that if banks increase their electronic banking by a unit, it will increase their return on equity by 0.212 holding the other variables constant.

Ofori-Dwumfuo and Dankwah (2013) looked at the benefits in adopting internet banking at a major bank in Ghana. Ofori-Dwumfuo and Dankwah (2013) posited that the development of the internet banking in Ghana is changing the way financial services are provided and that there are numerous benefits to the bank adopting internet banking. The benefits outweigh the challenges and the barriers put together. To some extent Ofori-Dwumfuo and Dankwah (2013) study encouraged other banks to offer internet banking to all of their retail customers in Ghana. Their study was a case study of one bank.

Agwu and Taiwo (2017) study on the role of e-banking on the operational efficiency of banks in Nigeria attest to the current study. Agwu and Taiwo (2017) study observed that banks operational efficiency in Nigeria since the adoption of electronic banking has improved compared to the era of traditional banking. The improvement was noticed in the strength of banks, revenue and capital bases. Their study concluded that the introduction of new channels into their electronic banking operations drastically increased bank performances and that the more active customers are with their electronic transactions the more profitable it is for the banks. Finding a positive effect of electronic banking on the profitability of banks is consistent to the findings of Agwu

and Taiwo (2017) who found similar using banks in Nigeria. It is also very important to assert that banks profitability has a significant relationship with electronic banking.

The study did not use automated teller machines and internet banking and mobile banking as the only electronic banking variables but the expenses or expenditure incurred on providing these services to the public. From Table 8 it can be stated that the expenses that banks incur on electronic banking have no significant effect on their profitability. The study therefore, accept the null hypothesis of no significance effect of electronic banking expenditure on profitability of banks. The study also used growth in interest income, banks size and cost to income ratio to test for their effect on the profitability of banks. Banks' size recorded a coefficient of 0.182 and a p-value of 0.000 indicating that larger banks are more profitable than smaller banks. The implication of the current finding is that when there is a unit increase in bank' size it will lead to an increase in their profitability by 0.182 holding all other variables constant.

Firm size and its effect on profitability and capital structure had been tested by many scholars. For example, in the study of Ahmed et al. (2015), banks size has significant effect on the profitability of banks and Amu and Nwezeaku (2016) did not find any significant relationship between size and performance. The current finding is consistent with Ahmed et al. (2015). Growth in interest income also showed a significant positive effect on the profitability (return on equity) of banks. Another key determinant of banks profitability is their efficiency measured by the use of cost to income ratio.

From Table 8, we can observe that there is a negative impact of cost to income ratio on the profitability of banks. This practically means that as banks cost to income increases, they become inefficient as a result their return on equity reduces. Banks profitability

can be truly associated to their efficiency level and inefficient banks have the tendency of eroding their profit and hence unable to meet competition.

The model for the study is tested for its fitness for the analysis. The F-statistics is the mean square model divided by the mean square residual which is 19.054. The p-value associated with the F-statistics is used to test the null hypothesis that all of the model coefficient are zero. A p-value of 0.000 means that we reject the null hypothesis and accept the alternative hypothesis that all the coefficient in the variables do not sum up to zero. And hence the model is fit for the study. The R-squared is the proportion of variance in the dependent variables which can be explained by the independent variables.

This is an overall measure of the strength of association and does not reflect the extent to which any particular independent variable is associated with the dependent variable. From Table 8, the adjusted R-squared is 0.822. This means that the independent variables explain up to 82.2 percent variation in the dependent variables and that the remaining 17.8 percent is explained by other determinants which were not included in this study. So long as the independent variables explain more than 80 percent of the variations in the dependent variable, the model can be used for further discussion. Following the discussion in this section, electronic banking has significant effect on return on equity used to measure the profitability of bank.

Table 4.6: Random effect estimation of the effect of electronic banking on profitability (return on assets)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.036	0.050	0.718	0.474
ATM	0.211	0.102	2.067	0.050
IMB	0.189	0.041	4.609	0.000
EXP	0.000	0.001	0.701	0.485
GRT	0.103	0.015	6.866	0.000
BKS	0.202	0.029	6.965	0.000
CIR	-0.090	0.008	-10.969	0.000
R-squared	0.640	Mean dependent var		0.018
Adjusted R-squared	0.617	S.D. dependent var		0.018
S.E. of regression	0.011	Sum squared resid		0.010
F-statistic	27.471	Durbin-Watson stat		1.833
Prob(F-statistic)	0.000			

Source: Field Survey (2022)

Return on equity is not the only variable used to measure profitability of firms. Other studies have used return on asset to measure profitability of firms (Abdullahi, 2012; Dinh et al., 2015; Dogarawa, 2006; Denirguc-Kunt & Huizinga, 2014; Halili, 2014; Musa et al., 2015). Currently, Bank of Ghana also uses return on asset to assess the performance and profitability of banks in Ghana (Bank of Ghana, 2016). The current study also used return on assets to measure the profitability of banks. It is advisable to also test the impact of electronic banking on the return on assets of banks in Ghana.

Table 4.6 display the statistical results of the effect of electronic banking on the profitability (return on asset) of banks. From Table 4.6 all the electronic banking variables proved to be significant and positive except the expenditure incurred on these electronic banking activities which was insignificant at 5 percent significant level.

Automated teller machines reported a coefficient of 0.211 at a p-value of 0.050 at a 95 percent confidence level and 5 percent significant level.

The implication for the rejection of the null hypothesis is that that an increase in the number of automated teller machines will increase the return on asset of the selected banks by 0.211 holding all other things constant. The same can be said of internet and mobile banking which recorded a coefficient of 0.189 and a p-value of 0.000 respectively. Testing for the significance of the study at 5 percent significance level, the null hypotheses of both variables are rejected outright, hence internet and mobile banking and automated teller machines have significant effect on return on assets of banks. However, expenditure incurred in providing these electronic banking activities has no significant effect on their profitability.

Kagan et al. (2015) did study on whether internet banking affect the performance of community banks. A structural equation model was used to develop an online banking index and the index was included in an econometric model to examine whether the index explains differences in community bank performance. The result show that banks that provides extensive online banking services tend to perform better than those who lag behind. Internet banking help community banks improve their earnings ability as measured by return on asset and improve asset quality by reducing the proportion of overdue or under-performing assets.

Following the study of Kagan et al. (2015), the current study also concludes on the basis that electronic banking affects the profitability (return on asset) of banks. Ogare (2001) also used return on asset to measure banks performance in Kenya and tested the impact of electronic banking on return on assets of the banks. Ogare (2001) study concluded

that automated teller machines, online banking and mobile banking has a strong and significant effect on the profitability of commercial banks in Kenyan banking industry.

Thus, there exists a positive relationship between e-banking and bank performance. The significance test showed that the influence of bank innovations on bank profitability was statistically significant meaning that the combined effect of the bank innovation explains the profits of commercial banks in Kenya. Kagan et al. (2015) and Ogare (2001) were not alone on these findings. The current study also finds that automated teller machines, internet and mobile banking has significant positive effect on the profitability (return on asset) of banks.

The study also used growth in interest income, bank's size and cost to income ratio as control variables to assess their impact on the return on asset of the selected banks. All the control variables were significant in terms of their effect on the performance of banks. Apart from cost to income ratio which showed a negative effect on return on assets the other variables reported a significant positive effect on the profitability of banks. The independent variables also ended up explaining up to 64 percent in the variation of dependent variable (return on asset). This was seen from the R-squared coefficient of 0.640 and the adjusted R-squared of 0.617. The F-statistic of 27.471 and p-value of 0.000 means that the null hypothesis that all of the coefficients are zero is rejected and the alternative hypothesis is accepted.

4.5 Effect of electronic banking on the efficiency of banks

Mensah (2012) did a case study using GT Bank and the result of the study indicated that electronic banking adoption was a business strategy taken by the bank in response to customer needs and the changing marketing trends in the banking industry of Ghana and that the benefit of electronic banking which include revenue generation,

improvement in productivity and efficiency in service delivery and the cost savings were derived from electronic banking. Mensah (2012) study shows that electronic banking has some significant effect on banks efficiency.

Nkem and Akujinma (2017) did a similar study on the financial innovation and efficiency on the banking sub-sector in Nigeria from 2006 to 2014. Their study evaluated the relationship between financial innovation and bank efficiency as well as the impact of financial innovation on the efficiency ratio of banks in Nigeria. The third objective of the current study was developed following the gap in Mensah (2012) study which used survey study and open questionnaires for the analysis.

To test for the effect of electronic banking on the efficiency of banks in Ghana, the study used ordinary least square estimation technique. The null hypothesis was that electronic banking has no significant effect on the efficiency of banks in Ghana. From Table 4.6 it is evidence that automated teller machine has significant negative effect on the efficiency of banks. With a coefficient of negative 0.167 and p-value of 0.002, it can be stated categorically that automated teller machine has significant effect on the efficiency of banks measured by the cost to income ratio of banks.

The implication of this finding is that an increase in the unit of automated teller machine, will necessitate a decrease in the cost to income ratio of banks (efficiency) by 0.167 holding all other variables constant. The same can be said of internet and mobile banking. A unit increase in the mobile and internet banking activities will lead to a decrease in the cost to income ratio of banks by -0.219. Expenditure on electronic banking however, also proved to be insignificant despite showing a positive effect on efficiency. Banks efficiency which is linked to their profitability can be improved by the electronic banking.

Table 4.7: Effect of electronic banking on the efficiency of banks

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.511	0.713	-2.116	0.038
ATM	-0.167	0.048	-3.479	0.002
IMB	-0.219	0.082	-2.671	0.014
EXP	0.091	0.049	1.847	0.069
GRT	-0.138	0.051	-2.705	0.012
BKS	0.054	0.041	1.305	0.196
R-squared	0.732	Mean dependent var		0.593
Adjusted R-squared	0.645	S.D. dependent var		0.217
S.E. of regression	0.129	Akaike info criterion		-1.037
Sum squared resid	1.037	Schwarz criterion		-0.425
Log likelihood	64.065	Hannan-Quinn criter.		-0.791
F-statistic	8.473	Durbin-Watson stat		1.502
Prob (F-statistic)	0.000			

Source: Field Survey (2022).

Bank of Ghana uses cost to income ratio to measure the efficiency of banks in Ghana (Bank of Ghana, 2016). As part of the quantitative disclosures by banks, they are also required to disclose their cost to income ratio which measured by the operational cost to the net income of banks. The negative effect of electronic banking on efficiency of banks can be explained to the extent that as banks continue to improve and increase their electronic banking activities and services, their average cost to income ratio decreases hence an inverse relationship between cost to income ratio (efficiency) and electronic banking.

Nkem and Akujinma (2017) used a multiple regression model to examine the effect of financial innovation on the efficiency of banks in Nigeria. Like Bank of Ghana, the central bank of Nigeria also measures efficiency of banks by the ratio of total overhead

expenses (operational expenses) against operating income. Nkem and Akujinma (2017) findings revealed the value of transaction on automated teller machines and internet banking were negatively related with efficiency ratio. In their final report they indicated that banks should invest more in ATM as it reduces the operating expenses to the net income ratio. The findings of the current study are in line with Nkem and Akujinma (2017) and Mensah (2012).

4.6 Chapter Summary

The chapter was presented according to the research objectives and hypothesis. From the results and discussion chapter it can be concluded that electronic banking has significant positive effect on the profitability of banks in Ghana. Also, electronic banking has significant negative effect on the efficiency of banks measured by cost to income ratio of banks.

CHAPTER FIVE

SUMMARY, CONCLUSIONs AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the research findings and the discussion of the results. It provides a conclusion to the whole study and finally provided recommendation based on the conclusion of the study. The presentation of the chapter is as follows: summary of findings, conclusions, recommendations and suggestion for further study. The study is organized into five chapters and they all provide information on the effect of electronic banking on the profitability of selected banks in Ghana.

5.1 Summary of the Study

The study focused on three main specific objectives which are to examine the relationship between electronic banking and profitability, the effect of electronic banking of the profitability of banks and the effect of electronic banking on the efficiency of banks in Ghana. The study developed research hypothesis to be accepted or rejected. All the research hypotheses were tested using a 5 percent significance level. Return on equity, return on assets were the main dependent variables used to measure the profitability of banks. Automated teller machines, internet and mobile banking and expenditure incurred on electronic banking were the main independent variables. Based on the findings of previous studies the current study used control variables such as bank's size, growth interest income and cost to income ratio to test for their effect on the profitability of banks as provided by the conceptual framework of the study.

5.2 Summary of Findings

Descriptive statistics was used to examine the central tendency and variation of the variables. The study revealed that return on equity and return on asset had an average of 19.7 percent and 3.2 percent respectively. It was further found that the average internet and mobile banking activities being 1.80 with the maximum of 2 indicating that majority of banks have both internet and mobile banking. Other variables such as ATM had an average of 3.52 and expenditure incurred on electronic banking reporting an average of 13.61. Cost to income ratio also showed an average of 0.593 representing a 59.3 percent of net income. Bank's size also showed an average of 21.269 with growth (38.9 percent). It was found that profitability among these banks is very low as compared to other jurisdictions (Bank of Ghana, 2016). The performance of banks also deteriorated during the 2015/2016 financial due to the power crisis (Bank of Ghana, 2016).

The study also examined the relationship between electronic banking and profitability of banks in Ghana. The findings revealed that there is a significant positive relationship between return on equity and automated teller machines, mobile and internet banking thus confirming the study of Addae-Korankye (2014), Abaenewe et al. (2013). The study also revealed that electronic banking variables showed a positive association with return on assets (Abbasi & Weigand, 2017). The significant relationship found between electronic banking and profitability of banks also support the earlier conclusion drawn by Nkem and Akujinma (2017). Ankrah (2016) hypothesized that there is a significant relationship between electronic banking and profitability of banks and this study also support Ankrah (2016) hypothesis.

The second and third objectives of the study require that the data be stationary before it can be used for the ordinary least square regression. From the study it was revealed that all those variables were stationary paving room for the analysis. The study also used the Hausman specification test to choose between random and fixed effect estimation. The chi-squared statistics and the p-values suggested that the random effect estimation technique be used for the estimation since there is no correlation between the regressors and effects making the fixed effect inefficient.

On the effect of electronic banking on the profitability of banks, the study revealed that automated teller machines have significant positive effect on both return on equity and return on assets. Furthermore, the study revealed that internet banking and mobile banking have significant effect on the profitability (return on assets and return on equity) of banks in Ghana. The however, did not found any significant effect of expenditure incurred on electronic banking on the profitability of banks. The findings of the current study however supported the earlier findings of Bakare (2015), Ehsan and Kamboh (2016), Mohammad (2015). In Ghana, the findings of Ofori-Dwumfuo and Dankwah (2013) and Mensah (2012). It is evidenced that there is a significant effect of electronic banking on the profitability of banks in Ghana.

The third objective of the study was to examine the effect if electronic banking on the efficiency of banks as measured by the use of operating cost to operating income. The study revealed that electronic banking variables such as automated teller machines, internet and mobile banking had negative effect on the efficiency of banks. The study supported the findings of Nkem and Akujinma (2017) who found similar evidence on the effect of financial innovation on the performance of banks in Nigeria. Mensah (2012) findings are also consistent with the current study.

5.3 Conclusions

The effect of electronic banking on the financial performance of financial institutions has been tested since the inception of financial innovation. The majority of the study on electronic banking uses case study analysis and single bank with few doing empirical analysis. Upon the review of the related literature, it was evidence that electronic banking has some effect on the performance of banks but with different significance level.

The current study based its conclusion on the findings of the study and the empirical literature reviewed. Based on the analysis of the data and the discussion of the results thereof the following conclusions are reached; electronic banking (automated teller machines and internet and mobile banking) has significant positive relationship with profitability of banks (return on equity and return on asset). The findings about the relationship between electronic banking and profitability attest to the fact that banks can increase their profitability if they improve their electronic banking services.

The study also concludes on the fact that electronic banking has significant positive effect on the profitability of banks used in the study. Automated teller machines have significant positive effect on the profitability of banks. Also, the study found that internet and online banking has significant positive effect on the profitability of banks. The study also examined the effect of electronic banking on the efficiency of banks (cost to income ratio) and concluded that electronic banking (automated teller machines and internet and mobile banking) has significant negative effect on the efficiency of banks. The negative effect of electronic banking on banks efficiency was due to the fact that as banks improved their electronic banking services, their operating cost to income ratio reduces hence the inverse relationship between them.

5.4 Recommendations

This section provide recommendation to banks based on the research findings and conclusion drawn from the study.

1. Bankers should attempt to increase the number of ATMs across the country since it has significant positive effect on the profitability of banks. Banks should have a clear and widely disseminated strategy that is driven from the top and takes into account the effects of electronic banking, together with an effective process for measuring performance against it. Take into account the effect that electronic banking will have upon their business risk exposures and manage these accordingly. Undertake market research, adopt systems with adequate capacity and scalability, undertake proportional advertising campaigns and ensure that they have adequate staff coverage and a suitable business continuity plan for the improvement of electronic banking since it has a bearing consequence on their profitability.
2. More ATM facilities should be placed at vantage locations within the city to reduce distance and time use in access the facility. It is also recommended that they should reduce the charges electronic banking attracts to lure more customers to patronize the products. It is recommended that prompt transaction onto mobile phones should be introduced to also entice more customers as in other banks. Regardless of the challenges, it is obvious that customers are ready to embrace electronic banking, provided the benefits are well promoted to them and banks are able to resolve system failure issues promptly. It can therefore be concluded from this study that there is a promising future for electronic banking in Ghana to help enhance the profitability of banks.

3. Another implication to managers of banks is that they should concentrate on their corporate websites to make it more user-friendly since that will go a long way to increase customers trust and upsurge their intention to accept internet banking. Generally, it is recommended that government should also improve upon free ICT and internet education and must be incorporated in the educational sector especially at the basic level, since as more people become IT literates the more, they will derive interest in accepting online banking and its related services like online shopping among others.

5.5 Suggestion for Further Studies

Following the recommendation and the conclusion from the study it is recommended future studies should focused on rural banks and non-financial institutions. Also, with respect to the variable's measurement, internet banking index can be developed and the structural equation model can be used for the analysis.

REFERENCES

Abaenewe, Z. C., Chibueze, Z., & Osondu, M. (2013). Electronic banking and bank performance in Nigeria. *West African Industrial and Academic Research, 6*(1), 171-179.

Abbasi, T., Hans, W. (2017). *The impact of digital financial services on firm's performance: a literature review*. Unpublished Manuscript.

Abdullahi, Y. (2012). Services automation and performance: evidence from deposit money banks in Nigeria. *International Journal of Advanced Research in Management and Social Sciences, 1*(2), 47-58.

Addai, B., Ameyaw, B., Ashalley, E., & Quaye, I. (2015). Electronic banking and customer satisfaction: Empirical evidence from Ghana. *British Journal of Economics, Management & Trade*, *9*(3), 1-8.

Addae-Korankye, A. (2014). The impact of E-banking on customer service and profitability of banks in Ghana. *Global Journal of Commerce & Management Perspectives, 3*(1), 61-65.

Agwu, M. E., & Taiwo, J. N. (2017). The role of e-banking on operational efficiency of banks in Nigeria. *Basic Research Journal of Business management and Accounts, 6*(1), 1-10.

Ahmad, B. D. (2015). *The impact of electronic banking on customer satisfaction in Nigeria.* Muich Personal Repec Archive, paper 23200.

Ahmed, A., Rezaul, K. M., & Rahman, A. M. (2015). E-banking and its impacts on banks' performance and consumers' behavior. *Journal of Internet Banking and Commerce, 20*(2), 25-34.

Amu, C. U., & Nwezeaku, C. N. (2016). E-banking and commercial banks' performance in Nigeria: a conitegration and causality approach. *International*

Journal of e-Education, e-Buisness, e-Management and e-Learning, 6(3), 175-186.

Ankrah, L. A. (2016). The role of electronic banking in banks growth strategies: the case study of United Bank of Africa Ghana ltd. *International Conference on Management, Communication and Technology, 4*(1), 1-8.

Appiah, T., Frimpong, M. J., & Domeher, D. (2014). Adoption of financial innovation in the Ghanaian banking industry. *African Review of Economics and Finance, 6*(2), 88-114.

Bakare, S. (2015). Varying impacts of electronic banking on the banking industry. *Journal of Internet Banking and Commerce, 20*(2), 1-9.

Bank of Ghana (2015). *Financial stability report*. Accra, Ghana: Bank of Ghana.

Bank of Ghana (2016). *Financial stability report*. Accra, Ghana: Bank of Ghana.

Bhaduri, S. N. (2002). Determinants of corporate borrowing: some evidence from The Indian Corporate Structure. *Journal of Economics and Finance, 26*(2), 200-215.

Chovanova, A. (2016). *Forms of electronic banking*. Slovenia; National Bank of Slovenia.

Churchman, W. C. (2011). *The systems approach*. New York: Dell

Churchill, T. (1991). *Research designs*. New York: SAGE Publications.

Chikochi, K., & Chirima, D. T. (2016). The impact of electronic banking on the competitiveness of commercial banks in Zimbabwe. *Case Studies Journal, 5*(11), 13-20.

Davies, F. D. (2014). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-339.

Denirguc-Kunt, A., & Huizinga, H. (2014). Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review, 13*(2), 379-408.

Dinh, V., Le, U., & Uyen, L. (2015). Measuring the impacts of internet banking to bank performance: evidence from Vietnam. *Journal of Interneet Banking and Commercce, 20*(2), 2-14.

Dogarawa, A. B. (2006). *The impact of E-banking on banks performance*. Unpublished M.Sc. Project Submitted to the Post graduate school, Ahmadu Bello University, Zaria.

Ehsan, M. J. L., & Kamboh, K. M. (2016). Impact of cashless banking on profitability: a case study of banking industry of Pakistan. *A Research Journal of Commerce, Economics, and Social Sciences, 10* (2), 83-93.

Federal Trade Commission (2014). *Electronic banking*. Texas, United States of America: Federal Trade Commission.

Federal Reserve Bank (2006). *Financial industry perspectives*. Kansas, United States of America: Federal Reserve Bank of Kansas City.

Halili, R. (2014). *The impact of online banking on banks' performance*. Charles University in Prague, Faculty of Social Sciences, Institute of Economic Studies: Unpublished Master Thesis.

Hausman, J.A. (1978). Specification tests in econometrics. *Econometrical, 46*(6), 1251–1271.

Hirschheim, R. A., & Klein (2014). Four paradigms of information Development. *Communications of the ACM, 32*(10), 1199-216.

Hirschheim, R. A. (1986). Understanding the office: a social-analytic perspective. *ACM, 4*(4), 331-344.

Horst, G., Kuttschruter, M., & Guttering, T. (2017). Internet banking and financial performance. *Journal of Computer and Communication, 4*(2), 23-36.

Hussain, Z., & Muhammad, H. S. (2016). E-banking challenges in Pakistan: an empirical study. *Journal of Computer and Communications, 5*(1), 1-6.

International Monetary Fund (2001). *International capital markets. Developments, prospects, and key policy issues*. Washington, United States of America, International Monetary Fund.

Kabaila, P., Mainzer, R., & Farchione, D. (2015). The impact of a Hausman pretest, applied to panel data, on the coverage probability of confidence intervals. *Scientific Research Publication, 6*(2), 12-19.

Kagan, A., Acharya, R. N., Rao, L. S., & Kodepaka, V. (2015*). Does internet banking affect the performance of community banks*? (Working Paper). Rhode Island; United State of America: American Agricultural Economics Association.

Khrawish, H. A., & Al-Sadi, N. M. (2011). The impact of e-banking on bank profitability. Evidence from Jordan. *Middle Eastern Finance and Economics, 13*(1), 142-158.

Kombe, K. S., & Wafula, M. K. (2015). Effects of internet banking on the financial performance of commercial banks in Kenya: a case of Kenya commercial bank. *International Journal of Scientific and Research Publications, 5*(5), 1-10.

Lawrence, E. R., Karels, G. V., & Krishnan, D. (2018). Internet banking services and credit union performance. *Managerial Finance, 34*(6), 437-446.

Arnett, K. (2000). Technology acceptance theory application and practices. *A Research Journal of Commerce, Economics and Social Sciences, 2* (1), 23-31.

Marshall, C. & Rossman, G. B. (2014). *Designing qualitative research*. New York: SAGE Publications.

Meihami, B., Varmaghani, Z., & Meihami, H. (2013). The effect of using electronic banking on profitability of banks. *Interdisciplinary Journal of Contemporary Research in Business, 4(*12), 99-131.

Mensah, C. A. A. (2012*). Electronic banking adoption in Ghana: A case study of Guaranty Trust Bank Ltd.* Institute of Distance Learning, Kwame Nkrumah University of Science and Technology: Unpublished Master's Dissertation

Mohammed, H. (2015). Electronic banking and profitability. *Interdisciplinary Journal of Contemporary Research in Business*, 5(1), 16-24.

Muhammad, E. J. L. (2016). Impact of cashless banking on profitability: A case study of banking industry of Pakistan. *A Research Journal of Commerce, Economics, and Social Sciences, 10*(1), 82-93.

Musa, A., Abubakar, S. K., & Hassan, H. (2015). The impact of online banking on the performance of Nigerian Banking Sector. *International Conference on E-commerce, 20(*2), 52-68.

Ngango, M. A. (2015). *Electronic banking and financial performance of commercial banks in Rwanda: A case of Bank of Kigali*. Jomo Kenyatta University of Agriculture and Technology: Unpublished Master's Dissertation.

Ngoma, B., & Nuwagaba A. (2014). Analysis of E-banking as a tool to improve banking services in Zambia. *International Journal of Business and Management Invention, 3*(11), 62-67.

Nkem, I. S., & Akujinma, A. F. (2017). Financial innovation and efficiency on the banking sub-sector: the case of deposit money banks and selected instruments

of electronic banking (2006-2014). *Asian Journal of Economics, Business and Accounting, 2*(1), 1-12.

Nuamah-Gyambrah, J., & Offei, H. (2016). Financial performance of banks. *International Journal of Business and Management Invention, 3*(11), 62-67.

Ofori-Dwunfuo, G. O., & Dankwah, A. B. (2013). Adopting internet banking in Ghana. *Current Research Journal of Social Sciences, 5*(4), 143-151.

Ogare, H. O. (2001). *The effect of electronic banking on the financial performance of commercial banks in Kenya*. University of Nairobi; Unpublished Master's Dissertation.

Okoro, A. S. (2014). Impact of electronic banking instruments on the intermediate efficiency of the Nigerian economy. *International Journal of Accounting Research, 1*(6), 14-21.

Olalekan, E., & Ajayi, I. E. (2016). Impact of electronic banking on bank performance in Ekiti State, Nigeria. *International Journal of Multidisciplinary and Current Research, 4*(1), 56-66.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(1), 335-346.

PriceWaterhouseCoopers (2015). *2014 Ghana banking survey: The future of banking in Ghana. What is next?* Accra, Ghana: PriceWaterhouseCoopers.

Bhalala, A., & Parul, C. (2014). Study on pre and post impact of e-banking on banking operations. Galaxy International Interdisciplianry Research Journal, 2(3), 175-186.

Rajan, R. G., & Zingales, L. (2015). What do we know about capital structure? Some evidence from international data. *The Journal of Finance, 50*(5), 1421-1460.

Sadekin, M. S., & Shaikh, A. H. (2016). Effect of e-banking on banking sector of Bangladesh. *International Journal of Economics, Finance and Management Sciences, 4*(3), 93-97.

Saksonova, S., & Solovjova, I. (2011). Analysis of the quality and profitability of assets in the banking system and the impact of macroeconomic factors on its stability-Case of Latvia. *International Conference on Banking and Finance, 1*(7), 212-231.

Schaechter, A. (2002). *Issues in electronic banking: An overview* (IMF Policy Discussion Paper 2). Washington D.C., United States of America, International Monetary Fund.

Singh, S. M., & Wadhe, T. (2015). Impact of e-banking on profitability of commercial banks in India. *International Journal in Management and Social Sciences, 3*(2), 478-483.

Shah, M., & Clarke, S. (2019). *E-banking management: issues, solutions, and strategies*. New York: Information Science Reference.

Surendran, P. (2012). Technology acceptance theory: a survey of literature. *International Journal of Business and Social Research, 2*(4), 175-186.

Tharanikaran, V., Sritharan, S., & Thusyanthy, V. (2017). Service quality and customer satisfaction in the electronic banking. *International Journal of Business and Management*, *12*(4), 67-83.

Titman, S., & Wessels, R. (2017). The determinants of capital structure choice. *The Journal of Finance, 43*(1), 1-19.

Wang, C., & Wang, Z. (2015). *The impact of internet on service quality in the banking sector.* Unpublished Master's Thesis, Lulea University of Technology, Department of Business Administration and Social Sciences.

Worku, G., Tlahun, A., & Tafa, M. (2016). The impact of electronic banking on customers' satisfaction in Ethiopian Banking Industry (The Case of Customers of Dashen and Wogagen Banks in Gondar city. *Journal of Business and Financial Affairs, 5*(2), 1-18.

Yin, R. K. (2013). *Case study research-design and methods*. New York: SAGE Publications.

Zakaria, A. (2006). Role of the electronic banking services on the profits of Jordanian banks. *America Journal of Applied Sciences, 3*(9), 145-152.

APPENDIX

PANEL DATA

BANKS	YEAR	ROE	ROA	ATM	EXP	IMB	BKS	CIR	GRT
ACC	2017	0.21	0.04	1.11	11.23	1	20.49	0.63	0.14
ACC	2018	0.22	0.05	1.21	11.43	2	20.71	0.51	0.13
ACC	2019	0.29	0.05	1.22	11.98	2	21.26	0.48	0.42
ACC	2020	0.22	0.03	1.29	12.35	2	21.61	0.54	0.25
ACC	2021	0.11	0.02	1.32	12.68	2	21.71	0.75	0.16
ADB	2017	0.14	0.02	4.33	11.82	1	21.09	0.76	0.32
ADB	2018	0.34	0.05	4.34	11.94	1	21.21	0.71	0.24
ADB	2019	0.15	0.03	4.35	11.91	2	21.49	0.89	0.34
ADB	2020	-0.23	-0.04	4.35	11.98	2	21.48	1.24	0.24
ADB	2021	-0.18	-0.03	4.35	12.18	2	21.83	1.21	0.15
BAC	2017	0.28	0.05	3.21	10.45	1	21.44	0.44	0.29
BAC	2018	0.32	0.06	3.48	11.26	2	21.56	0.41	0.31
BAC	2019	0.37	0.06	3.53	11.72	3	21.82	0.42	0.29
BAC	2020	0.33	0.05	3.85	11.98	3	22.01	0.56	0.19
BAC	2021	0.38	0.06	4.12	12.01	3	22.39	0.41	0.15
CAL	2017	0.25	0.04	3.09	15.23	2	20.87	0.37	0.42
CAL	2018	0.33	0.06	3.12	15.57	2	21.17	0.33	0.48
CAL	2019	0.36	0.05	3.32	15.88	2	21.72	0.32	0.36
CAL	2020	0.32	0.05	3.39	15.81	2	21.93	0.36	0.49
CAL	2021	0.02	0.003	3.45	16.23	2	22.01	0.41	0.24
ECO	2017	0.31	0.04	4.25	17.23	1	19.64	0.53	0.45
ECO	2018	0.33	0.04	4.32	17.34	2	22.25	0.45	0.42
ECO	2019	0.39	0.05	4.36	17.48	2	22.45	0.45	0.23
ECO	2020	0.37	0.05	4.39	17.59	3	22.61	0.44	0.19
ECO	2021	0.34	0.04	4.67	17.85	3	22.81	0.52	0.24
ECB	2017	0.08	0.03	3.24	11.14	1	19.23	0.56	0.93
ECB	2018	0.08	0.02	3.28	8.72	1	19.32	0.66	0.53
ECB	2019	0.002	0.003	3.37	10.13	2	19.56	0.92	0.24
ECB	2020	0.002	0.004	3.48	10.66	2	19.67	0.66	0.15

ECB	2021	0.008	0.002	3.52	11.19	3	19.72	0.98	0.35
FID	2017	0.31	0.04	4.12	10.01	1	21.01	0.44	0.42
FID	2018	0.32	0.03	4.32	10.02	2	21.25	0.46	0.36
FID	2019	0.31	0.04	4.32	10.56	2	21.83	0.45	0.29
FID	2020	0.33	0.04	4.69	11.12	2	22.14	0.62	0.32
FID	2021	0.03	0.004	4.76	11.18	3	22.15	0.96	-0.16
GCB	2017	0.48	0.05	4.79	14.42	1	21.82	0.53	0.45
GCB	2018	0.49	0.07	4.89	14.46	1	21.95	0.46	0.46
GCB	2019	0.41	0.07	5.14	14.51	2	22.17	0.46	0.25
GCB	2020	0.29	0.06	5.18	14.56	2	22.26	0.58	0.21
GCB	2021	0.3	0.05	5.26	14.58	2	22.53	0.57	0.22
GT	2017	0.27	0.06	3.56	13.92	1	20.66	0.42	0.54
GT	2018	0.34	0.06	3.61	14.01	2	20.75	0.46	0.71
GT	2019	0.31	0.05	3.69	14.21	2	20.87	0.45	0.64
GT	2020	0.26	0.05	3.45	14.28	2	21.16	0.48	0.56
GT	2021	0.26	0.05	3.58	14.32	3	21.05	0.49	0.35
HFC	2017	0.11	0.02	3.01	13.27	1	20.19	0.67	0.82
HFC	2018	0.22	0.04	3.13	13.48	2	20.69	0.49	0.74
HFC	2019	0.23	0.04	3.18	13.64	2	21.01	0.54	0.31
HFC	2020	-0.22	-0.02	3.24	13.45	2	21.17	0.75	0.48
HFC	2021	-0.28	-0.02	3.21	13.24	3	21.34	1.01	-0.04
NIB	2017	0.11	0.01	3.12	13.89	1	20.59	0.56	0.32
NIB	2018	0.13	0.03	3.29	13.94	1	20.89	0.46	0.56
NIB	2019	0.16	0.03	3.42	14.02	2	21.56	0.47	1.11
NIB	2020	0.22	0.05	3.48	14.06	2	21.69	0.51	0.56
PRUD	2021	0.11	0.02	3.14	13.01	1	20.33	0.74	0.33
PRUD	2017	0.15	0.02	3.21	13.09	2	20.53	0.64	0.37
PRUD	2018	0.17	0.02	3.33	13.21	2	20.83	0.67	0.43
PRUD	2019	0.07	0.01	3.39	13.45	2	21.05	0.71	0.33
PRUD	2020	0.01	0.01	3.41	13.65	2	21.21	0.92	0.38
SSGB	2021	0.18	0.02	2.94	13.89	1	20.81	0.66	0.34
SSGB	2017	0.22	0.03	2.98	13.91	2	21.24	0.65	0.25
SSGB	2018	0.17	0.02	3.24	14.01	2	21.42	0.72	0.13

SSGB	2019	0.17	0.03	3.12	14.23	2	21.41	0.76	0.28
SSGB	2020	0.19	0.03	3.23	14.51	3	21.62	0.72	0.15
SCB	2021	0.44	0.06	3.42	13.79	1	21.59	0.37	0.42
SCB	2017	0.43	0.07	3.61	13.81	2	21.82	0.31	0.68
SCB	2018	0.4	0.06	3.73	13.98	3	21.98	0.38	0.12
SCB	2019	0.12	0.02	3.84	14.1	3	21.94	0.43	0.16
SCB	2020	0.34	0.06	3.89	14.13	3	22.2	0.31	0.12
ROY	2021	0.085	0.034	1.28	14.21	1	19.44	0.66	0.12
ROY	2017	0.052	0.012	1.29	13.78	1	19.91	0.84	0.53
ROY	2018	0.034	0.004	1.34	14.38	2	20.68	0.93	0.99
ROY	2019	-0.57	-0.03	1.39	15.21	2	20.82	1.47	0.57
UNI	2020	0.23	0.03	3.56	15.01	1	20.62	0.56	0.52
UNI	2021	0.21	0.03	3.62	15.12	1	20.98	0.45	0.42
UNI	2017	0.18	0.04	3.65	15.36	2	21.48	0.48	0.65
UNI	2018	0.15	0.02	3.75	15.38	2	22.06	0.65	0.45
UNI	2019	0.12	0.02	3.89	15.41	2	22.15	0.64	0.32
ZEN	2020	0.21	0.03	4.32	15.02	1	20.67	0.45	0.89
ZEN	2021	0.31	0.04	4.45	15.01	1	21.37	0.48	1.26
ZEN	2017	0.39	0.05	4.56	15.09	2	21.84	0.42	1.17
ZEN	2018	0.19	0.03	4.68	15.12	3	21.65	0.52	0.14
ZEN	2019	0.24	0.04	4.75	15.34	3	21.94	0.49	-0.02