

**EFFECT OF TECHNOLOGICAL FINANCIAL INNOVATIONS
ON FINANCIAL PERFORMANCE OF COMMERCIAL BANKS
IN KENYA**

BY

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DECLARATION

I, the undersigned, declare that this is my original work and has not been previously presented for the award of any degree in any other university.

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TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENT	vi
DEDICATION	vii
LIST OF TABLES	viii
LIST OF FIGURES	ix
ABSTRACT	x
LIST OF ABBREVIATIONS	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the Study.....	1
1.1.1 Technological Financial Innovations.....	3
1.1.2 Financial Performance of Firms.....	4
1.1.3 Technological Financial Innovations and Financial Performance of Firms.....	6
1.1.4 Commercial Banks in Kenya.....	8
1.2 Research Problem.....	9
1.3 Research Objective.....	11
1.4 Value of the Study.....	11
CHAPTER TWO	13
LITERATURE REVIEW	13
2.1 Introduction.....	13
2.2 Theoretical Review.....	13
2.2.1 Financial Intermediation Theory.....	13
2.2.2 Innovation Diffusion Theory.....	14
2.2.3 Silber's Constraint Theory of Innovation.....	16
2.3 Determinants of Banks' Financial Performance.....	17
2.3.1 Financial Innovations.....	17
2.3.2 Management Efficiency.....	18
2.3.3 Credit Risk.....	19
2.3.4 Liquidity.....	20
2.4 Empirical Review.....	21
2.5 Conceptual Framework.....	24
2.6 Summary of Literature Review.....	25
CHAPTER THREE	27
RESEARCH METHODOLOGY	27

3.1	Introduction.....	27
3.2	Research Design.....	27
3.3	Target Population.....	28
3.4	Sample Design	28
3.5	Data Collection	28
3.6	Diagnostic Tests.....	29
3.6.1	Autocorrelation	29
3.6.2	Multicollinearity	30
3.6.3	Heteroscedasticity	30
3.7	Data Analysis Technique.....	30
3.7.1	Analytical Model	31
3.8	Hausman Model Specification Test.....	32
3.9	Variables Operationalization	33
	CHAPTER FOUR.....	34
	DATA ANALYSIS, RESULTS AND DISCUSSION.....	34
4.1	Introduction.....	34
4.2	Descriptive Data Analysis.....	34
4.2.1	Exploratory Data Analysis	35
4.3	Correlation Analysis	37
4.4	Analytical Model	38
4.4.1	Diagnostic Tests	38
4.4.2	Autocorrelation.....	38
4.4.3	Multicollinearity.....	39
4.4.4	Testing for Heteroskedasticity	39
4.4.5	Measures of Normality.....	40
4.4.6	Analytical Regression Model Coefficients	40
4.5	Discussion of Findings.....	42
	CHAPTER FIVE	45
	SUMMARY, CONCLUSION AND RECOMMENDATIONS	45
5.1	Introduction.....	45
5.2	Summary of Findings.....	45
5.3	Conclusions.....	46
5.4	Recommendations.....	48
5.5	Limitations of the Study.....	49
5.6	Suggestion for Further Research.....	50

REFERENCES	51
APPENDICES	56
Appendix A: Secondary Data Collection Sheet.....	56
Appendix. B: Kenyan Commercial Banks.....	57
Appendix. C: Data Template	58
Appendix D: Prais Winstein Regression Model From STATA.....	60
Appendix E: Hausman Test Table Extract from STATA	61
Appendix F: Descriptive Statistics.....	62
Appendix G: Regression Model showing R^2 and adjusted R^2	63

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DEDICATION

I dedicate this research project to my parents, sisters and brothers for their committed continuous support and encouragement throughout my studies and research process.

LIST OF TABLES

Table 4: 1 Descriptive Statistics	34
Table 4: 2 Correlation Matrix	37
Table 4: 3 Test of Autocorrelation.....	38
Table 4: 4 Test of Multicollinearity	39
Table 4: 5 Breusch-Pagan Test for Heteroskedasticity.....	40
Table 4: 6 Skewness/Kurtosis tests for Normality.....	40
Table 4: 8 Prais-Winsten regression, heteroskedastic panels corrected standard errors	41

LIST OF FIGURES

<i>Figure 2: 1 Conceptual Framework</i>	25
<i>Figure 4: 1 Individual Bank's ROA Growth Plot</i>	36
<i>Figure 4: 2 Overlain Growth Plot</i>	37

ABSTRACT

Technology has enabled the undertaking of banking transactions in a variety of mediums. It is true to suffice that through adoption of technological tools business processes have been able to undertake more effectively and cost efficiently. The banking sector has not been left behind in adopting technology in offering banking services to its customers. These innovations include use of automated Teller Machines, agency banking, Electronic Funds transfers, real time gross settlements and mobile banking. However, the exact position of technological financial innovations has not been studied conclusively. It is for this reason that this study was undertaken. This study was inspired by the fact that most of the commercial banks in Kenya had adopted such innovations but still recorded reduced earnings. In light of this gap in literature this study purposed to establish whether the selected innovations had influence and to whether the influence was significant on financial performance. The studies objective was to assess the effect of technological financial innovations on financial performance of firms, evidence from commercial banks in Kenya. This study was based on three theories: financial intermediation theory, innovation diffusion theory and Silber constraints theory of Financial Innovations. This study adopted a descriptive research design. The target population for this study were all commercial banks. This study had a sample size of 15 commercial banks. Secondary data was collected from 2012 to 2016 from various commercial bank annual report, website & CBK bank report. The study adopted a panel data analysis. The findings were reported using the Prais Winstein regression model. Agency banking and use of ATMS had positive but minimal effect on financial performance of banks. The control variable, credit risk was revealed to have a negative and insignificant effect on financial performance of banks. Bank liquidity had a negative and significant effect on financial performance of banks. The study recommend that banks need to adopt financial innovations since they had positive effect on performance of banks. Equally, it is important for banks to establish robust risk identification, assessment and control measure in order to improve financial wellness.

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ATMS	Automated Teller Machines
CBA	Commercial Bank of Africa
CBK	Central Bank of Kenya
EFT	Electronic funds Transfer
FSD	Financial Sector Deeping
GOK	Government of Kenya
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
POS	Point of Sale
RGTS	Real Time Gross Settlement
ROA	Return on Assets

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Banking sector has experienced remarkable changes in the last few decades which majorly has been due to deregulations and adoption of technological tools (Lawrence, 2010). It is true to suffice that technology has advanced because organizations are constantly looking for opportunities to enhance efficiency of processes. Technology has enabled the undertaking of banking transactions in a variety of mediums.

According to Hasan, Schimiedel and Song (2010) technology has provided banks with several channels of delivering products and services to their customers. This is because, innovations seek to establish new ways of delivering services more efficiently than before. For instance, agency banking ensures that customers have access to banking services closer to their homes. Gorton and Metrick (2010) notes that innovations in the banking sector are led by the need to offer customized services, enhance accountability, eliminate those costs associated with traditional banking systems and develop markets. Banking innovations are crucial because they foster competitiveness of banks in a given economy (Lawrence, 2010).

This study was based on three theories: The Financial Intermediation Theory, Innovation Diffusion Theory and Silber's Constraint theory. Ndebbio (2004) notes that financial intermediation brings together the surplus units and deficit units together ensuring that they can save and borrow respectively. This theory therefore views that depositor's loan to banks who then give out loans to borrowers. This theory

is crucial because it provides insights on how financial institutions such as banks operate in order to mediate between those with surplus and those with deficits.

Innovation Diffusion Theory focuses on explaining how new technology and ideas spread among organisations (Rogers, 1962). This theory is important because it provides insights on how innovations diffuse to the banking sector. Silber's Constraint Theory of Innovation focuses on how financial institutions adopt financial innovations in order to enhance efficiency (Silber, 1975). The theory is crucial since it provides an understanding on financial innovations in the banking sector.

In the Kenyan perspective, commercial banks have adopted financial innovations with the aim of improving customer service and service delivery. Through adoption of Information and Communication Technology (ICT) in Kenya, in overall performance of financial institutions has improved the performance (Ongori & Migiro, 2010). This is attributed to the fact that ICT tools lead to saving of time and costs of offering banking services and this leads to customer satisfactions. As a result of improved customer satisfaction, clients' acquisition and retention is high. Equally, Monyoncho (2015) views that use of banking technologies can potentially lead to reduction of transaction costs. Ideally, financial innovations are enabled through exploiting ICT capabilities. In Kenya, among the financial innovations that are adopted are agency banking, internet banking, use of ATMS, debit cards and electronic funds transfers. Use of these technologies in service delivery increases customer satisfaction, saves costs for the banks, improves convenience and facilitates fast and secure money transfers (Muyoka, 2014).

1.1.1 Technological Financial Innovations

There are several definitions of what really constitutes technological financial innovations.

According to Gardeva and Rhyne (2011) technological financial innovations is the process through which financial institutions harness the capabilities of Information and Communication Technology (ICT) in establishing new products and services and new ways of rendering banking services. As such, the term denotes to establishment of new products and service by financial services. Equally, Jack and Suri (2010) notes that innovations in the banking sector aim at enhancing service delivery thereby enlarging the market share of the specific financial institutions.

An innovation is a new product, service or channel of production. It could also mean an improved version of an existing product or method of production. According to Lawrence (2010) innovations seeks to establish more efficient systems that the previous systems. It therefore means that innovations are only beneficial if they lead to cost savings, reduction of time for carrying out activities, enhanced service delivery, improved stakeholders' relations and improved access to products and services. Innovations are developed in order to establish competitive advantaged (Mabrouk & Mamoghli 2010). Innovations calls for a lot of care before adoption since where they involve huge capital outlay, failure to successfully adopt them may leads to massive losses.

Al-Jabri (2012) indicates that most innovations involve technological advancement. In this respect, development of technology is an important impetus to innovations. The need to establish a competitive edge has been attributed to be a major factor that

makes firms engaged in Research and Development (R&D). According to Atman (2013) a firm that needs to achieve the generic goals of survival, growth and sustained profitability ought to have innovation being one of its strategic goals. This is because it is only through offering innovative products that firms can be market leaders in their niches.

Technological financial innovations are tools that are adopted by financial institutions in order to serve their customers more effectively and efficiently. In the study technological financial innovation will be denoted using ATM & Agency banking as innovative techniques. Innovations among banks leads to efficiency and this improves performance of banks and at the same time makes accessibility of financial services easy (Malhotra and Singh, 2009). According to Etim (2014) mobile banking improves access to financial services. It is notable that mobile banking is one of the forms of technological financial innovations. Therefore, technological innovations are not only beneficial to the banks and other financial institutions, but also to the nation as whole since they lead to enhancement access to financial services by the people.

1.1.2 Financial Performance of Firms

Performance entails the analysis of outputs with regards to the inputs (Pandey, 2010) In this respect, performance denotes the reporting of how input materials are utilized in the process of achieving organizational goals. It is important to note that performance may be high or low depending on the actual results in comparison to the expected results. According to Alam (2012) performance seeks to ascertain whether entities are efficient in resource use. Performance can be measured in terms of financial results or using non-financial parameters (Bagorogoza & Waal, 2010).

According to Tavitiyaman, Zhang and Qu (2012) financial performance entails measures that depict the profitability of organizations, productivity and growth. This implies that financial performance provides information on how efficient resources are used in income generation, how the resources lead to sustained performance or how a firm increases in size. Thus, financial performance indicates if financial goals are being met or not (Bakar & Ahmad 2010). Evidently therefore financial performance would be of much interest to the shareholders than it is for any other stakeholders of the firm.

Shareholders are keen on the ability of firms in making revenue which is sufficient to cover costs and leave enough residual that can be distributed as dividends to them (Mabrouk & Mamoghli 2010). Several methods have been used to measure financial performance. For instance, Bagorogoza and Waal (2010) views that the profitability and profits are a good measure of financial performance. Thus, financial performance equates resources and profits that have earned in a given time period.

Muiruri and Ngari (2014) measured performance of banks in terms of profits. According to Al-Hussein and Johnson (2009) the efficiency of how financial goals are being achieved is what constitutes financial performance. In other words, financial performance is the measure of how entities achieve their financial goals. In this respect, their measured financial performance of commercial banks in Saudi Arabia in terms of Return on Assets. This study measured financial performance in terms of Return on Assets. Return on Assets (ROA) seeks to measure financial performance as

the amount of income over total assets. In other words, it is a profitability measure that shows how the firm utilizes its assets in generating income.

1.1.3 Technological Financial Innovations and Financial Performance of Firms

Performance of banks is crucial since the entities exist to make profits for the shareholders through efficient resource use. Thus, management of banks are motivated to adopt new technologies with the aim of streamlining activities, leading to costs reduction and ultimately improving profitability (Nader, 2011). According to McKay and Pickens (2010) through adoption of branchless banking platforms, banks are able to acquire competitive advantage and improve performance. Perhaps, this can be related to the aspect that branchless platforms are cheaper to maintain since there are not labour intensive as in the case of traditional banking halls.

In particular, agency banking reduces the establishment expenses for banks since they are owned by other investors and not the banks. According to Gutu (2014) use of technologically enabled tools in the Romanian banking sector has helped reduce costs of doing business. This means that adoption of innovative service delivery channels is a cost saving measure for banks. It is important to note that cost cutting measures aim at increasing the profitability of entities.

In Asia, adoption of innovations has been linked to lowering costs of rendering banking services (Hosein, 2013). Innovations tend to reduce overreliance on manual labour but establish platforms that account holders can transact in self-service capacities. For instance, in Jordan, electronic banking has led to being associated with

reduced costs and this improves profitability of banks (Khrawish & Al-Sa'di 2011). The banking sector is highly competitive since the banks offers similar products. As a result, the best form of realizing competitive advantage is through providing superior customer service and service delivery.

Nader (2011) views that in Saudi Arabia, innovations among banks were inclined towards enhancing service delivery but did not result into improved profitability. Therefore, innovations ought to be critically considered before being adopted by financial institutions. This is because the systems are costly and would lead to massive losses if not successful. Hassan, Maman and Farouk (2013) revealed that in Nigeria, electronic banking enhanced performance of banks due to improved customer satisfaction. This is because, innovations ensure that less time taken to perform banking transactions and this saves money for both accounts holders and the financial institutions.

Innovations such as internet banking, use of Automated Tellers Machines and agency banks reduces overheads for banks (Khrawish & Al-Sadi, 2011). Thus, innovations foster's customer satisfactions and at the same time can potentially improve performance of banks. According to Onay, Ozsoz and Helvacioğlu (2008) offering banking services online In Turkey was found to be of value to the banks. This is because, online banking makes the initiation and completion of banking transactions faster and cheaper than in the brick and mortar case.

Electronic banking derives its benefits through high customer satisfaction and reduction of the moral hazard. Online banking enables the customers to tract their

transactions and obtain banks reports in a timely fashion. On the side of the banks, information retrieval is fast and less costly thus impacting positively on performance. More so, financial innovations are vital in dealing with competition in the market (Muiruri & Ngari, 2014)

1.1.4 Commercial Banks in Kenya

Commercial banks in Kenya operates in the financial markets and institutions which is regulated by the Central Bank of Kenya. According to the CBK (2017) there are 44 fully fledged commercial banks in Kenya. Majority of the commercial banks in Kenya are private owned. The regulator also indicates that 27 are local banks while 13 are foreign owned. The Imperial Bank Limited, Chase Bank Limited, Charterhouse Bank Limited are under receivership. Commercial banks are an important impetus towards economic growth in the country. To this end, the role and stability of the sector has been included in the Vision 2030 which has a pillar of ensuring that the banking industry is sustainable for economic development through savings mobilizations (GoK, 2016).

Commercial banks in Kenya operate under regulation of the Companies Act 487, Central Bank of Kenya Act 491 and the Banking Act 488. These Acts ensures that the banking sector is stabilised and that there is no unscrupulous dealing which may compromises the safety custody of deposits. Further, the Central Bank of Kenya issues prudential guidelines that ensures that individual banks are safeguarded from risks. The guidelines issues specific requirements of capital adequacy, liquidity management, asset quality, licensing requirements and all products must be

sanctioned by the CBK. It is thus important that commercial banks curtail their operations within the law while maximising return on investments.

According to Beck, Demirguc-Kunt and Levine (2009), the Kenyan banking sector is the largest in East and Central Africa in terms of size of market served and diversification of financial services. The CBK Act is meant to ensure that depositors are protected and that the risk of instability in the banking industry is eliminated. Further, CBK regulations aims at taming such illegal activities like corruption and money laundering. For instance, the CBK demands declaration and source of any money transacted to the tune of Kenya Shillings one million and above. The CBK also is mandated in licensing financial innovations that are proposed by banks in Kenya.

1.2 Research Problem

Being innovative can potentially establish a competitive edge for financial institutions such as banks. This is because, innovative banks can expand their market through establishment of new channels of product distribution, new products and new markets. Due to stiff competition in the financial sector, banks need to be innovative in order to remain profitable (Mabrouk & Mamoghli 2010). In this respect, banks engage in financial innovations to improve service delivery which is believed to foster the chances of making profits by the firms.

Malhotra and Singh (2009) views that financial innovations aid in cost management but when empirically tested in India, financial innovations did not offer much financial benefits. Therefore, banks adopt financial innovations to improve

organizational performance and remain competitive. However, it does not impact innovations tends to differ with respect to the timings of adoption (Learner & Tufano 2011).

In as much as financial banks in Kenya have adopted financial innovations, some banks have reported deteriorating performance. For instance, in the last five years Imperial Bank and Chase bank were put under statutory management due to malpractices (CBK, 2014) According to FSD (2018) the number of agency banking has increased from 8,809 agents in 2009 to 35,789 agents in 2014. Technology has led to emergence of innovations in the way banks deliver services, Stanbic has Digibank, Equity Bank has Eazzy pay, CBA has partnership with Safaricom to provide M-Shwari digital bank branch, CBA also has Loop which is an online banking platform. However, there is no exhaustive evidence all these financial innovations improves bank's profits and shareholders wealth.

It is true that financial innovations have been adopted by banks with the intention of fostering performance. Among the innovations are use of ATMs, EFTs, RTGS, cheques truncation systems, agency banking, mobile banking and internet banking. Most commercial banks have at least a single of these innovations. Few studies have been done in this regard. Ngumi (2014) evaluated the consequence of financial innovations in the financial markets and revealed that financial innovations were of value to banks. On the contrary, Muiruri and Ngari (2014) revealed that some aspects of financial innovations (mobile transactions, transacting through agents and performing banking transactions by use of cards was not effective in fostering banks' profits.

Simiyu, Ndiangui and Ngugi (2014) specifically sought to assess if customer satisfaction was influenced by adoption of financial innovations. This contradiction results forms the motivation of this study. This study was undertaken to be able to compare the findings of other global, regional and local studies. The main objective of this study was to assess what is the effect of financial innovations on financial performance of firms, evidence from commercial banks in Kenya?

1.3 Research Objective

The objective of this study was to assess the effect of financial innovations on financial performance of firms, evidence from commercial banks in Kenya.

1.4 Value of the Study

The study is of value to management practice. The findings of the study greatly benefits the managers of banks in that it provides statistical evidence on impact of innovations. A deep understanding of technological financial innovations and its impact on financial performance of commercial banks in Kenya is instrumental in assisting the management of banks in making decisions in respect to their adoption. Therefore, the findings can be used as basis of planning on market and product developments.

This study is of value to the theoretical understanding of the concepts of technological financial innovations. Thus, the study may benefit other researchers as it may provoke the undertaking of more studies. The presence of literature about

innovations and its effects on financial performance is important for banks and also to other players in the financial sector.

Thirdly, this study can be used a tool of policy formulation. The findings can be useful to the Central bank of Kenya in making of policies on banks governance. The CBK regulates commercial banks in Kenya. For this reason, the findings can be used in provision of information that is pertinent in policy formulation with especially with respect to adoption of technological financial innovations among commercial banks in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This is the second chapter of the study and contains the theories of the study, empirical review, research gaps and conceptual framework.

2.2 Theoretical Review

This proposal is based on three theories: financial intermediation theory, innovation diffusion theory and Silber constraints theory of Financial Innovations.

2.2.1 Financial Intermediation Theory

Financial Intermediation theory is a theory that depicts how a financial sector facilitates savings and borrowings in an economy. The theory was coined by Bisihnano (1992) who identified that financial intermediation is the process that ensures those with excess funds can save them and those with deficits have somewhere to borrow from. In this respect, the theory views that savings and borrowing forms the fundamental operation of financial institutions. This is to mean that there is a need to ensure that people can access financial services as and when they require them. Ndebbio (2004) notes that financial intermediation brings together the surplus units and deficit units together ensuring that they can save and borrow respectively. This theory therefore views that depositor's loan to banks who then give out loans to borrowers.

According to Diamond (1984) there are financial market frictions that results due to existence of information asymmetry and transaction costs. In this respect, where their

frictions are hazardous to a certain class of people, accessing such services becomes elusive due to high costs or due to lack of information. It is for this reason that financial intermediaries exist to solve these problems.

According to Demirgüç-Kunt, Asli, Beck, and Honohan (2008) financial intermediations seeks to explain how those with negative spending can access finances from those with positive spending. As a result, due to information asymmetry, financial institutions exist to cover the gap. It is true to suffice that it is not possible for individual's lenders to find individuals borrowers easily. The theory posits that individuals' loans to financial institutions since it is an effective mechanism for savings as opposed to loaning to individual borrowers.

This theory is crucial to this study because it provides information on how financial systems operates. Financial institutions obtain funds from depositors who in turn loan to borrowers. The introduction of technological innovations has ensured that even those in rural areas can access banking services through such platforms such as agency banking and mobile banking. In addition, the low-income earners may access mobile loans when in need and this is basic theme of the intermediation theory. The theory posits that the existence of financial institutions is to provide a platform where those with surplus funds can loan to those with deficits. Therefore, this theory forms a good basis of understanding financial innovations.

2.2.2 Innovation Diffusion Theory

This theory was first proposed by Rogers (1962) with the aim of explaining what subtle factors lead to spread of innovations across industries. The theory intended to

explain the process involved in new technology and ideas spread among organisations. Rogers viewed that new technological adoption was a time based process which involves decision making situations among members of a social setup. He characterized that diffusion of innovation followed five factors which were awareness, interest, evaluation, trial and lastly adoption. According to Sevcik (2004) an innovation is an item or process that a given social system views as new relative to existing ones.

It is for this reason that Lundblad and Jeniffer (2003) idealises that before innovations can fully take shape in a market, their inputs and outputs should be seen to be measurable and satisfactory to the users. The technology should be relatively easy to use and thus be able to attract the users.

Innovation Diffusion Theory (IDT) focuses on the new item characteristics. In this regard, the theory views that acceptability of new technologies are triability, complexity compatibility, observability and relative advantage are prerequisite features that determines successful spread of innovations (Mas & Morawczynski, 2009). This means that technological tools should fulfil those features before they are adopted. Innovations must have benefits for them to be successfully adopted by the intended users. In connection to this study, technological innovations should be characterised with ease of use in order to be adopted in the market. Liu and Li (2009) cites that IDT is a good hypothesis that provides valuable information on the how innovations spread and adopted by consumers in an economy.

IDT is pertinent to this study because it shows the process of new technological innovations adoptions in a social set up. The adoption of technological innovations is meant to widen the market base of financial institutions. Having noted this, it is therefore true to suffice that adoption of innovations has a potential of enhancing financial performance due to increased markets. Such tools such as use of ATMS and mobile banking makes carrying out banking transactions convenient and cheaper as opposed to visiting the traditional banking halls.

2.2.3 Silber's Constraint Theory of Innovation

This theory was coined by Silber (1975) with the aim of describing why financial institutions engaged in financial innovations.

In his observations, Silber noted that adoption of financial innovations was an attempt to enhance the profitability of firms through efficiency delivery of services. The theory views that firms have both internal and external initiated challengers which can be managed through adoption of technologically enabled processes. Through harnessing the power of technology, firms can enhance efficiency, and this increase their profits due to cost savings.

According to Silber (1983) financial innovations tends to attract more customers to firms' products also saves the bank a huge deal of administrative costs. This means that the benefits of innovations are in two folds: one it is a cost saving mean for the financial institutions and second is a tool for market and product development. The author viewed that those firms that were not innovative had poor performance when compared to those firms that engaged in product developed through innovative means.

This theory is important to this study because it provides information on financial innovations. This study seeks to assess the effect of financial innovation on financial performance in Kenya. It is important to note that agency banking, internet banking, mobile banking use of RTGS and ATMS are all tools of financial innovations. The theory further indicates that financial innovations improves profitability of firms.

2.3 Determinants of Banks' Financial Performance

Bank's performance is influenced by a variety of factors that which may be related to financial innovations or otherwise.

2.3.1 Financial Innovations

Theoretically, financial innovations are expected to reduce the costs of doing business for the banks and this can improve profitability (Lyons, Chatman & Joyce 2007).

Adoption of technology ensures that large volume of bank's transactions can be undertaken in less time as it would be for brick and mortar bank. Equally, innovations tends' to offer more channels through which customers can access banking services and for more hours in a day. For instance, ATMs, mobile banking and internet banking enable customers to transact for 24 hours. This may result to more income for bank since there are transaction charges for the transactions. Theoretically, ATMs, mobile banking, EFTs and RTGS are expected to improve profitability for the banks due to increase in distribution channels (Stavins, 2011).

According to Mabrouk and Mamoghli (2010) innovations are tools that establish the competitive advantage of banks and this creates a favorable edge in the market. For

instance, a bank that has adopted internet banking and agency banking may have a better brand image than a bank has not. More importantly, successful adoption of financial innovation is regarded as strategic moves by banks. Kingoo (2011) views that use of ICT tools enhances productivity of staff, offers cost reduction avenues and provides accurate risk monitoring methods. Nofie (2011) also reveals that innovations obviously result to improved versions of products or channels which are cost efficient thus improving profitability of banks. As such, innovation tends to increase the channels of distributing a bank's product which can increase customer satisfaction thereby aiding in customer acquisition as well as customer retention.

Lawrence (2015) idealizes that innovations increases the channels of productions, it is probable that more customers will be attracted, and this can lead to improved profitability. Innovations harness the ICT capabilities to create new banking services and new media for offering services. According to Mungai, Maingi, Muathe and Ndungu (2015) innovations can potentially lead to market leadership as they enhance access to new markets. For instance, mobile phone banking and agency banking inarguably has enabled the rural people to access banking services much more conveniently than it was before the adoption of these innovations. Okiro and Ndungu (2013) cites that the introduction of internet banking and mobile banking has favorably affected banks capacities to offer services and this lead to a higher performance.

2.3.2 Management Efficiency

The management is responsible for organizing all the other factors of production in a way that they earn income. In this respect, management plays an important role in

enhancing performance of the financial institutions. More so, banks are involved in provision of financial services to a variety of customers which implies that it is crucial that market and product is done. Thus, product diversification is vital if banks are to experience higher performance. Ongore and Kusa (2013) notes that the board has a role in enhancing performance of banks. This is in connection to the ability of the board to make appropriate policies in respect to operations of the banks. In order to enhance efficiency, the management should be competent to make right decisions that ensures that risk are mitigated.

Obamuyi (2013) maintains that competent management enhances efficiency thereby reducing expenses which can potentially lead to improved profits and profitability of commercial banks. More importantly, management efficiency should focus on costs and wastes reduction such that profits are maximized. It can therefore be noted that management of banks is responsible for steering the banks into achieving high profitability. Profits are important to banks since they enhance the stability of the banks ensuring that they can meet their liabilities without delaying. The management should plan the operations of banks in way that the financial innovations adopted are capable of enhancing performance. It is true to suffice that, without appropriate management policies, efficiency may be hard to achieve and this could result into poor performance.

2.3.3 Credit Risk

Commercial banks are involved in offering financial services to a wide range of customers. It is vital that the banks offer credit facilities to those clients that are credit

worth in order to reduce the frequency of incurring non-performing loans. In this respect it is therefore important for banks to manage credit risk appropriately.

According to Dang (2011) credit risk is the chance that the loans awarded to customers won't be repaid. Thus, credit risk is the probability of borrowers defaulting from their loan obligations. This hampers the profitability of commercial banks because loan defaults leads to loss of interest which is the main income source of commercial banks. Commercial banks should therefore formulate credit policies that are appropriate in ensuring that credit risk is kept as low as possible and where practical, non-performing should be eliminated. This same sentiment is maintained by Sangmi and Nazir (2010) who views that credit risk is one of the major determinants of profitability of commercial banks.

2.3.4 Liquidity

Liquidity focuses on the capacity of firms to pay their short terms as they become payable. In this respect, liquidity tends to express whether entities can repay debts as they become payables. According to Ifeacho and Ngalawa (2014) liquidity of a bank is important because it ensures that banks can clear off liabilities without falling into financial distress. Commercial banks usually have liabilities which they may owe other banks or federal banks. In order to avert plunging into financial distress, commercial banks should therefore keep adequate current assets to clear off current liabilities. However, maintaining a large portion of assets in liquid state interest income is lost because long term assets earn income.

According to Okoth and Gemechu (2013) liquidity management is a key function of the management of banks. They noted that liquidity ensures that the public trust is upheld and thus affecting performance of banks. In the event that banks cannot service their dues in good time, this exposes them to financial distress and which could ultimately lead to bankruptcy. Liquidity management should be given the much attention it deserves in order to increase the profits of commercial banks. Further, since commercial banks main liabilities are the deposits, due care should be observed in structuring assets. When this is done effectively it ensures that banks operations are not compromised. As a result of appropriate liquidity management, performance of commercial banks is improved.

2.4 Empirical Review

Empirical review entails a review of other studies which are related to the current one. This is important because it avoids duplication of researchers through establishing a research gap. The empirical review is discussed in this section.

Akhisar, Tunay and Tunay (2015) undertook a study on effect of innovations on bank's performance in Turkey. The study adopted a descriptive research design where secondary data was collected from twenty-three nations. The study sought to assess the effect of credit cards and debit cards, point of sales, ATMs and internet banking. It was revealed that both POS and internet banking had a negative effect on performance of banks. On the contrary the ratio of ATMs to bank branches had positive effect on performance. The study concluded that ATMS are beneficial to banks since they improve performance. This study was carried out in Turkey and

involved both developed countries and developing nations. Thus, it is important to undertake a comparative panel study.

In Pakistan, Fu-Qiang and Sajid (2014) undertook to assess whether profitability of banks was affected by use of debit cards. Bank performance was measured in terms of Return on Assets. Their study collected data for a period of ten years and used descriptive statistics in reporting the findings. It was revealed that a positive relationship existed between adoption of debit cards and profitability. This reveals that technologies is beneficial to commercial banks. However, this study was undertaken in Asia.

Malhotra and Singh (2010) did a study in India with the purpose of ascertaining the role of financial innovations. In particular, the study assessed internet banking by collecting data eighty-two banks for a period of ten years up to 2007. The study was motivated by the existence of literature that depicted that financial innovations had tangible results on performance. However, the study revealed that neither internet banking nor experience in internet banking had effect on performance of the Indian lenders.

In Nigeria, Dauda (2011) undertook a study on banks' performance in Nigeria. The study assessed the effect of the role of financial innovation and its impact on performance. The study collected primary data through issuance of questionnaires.

The study also sought to evaluate the extent to which financial innovations influenced customer satisfaction and profitability. A sample of fifteen banks were picked in order

to evaluate the hypothesis. The study revealed that innovations impact was three folds in that it fostered the motivation of staff, improved service delivery which consequently bettered profitability of the lenders.

Cherotich et al. (2015) assessed the role of innovations on banks' performance. Due to the purpose of the study a descriptive research design was deemed fit. All banks were considered in data collection since aggregate data was adopted which was collected from records of the Central Bank of Kenya.

The period of analysis was five years up to 2013. The Regression model revealed that cheques, EFTs and RTGS significantly influence variations in Return on Assets. More so, all these variables had positive and statistically significant impact on performance of the banks.

In another study Muiruri and Ngari (2014) did a study to evaluate the effect of financial innovations on financial performance of commercial banks in Kenya. The researchers aimed at assessing effect of credit cards, mobile banking, internet banking and agency banking on performance of banks. The study adopted both first hand data that was collected through issuance of questionnaires and secondary data. The period of analysis was four years from 2008. It was revealed that all the variables affected performance in a positive manner. Further all the aspects tested has significant influence on profits of banks in Kenya.

Another study was done by Gichungu and Oloko (2015) with the aim of establishing whether banks performance was affected by bank innovations. The study purposed to

assess of agency banking, use of ATMs, online banking and mobile banking had effect on bank's performance. Secondary data was mined from bank's annual reports. Descriptive statistics were used to report the findings. The regression model revealed that these variables significantly influenced performance. More so, all these variables were establish to be statistically significant in influencing performance of the institutions. Also, all the variables were revealed to be significant determinants of financial results of the entities.

Monyoncho (2015) purposed to determine whether financial performance of banks in Kenya was affected by banking technologies. His study followed descriptive analysis where all forty-four banks were considered.

The ANOVA test revealed that use of ATMS, debit cards and credit cards, mobile banking and internet banking affected performance of banks in a significant manner. Further, the model revealed that all the variables positively and significantly affected banks' performance.

2.5 Conceptual Framework

A conceptual framework is a flow chart that shows the hypothesised relationship between independent and dependent variables. Independent variables are those variables that are not influenced by others. This study has four independent variables which are: agency banking and use of ATMS. Dependent variable is that variables that is expected to be influenced by other variables. The dependent variable for this study was financial performance

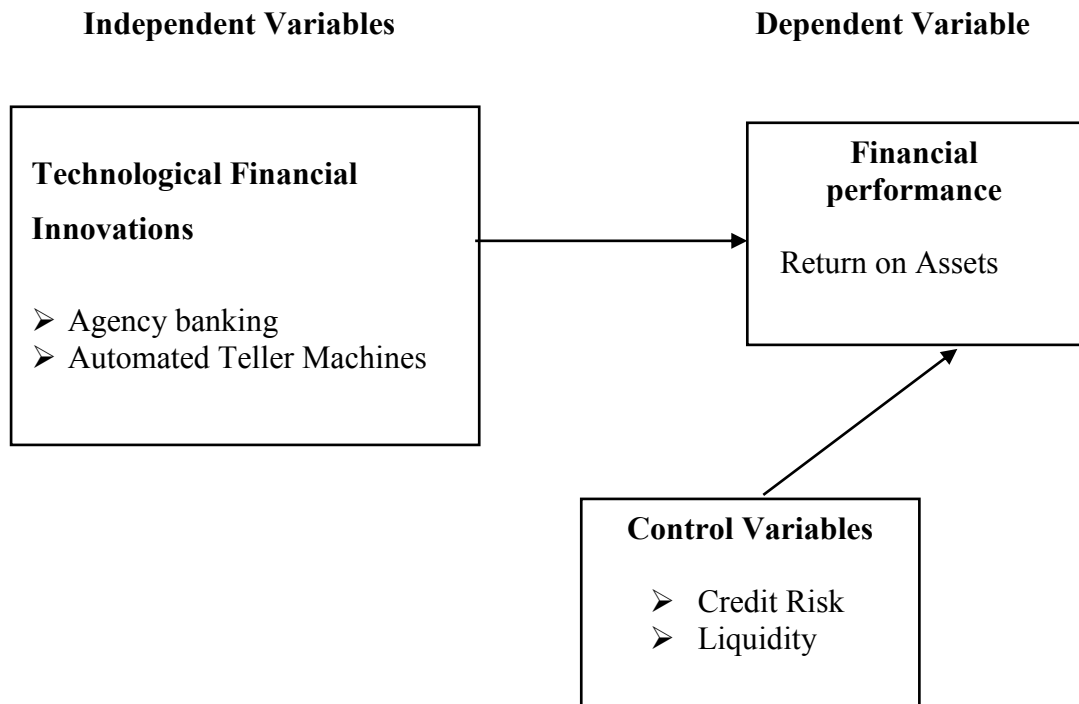


Figure 2: 1 Conceptual Framework

2.6 Summary of Literature Review

The literature reviews has provided a theoretical review of the study. In this respect, the chapter entailed a discussion of theories that subtly expounds on the study variables. These theories are financial intermediation theory, innovation diffusion theory and Silver Constraints theory of innovations. Also, the chapter has discussed the theoretical relationship between financial innovations and performance of banks. The study variables were also conceptualized to provide a hypothesized relationship among variables. Further, this chapter has a review of global and local studies that are pertinent to this study which has helped in identification of the gap to be filled.

Some studies revealed that a bank's innovations in terms of establishing new products and new channels positively impacts on performance (Mabrouk and Mamoghli (2010) found that first mover banks enjoyed more benefits of financial innovations. Akhisar et al. (2015) revealed that in Turkey, ATMs positively affected performance while

both POS and Internet banking have negative effect. Malhotra and Singh (2010) established that innovations did not have any significant effect on revenue of banks in India. In Pakistan, Fu-Qiang and Sajid (2014) revealed that debits cards positively affected performance of banks. In Nigeria, Dauda (2011) innovations improved financial standings of the lenders. Cherotich et al. (2015) revealed that cheques, EFTs and RTGS significantly influence variations in Return on Asset.

Equally, Muiruri and Ngari (2014) revealed that of credit cards, mobile banking, internet banking and agency banking had positive and significant effect on bank's performance. Gichungu and Oloko (2015) did a cross sectional survey and found that agency banking, use of ATMs, online banking and mobile banking significantly improved performance of banks. Monyoncho (2015) revealed that use of ATMS, debit cards and credit cards, mobile banking and internet banking affected performance of banks in a significant manner.

The literature has shown that innovations can potentially led to enhanced performance or hamper performance of banks. On the same line, the studies found differing significance of innovations. More so, few studies have been done in Kenya using panel data analysis. As a result of these contradicting results and the fact that there is need to compare findings, this study is justified. The studies objectivewas to provide evidence of how innovations affects performance of firms, case of banks in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter has research design, target population, sample design, data collection and data analysis technique.

3.2 Research Design

A research design is a framework that facilitates data collection and analysis in a way that objectives of the study can be met. According to Sekeran (2012) a research design is a plan that sets the rules of data collection ensuring that research questions are answered. The choice of research design is determined by the type of data and type of data analysis that a given research adopts (Cooper & Schindler, 2013). This study adopted a descriptive research design. A descriptive research design is a type of research design that seeks to collect data to ascertain the existence of a relationship between variables.

Another reason for adopting a descriptive research design is that it entails collection of data without interfering with their natural settings (Mugenda & Mugenda, 2003). In this respect, a descriptive research seeks to establish the existence of relationship between variables their natural settings. Thirdly, a descriptive research design seeks to describe specific patterns whilst describing situations in the past and making inferences about current and future situations.

3.3 Target Population

A target population defines the set of all items that forms the basis of a given study. According to Cooper and Schindler (2013) a target population as a complete set of elements and units that a given study seeks to make inferences on.

The target population for this study were all commercial banks in Kenya. These includes 42 commercial banks in Kenya which were in operation from 2012 to 2016.

3.4 Sample Design

A sample is a small portion of the target population that is considered in data collection in order to make inferences on the entire target population. This is the usual case, when the target population is vast. Conversely, a census is done. According to Sekeran and Bougie (2012) a census considers all items in data collection. This study had a sample size of 15 commercial banks. Mugenda and Mugenda (2003) recommends that a prudent sample size that is adequate for providing inferences about the total target population is approximately between the range of 10 % to 30 %. The sample of 15 commercial banks represented 36 % of the fully licensed commercial banks in Kenya.

3.5 Data Collection

Secondary data was collected from 2012 to 2016 to be able to provide a panel data set that can be analysed to provide inferences on the effect of financial services. Data was collected for a period of 5 years. This period is suitable because it is the period that Kenya has experienced tremendous developments in terms of financial innovations. The study collected data from the Central Bank of Kenya supervisory reports, the respective Bank websites and Annual financial statements of banks. From the CBK

bank supervisory reports, the study obtained values for Return on Assets of each bank. From the Annual Financial statements and Reports, data on credit risk and Bank liquidity. From the websites data on number of agency banking outlets and ATM distribution were obtained. These sources are credible and thus allows generalization of findings. This study seeks to assess the effect of technological financial innovations on performance.

3.6 Diagnostic Tests

Diagnostic tests are those tests that ensure that the assumptions of linear modelling are not violated, and this provides validity to the regression outputs. A regression model assumes that there is a potential relationship between the independent variables and dependent variable. This study carried out autocorrelation tests, multicollinearity test, test for normality and the test for heteroscedasticity.

3.6.1 Autocorrelation

Brooks (2008) notes that autocorrelation exists where variable measures are influenced by its historical values which makes modelling complex. It is often referred to as first order serial correlation.

In other words, the current measures of a variable indicate a similarity due existence of time lag for the same variables. In order to ensure that the data set does not have autocorrelation, the study used the Wooldridge test of autocorrelation. The evaluation criteria is that when the statistic is less than less than 0.05 it is then probable that the data has first order serial correlation.

3.6.2 Multicollinearity

According to Brooks (2008) Multicollinearity exists when the independent variables relates to another independent variable. In this respect, it becomes hard to establish the combined impact of the independent variables on the dependent variable. This study employed the Variable Inflation Factor (VIF) and tolerance test. The rule is that data is void of multicollinearity when the VIF is less than 10 and the tolerance statistic is more than 0.1. Tolerance is the reciprocal of VIF.

3.6.3 Heteroscedasticity

According to Brooks (2008) heteroscedasticity is the other way round of homoscedasticity. Thus, to understand the term heteroscedasticity, it is important to understand what homoscedasticity means. Homoscedasticity implies a situation where the error terms in the regression model have constant variance and that they cannot influence each other. In this respect, the linear equation makes a basic assumption that the error term is homoscedastic and thus constant which does not interfere with the output of the model. This study used the Breusch-Pagan test to detect Heteroscedasticity. As a general rule, the Chi-square is less than 0.05 a given set of data is not homoscedastic.

3.7 Data Analysis Technique

This study adopted descriptive statistics where data was analysed using descriptive statistics such as mean and standard deviation. The study also used inferential statistics in which a multiple regression model was developed in order to assess the effect of technological financial innovation on financial performance of the banking institutions. The study used STATA version 12 in data analysis.

3.7.1 Analytical Model

The study has used this panel regression model:

$$FI_{it} = \beta_0 + \beta_1 AB_{it} + \beta_2 ATM_{it} + \beta_3 CR_{it} + \beta_4 BL_{it} + \varepsilon_t$$

Where:

FP_t = financial performance at year t

β_0 = is the constant to be estimated by the model

$\beta_1, \beta_2, \beta_3,$ and β_4 = Coefficients indicating influence of independent variables on the dependent variable.

AB_t = Number of Bank Agent a transactions year

ATM_t = Number of ATMs per bank per year

CR = Credit Risk of bank (Control variable)

BL = Bank Liquidity (Control variable)

t = time

i = individual bank

ε_t = error term in the model

3.7.2 Tests of Significance

The study carried out at 95 % confidence level indicating that the margin of error was 5 %. The F-test was computed to explain the overall effect of technological financial innovation on financial performance.

The study measured measure the statistical significance of variables by evaluating the P-Value. Variable are significant if the P-Value was less than 0.05 which is the alpha value at 95 % confidence level.

3.8 Hausman Model Specification Test

This test is used to select the model that is suitable for reporting the regression model. The Hausman test aims at ensuring that the error term does not correlate with any of the independent variables. In other words, the Hausman test seeks to validate that the error term does not affect the predictor variables which would otherwise invalidate the results of the regression model. The test seeks to guide on whether to use the model selection. The existence of time relate effects in order to decide on whether to adopt the Random Effects (RE) model or Fixed Effect (FE) model.

This was done by use of Hausman test that aims ensuring that the error term does not correlate with any of the independent variables. In other words, the Hausman test seeks to validate that the error term does not affect the predictor variables which would otherwise invalidate the results of the regression model. The test seeks to guide on whether to use the Fixed Effects model or the Random Effects Model.

Fixed Effect (FE) model is usually preferred where it is probable and known that panel specific effects do with certainty affect and correlate with the predictor variables. However, the FE model removes the time invariant model in the panel data series. Conversely, the RE model assumes that panel specific effects are random meaning that they are not correlated with the predictor variables. Of importance is that where the Hausman test statistic is less than 0.05, we use fixed effects model which forms the basis of rejecting the null hypothesis. On the other hand, when the Hausman test value yields a value of more than 0.05, we use the random effects model which means we adopt the alternative hypothesis.

3.9 Variables Operationalization

The variables of this proposal are operationalized as presented on Table 3.1

Table 3: 1 Variables Operationalization

Variable	Its Meaning	Type of	Measurement	Studies	Scale
FP	Financial Performance is the measure of outcome of companies	Dependent	Return in Assets	Akhisar, Tunay & Tunay (2015). The Effects of Innovations on Bank	Ratio
AB	Agency banking is the carrying out of banking transactions by use of third parties who are not employees of the	Independent	Number of bank agents	Monyoncho, L.N. (2015). Relationship Between Banking Technologies And Financial Performance Of Commercial Banks In	Ratio
ATM	Automated Teller Machines is a machine that offers banking services to those with	Independent	Number of ATMs per year	Makur (2014). Effects of financial innovations on financial performance of banks in South Sudan	Ratio
CR	This is credit risk of bank which measured by rate of loan defaults	Control	Non-performing loans/ Total loans	Heffernan & Fu (2010). Determinants of financial performance in Chinese banking	Ratio
BL	This is the bank liquidity of a bank measured by the statutory	Control	Current assets/current liabilities	Oluwafemi S.A, Funso T.K, Adewale O.A., (2014). Determinants of Commercial Banks	Ratio

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

Chapter four contains data analysis, presentation of results and discussions of the results. The study sought to assess the effect of technological financial innovations on financial performance of commercial banks in Kenya. The study target all commercial banks in Kenya. A sample of 15 commercial banks was selected to be a representative of the entire population. Data analysis was done in both descriptive and inferential statistics. A regression model was done using panel data analysis. The study used STATA version 12 in both analyses. The results are presented in this section

4.2 Descriptive Data Analysis

The study collected data on Return on Asset, agency banking, automated teller machines, credit risk and bank liquidity. The results of the descriptive statistics are presented on Table 4.1. The STATA command was *sum, varlist*.

Table 4: 1Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
roa	75	0.034	0.027	(0.061)	0.077
ab	75	1,395.893	2,640.922	-	10,190.000
atm	75	232.467	161.031	49.000	580.000
cr	75	0.069	0.065	-	0.437
bl	75	0.364	0.093	0.144	0.569

As shown on Table 4.1, the mean ROA was 0.034 with a standard deviation of 0.027, the minimum was -0.061 with the maximum ROA being 0.077.

These results indicate that the performance of commercial banks in Kenya during the data collection period was not high. It therefore means that financial performance of

banks was low as evidenced by the fact that some banks recorded losses during the period.

Agency banking recorded a mean of 1395.893 with a standard deviation of 2640.922, the minimum agency banking transactions were nil and the maximum was 10,109. The results indicates that agency banking was growing over the time data was collected. More importantly it is vital to mention that agency banking started in the 2008 and only a few banks have adopted the platform. ATMs had a mean of 232.467 with a standard deviation of 161.031, the minimum was 49.00 and the maximum was 580. It therefore means that ATMs were not common for most banks which can be attributed to the fact that most ATM are found in the urban areas in Kenya.

Credit risk was found to have a mean of 0.069 with a standard deviation of 0.065, the best rate for the non-performing loans was 0.00 while the worst rate was recorded at 0.437. This means that banks were efficient in credit risk management since the rate was low. The study found that bank liquidity had mean of 0.364 with a standard deviation of 0.093, the minimum was 0.144 and the maximum was 0.569. These results indicate that liquidity of banks was low. However some of the banks kept a high liquidity ratio. Liquidity management entails taking deliberate measures to ensure that financial obligations can be cleared when the time of payment arise.

4.2.1 Exploratory Data Analysis

Panel data analysis requires the carrying out of exploratory data analysis with respect to the dependent variable in order to establish whether there exists time related fixed

effects. This study used graphical methods in carrying out exploratory data analysis. The STATA command for this statistic is *xtline, var* for the individual growth plot and *xtline variable, overlay* for the overlain graph. The findings are presented on Figure 4.1 and Figure 4.2

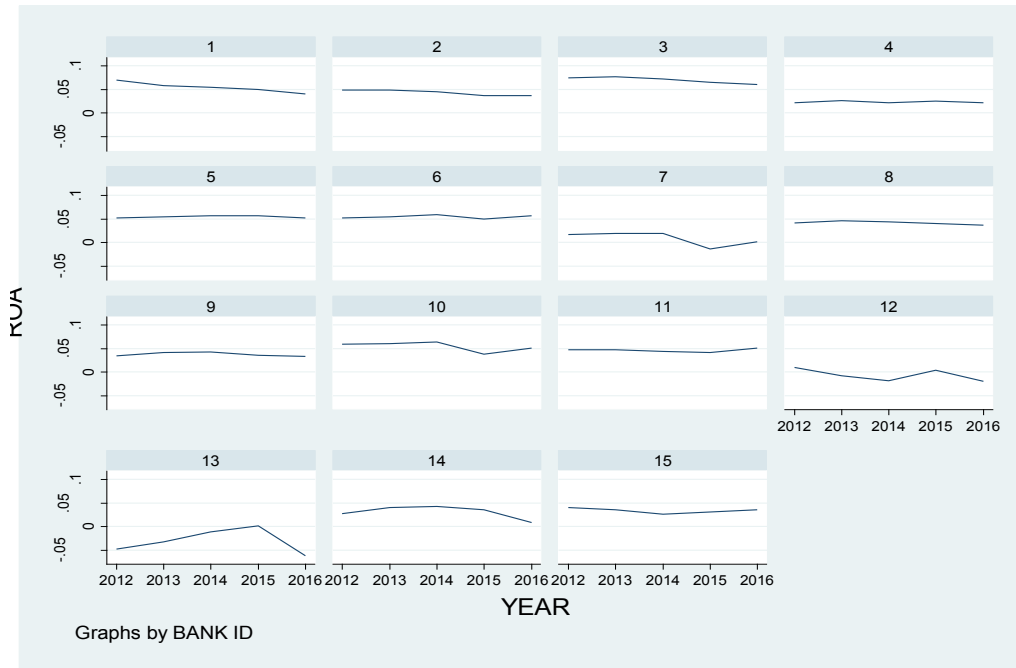


Figure 4: Individual Bank's ROA Growth Plot

The individual growth plot indicates that most of commercial banks followed a similar trends expect for Bank 5 and bank 12. Equally, the overlain plot revealed that the y-intercept for ROA of the banks was different but not very significant. Therefore the data set was found good enough for panel data analysis as opposed to the use a simple pooled regression model.

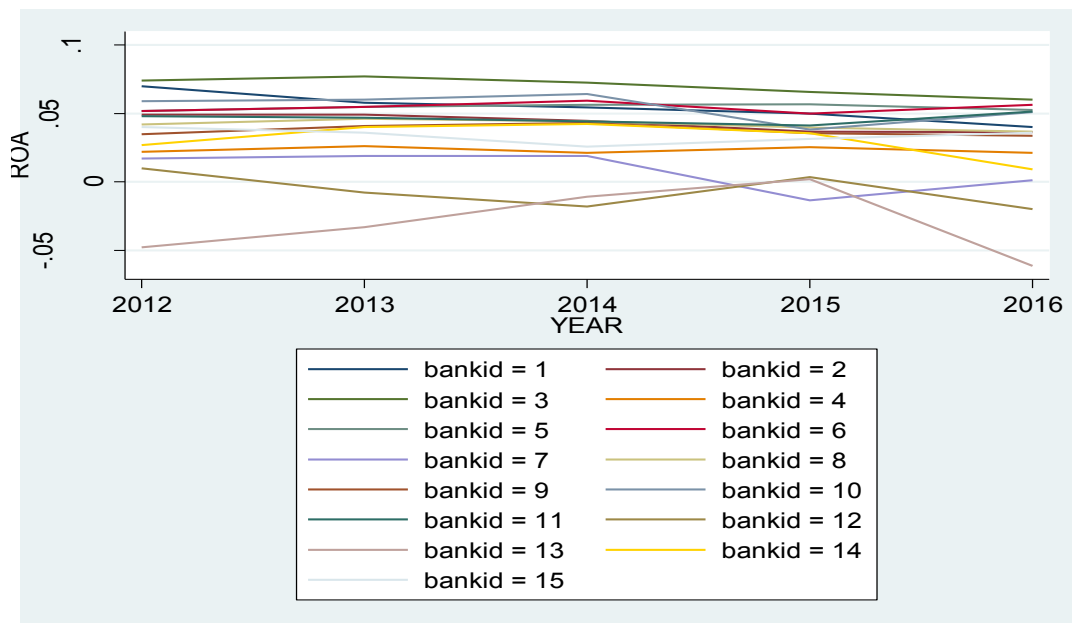


Figure 4: 2 Overlain Growth Plot

4.3 Correlation Analysis

The study computed a correlation matrix in order to ascertain that the independent variables were not perfectly correlated with each. An assumption of regression modelling is that none of the independent variables should be correlated with each. In case two variables are in perfect correlation, then one variable should be dropped. The results for this test are presented on Table 4.2

Table 4: 2Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)
(1) roa	1.000				
(2) ab	0.366	1.000			
(3) atm	0.387	0.836	1.000		
(4) cr	-0.528	-0.107	-0.011	1.000	
(5) bl	0.423	0.175	0.058	-0.214	1.000

Table 4.2 shows that ROA had a positive correlation with agency banking, ATMS and Bank liquidity at 0.366,0.678 and 0.423 respectively. ROA and credit risk had

negative correlation at -0.528. Agency Banking had a positive correlation with ATMs and Bank Liquidity at 0.836 and 0.175 respectively.

Credit and Agency banking had a negative correlation at -0.107. ATMs and Credit risk had a negative correlation at -0.011 and positive correlation with bank liquidity at 0.058. Credit risk and bank liquidity were negatively corrected at 0.214. The study found that none of the independent variables were perfectly correlated. In this respect all variables were used in data analysis.

4.4 Analytical Model

4.4.1 Diagnostic Tests

This study carried out the following diagnostic tests in order to ensure that assumptions of linear regression were not violated.

4.4.2 Autocorrelation

Autocorrelation exists where variable measures are influenced by its historical values which makes modelling complex. Autocorrelation is equally referred to as first order serial correlation. This study used the Wooldridge test of autocorrelation in evaluation of autocorrelation. The results are indicated on Table 4.3

Table 4: 3Test of Autocorrelation

Panel data -Wooldridge test for autocorrelation
H0: no first-order autocorrelation
F(1, 14) = 18.271
Prob > F = 0.0008

The study found a Woodlrigge statistic of 0.0008 which was less than 0.05 and this indicates that the set of data had autocorrelation problem. Therefore, the measures of a variables potentially had some similarity due existence of time lag for the same

variables. This is a common problem with panel data corrected over time and thus the findings had to be reported using autocorrelation corrected panel standard errors using Prais Winstein regression Model.

4.4.3 Multicollinearity

Multicollinearity exists when the independent variables relates to another independent variable. The study used the VIF test in order to establish the existence of multicollinearity. The results are presented on Table 4.4

Table 4: 4Test of Multicollinearity

	VIF	1/VIF
Ab	3.57	.28
atm	3.454	.29
Bl	1.095	.913
Cr	1.068	.937
Mean VIF	2.297	.

The study revealed that agency banking had a VIF of 3.57 with tolerance of 0.28, ATMs had 3.454 with a tolerance of 0.29, bank liquidity had a VIF of 1.095 with a tolerance of 0.913 and credit risk had a VIF of 1.068 with a tolerance of 0.937. The mean VIF was 2.297. These results indicate that the data set did not have multicollinearity problem.

4.4.4 Testing for Heteroskedasticity

Homoscedasticity implies a situation where the error terms in the regression model have constant variance and that they cannot influence each other. This study used the Breusch-Pagan test to detect Heteroscedasticity. The results are presented on Table 4.5

Table 4: 5Breusch-Pagan Test for Heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: ab atm cr bl	
chi2(4) = 12.82	
Prob > chi2 = 0.0122	

Table 4.5 shows a P-value of 0.0122 which is less than 0.05 indicating that the data was not homoscedastic. Therefore, it was important to fit a robust standard errors model as a remedy to the heteroscedasticity problem.

4.4.5 Measures of Normality

Normality test seeks to evaluate if data has normal characteristics. This was done using the skewness and Kurtosis. The results are presented on Table 4.6

Table 4: 6Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
Roa	75	-	0.01	17.83	0.00
Ab	75	-	0.01	24.98	-
Atm	75	0.01	0.11	8.72	0.01
Cr	75	-	-	51.97	-
Bl	75	0.64	0.90	0.24	0.89

Table 4.6, shows that all the variables exhibited a skewness of between the range of -3 and 3 and kurtosis of between the range of -10 to 10 indicating that the data exhibited normal characteristic.

4.4.6 Analytical Regression Model Coefficients

The study used the Hausman specification test in order to establish whether to adopt the Fixed Effect Model or Random Effect Models. The Hausman test seeks to validate that the error term does not affect the predictor variables which would otherwise

invalidate the results of the regression model. The test seeks to guide on whether to use the model selection.

The existence of time relate effects in order to decide on whether to adopt the Random Effects (RE) model or Fixed Effect (FE) model. A P-value of 0.055 indicating that the suitable model for reporting was the fixed effects model.

However, data had heteroscedasticity indicating that the appropriate model was the robust standard errors model. However, data had heteroscedasticity indicating that the appropriate model was the robust standard errors model.

The study used the robust standard errors model in reporting the model. The results are indicated on Table 4.8

Table 4: 7Prais-Winsten regression, heteroskedastic panels corrected standard errors

Roa	Coef.	St.Err	t-value	p-value	Sig.
Ab	0.000	0.000	-0.77	0.442	
Atm	0.000	0.000	2.72	0.006	***
Cr	-0.174	0.042	-4.11	0.000	***
Bl	0.071	0.022	3.24	0.001	***
_cons	0.001	0.012	0.07	0.940	
Mean dependent var	0.034	SD dependent var		0.027	
R-squared	0.681	Number of obs		75.000	
Chi-square	84.307	Prob > chi2		0.000	

*** p<0.01, ** p<0.05, * p<0.1

The regression model was established as follows

$$FI_t = 0.001 + 0.000AB_t + 0.000ATM_t - 0.174CR_t + 0.071BL_t$$

Where 0.001 is ROA in absence of the study variables

-0.174 is the decrease in ROA in response to a one unit increase in credit risk

+0.071 is the increase in ROA in response to a one unit increase in bank liquidity

Agency banking, ATMS had minimal but positive effect on financial performance of commercial banks in Kenya

The study found an R^2 of 0.681 indicating that the independent variables accounted for 68.1 % of variations in financial performance of commercial banks which was measured in terms of ROA. A P-value of 0.000 indicating that the model was substantially fit in to predict performance. It was found out that agency banking and use of ATMS had minimalbut positive effect on performance. Bank liquidity has positive and significant effect on the financial performance of commercial banks. Credit risk had negative and significant effect on the financial performance of commercial banks in Kenya.

4.5 Discussion of Findings

This study had sought to establish the effect of technological financial innovations on commercial banks performance in Kenya. The model that was developed as found to be fit for explaining the effect of the selected predictors on financial performance of commercial banks in Kenya. The overall model had a P-Value of 0.000 as showed by probability of the Chi-square. This indicates that the model was fit in predicting financial performance of commercial banks. The Prais Winstein regression with robust standard errors was used since data was found not homoscedastic. An R^2 of 0.681 was found which indicates that an extent of 68.1 % of variations in ROA of banks was influenced by changes in agency banking, use of ATMS, credit risk and Bank liquidity. This means that 31.9% of variations in ROA was influenced by other factors that were not within the scope of this study.

The study revealed that financial innovations had an effect on financial performance of commercial banks. The study revealed that agency banking has a positive and non-significant effect on performance. This is as indicated by the coefficient of 0.000 at three decimal places with a P-value of 0.442. The P-Value was greater than 0.05 indicating that the relationship between agency banking and ROA was not statistically significant.

Agency banking improves efficiency of service delivery since the banks' clients can access banking services. In this respect, it may attract more customers who may earn the bank transactional fees which can hence improve profitability. These results agree with those of Muiruri and Ngari (2014) who did a study evaluating the effect of financial innovations on financial performance of commercial banks in Kenya and revealed that mobile banking, credit cards, agency banking and internet banking on performance of banks affected performance in a positive manner.

On the second variable, that is, use of ATMs, it was found out that there was a positive albeit minimal but statistically significant effect on ROA of commercial banks in Kenya. This inference is supported by the coefficient of 0.000 and P-value of 0.006 respectively. It therefore means that adoption of ATMs is beneficial to banks as it improves profitability. Perhaps, this can be attributed to the fact that ATMs are located close to the customers and this can potentially increase transactional income for commercial banks. Similar findings were revealed by Akhisar, Tunay and Tunay (2015) who undertook a study on effect of innovations on bank's performance in Turkey.

The study found out that credit risk significantly and negatively affects performance of commercial banks in Kenya. Credit risk is the chance that the loans awarded to customers won't be repaid. In this respect, an increasing in non-performing loans tends to lower interest income for banks. These findings agrees with those of Sangmi and Nazir (2010) who views that credit risk is one of the major determinants of profitability of commercial banks in Pakistan.

It is true to suffice that when credit risk management of banks is not effect in mitigating credit risk, non-performing loans would increase and this is not profitable for banks. Credit risk management seeks to establish a risk management framework that is robust not to lower loans uptake but still that which can low the level of non-performing loans.

The study has found out that bank liquidity affects performance of banks in a positive way. More so the relationship between bank liquidity and financial performance was statistically significant. Liquidity is the ability of a business to pay off debts as they mature. This finding disagrees with those of to Ifeacho and Ngalawa (2014) who established that bank liquidity has a negative effect on financial performance of banks in Nigeria. Perhaps, this is because too much liquidity can reduce income that would have been earned should the assets been invested for long term basis. In the event that the banks in Nigeria banks maintained too much liquidity, this can be lead to a negative relationship between liquidity and financial performance.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter includes a summary of findings, conclusion and recommendations. The study sought to establish the effect of technological financial innovations on performance of banks in Kenya. Secondary data was collected from individual commercial banks records and annual financial statements for the period 2012 to 2016. A panel data analysis was adopted in this study.

5.2 Summary of Findings

The study revealed that technological financial innovations had an effect on financial performance of commercial banks in Kenya. The entire model was found to be fit in explaining the variations of ROA in respect to agency banking and use of ATMS among the commercial banks in Kenya. In particular, the study found out that agency banking had positive but minimal effect on financial performance of commercial banks in Kenya. Perhaps, this can be attributed to the fact that agency banking ensures that customers can access banking services closer to their locations of work or homes and thus can potentially increase transaction income for the commercial banks.

The study equally found out that adoption of ATMs in offering banking services improves financial wellness of the financial institutions. The relationship between ATMs and financial performance was found to be statistically significant. It is to be noted that ATMs have various functions in respect to banking services. ATMs enables the banks' customers to withdraw cash and deposit cheques and cash easily. Use of

ATMs ensures that banks services can be accessed with ease and this earns the bank extra transactional incomes.

The study found out that credit risk had a negative effect on financial performance of commercial banks in Kenya. Credit risk is measured by the rate of non-performing loans as a percentage of gross loans. In this line, an increase in credit risk due to increase in non-performing loans is expected hamper the financial wellness of financial entities. This is due to the loss of interest income because of a deteriorating assets. Loans are the main income earning assets of most lenders. Thus where credit risk is not effectively managed leads to increase in non-performing loans thus lowering the profits of commercial banks.

The study found that bank liquidity improves performance of banks in Kenya. In addition it was revealed that the effect of liquidity on financial performance was notably significant. Bank liquidity is crucial as it denotes the ability of the financial entities to service call deposits, grant loans and meet other obligations as and when they become payable. For this reason, an adequate liquidity prevents banks from plunging into financial distress. Liquidity of a bank also tends to send signals to the stakeholders on the ability of banks to meet financial obligations. In this respect, where liquidity is greatly compromised performance tends to be hampered.

5.3 Conclusions

The study made the following conclusion on the findings. The study concluded that there is a weak effect of technological innovations on financial performance of commercial banks in Kenya. The study concluded that agency banking positively

impacts on bank's profitability. In addition the study concluded that the relationship was not statistically significant.

Agency banking brings banking services closer the customers and this facilitates the access of such services conveniently and also for longer hours. Agency banking outlets operate for longer hours than the traditional banking halls.

The study concluded that adoption of ATMs positively and significantly influenced bank's financial wellness. ATMs provide banking services conveniently in a wide scale. Customers can make deposits, both cash and cheques through the drop boxes and can also withdrawal cash at cheaper rates than at the banking halls. With increased transactions due to convenient access, transactional fees are bound to increase and this may enhance performance of banks. In addition, a bank with many ATMs may attract new customers thus leading to market leadership in terms of customer base.

The study established that credit risk negatively and significantly impacts performance of banks. Credit risk if not effectively handled can result to financial crisis particularly when loans are not being serviced. Credit risk is conventionally measured by the rate of non-performing loans of lenders. Low percentage is an indication of an effective risk management framework. Conversely, it shows that risk management is not helpful in terms of risk identification, assessment and control. Credit risk is a major concern for all financial institutions whose main business is lending.

The study concluded that bank liquidity has a positive effective on financial wellness of banks. In addition, the study concluded that the relationship existing between the two variables is significant. Bank liquidity is a critical aspect that is actually enforced by the Central Bank of Kenya.

Perhaps, this can be attributed to the fact that liquidity enables banks to settle call deposits and regular deposits and other financial obligations when required to do so. To this end, liquidity of banks is an important ingredient towards ensuring that the stability of the individual bank and entire sector is maintained.

5.4 Recommendations

The study commends that banks should adopt technological financial innovations since it was established that they do positively impact on banks' financial wellness. In as much as the impact was minimal, the relationship was positive and therefore use of such tools should be promoted. The top management of commercial banks should increase the number of ATMs and agency banking outlets around the country since this would reduce the operational costs associated with running the traditional banking halls. For instance, most agency banking outlets are manned by vendors and thus the banks does not pay for such overheads like rent, power and security expenses. The vendors are contractors whose returns are commissions based on volume of transactions recorded in a certain month.

Also, the study recommends that commercial banks should establish an effective risk management framework in order to reduce the negative effect of credit risk. In this light, appropriate credit risk management would aid in reduction in non-performing

loans. Non-performing leads to loss of interest income. This is because loans are the major income earning assets of commercial banks.

The study recommends that banks need to adhere to the liquidity guidelines that is issued the Industry regulator, that is, Central Bank of Kenya. Through maintaining the minimum liquidity of 20 % as required by the CBK improves stability of the entire sector.

The banking sector is quite volatile and it is for this reason that this study advocates for the CBK to enhance regulation and enforcement with respect to the banking Act stipulations.

5.5 Limitations of the Study

Due to time and financial constraints, this study was done on fifteen commercial banks only which was selected as the sample size. A small sample size like this may increase the inherent risk associated with sampling, that is, the sample may not be a representation of the entire bank population. However, in line with the purpose of the study the sample size was fit and enough to make inferences and generalise the findings.

The study was done for a period between the years 2012-2016 and the outcome gave a conclusive results, a period of five years. This period of time is short and perhaps undertaking a similar study in a longer period of time may lead into different conclusions. In addition, the inclusion of control variables may have potentially interfered with the exact position in respect to effect of technological financial innovations on financial performance of the entities under consideration. However,

banks' profitability is not solely influenced by technological financial innovations and therefore it was necessary to include the selected control variables.

5.6 Suggestion for Further Research

This study sought to establish the effect of technological financial innovations on financial performance of commercial banks in Kenya. The study revealed that financial innovations have weak effect on financial performance. The study recommends that another study be done on more banks in order to compare the findings with the ones of this study.

The study further recommends that primary data be used in future studies to compare the outcomes with those of secondary data used in this study

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APPENDICES

Appendix A: Secondary Data Collection Sheet

Year	ROA	Agency Banking Number of Bank Agents per bank	ATMs(number) Number of ATMs per bank	Credit Risk (Nonperformi ng loans/Gross loan)	Bank Liquidity (Current Assets/Current Liabilities)
2012					
2013					
2014					
2015					
2016					

Appendix. B: Kenyan Commercial Banks

1. African Banking Corporation, Nairobi	2. Bank of Africa Kenya, Nairobi
3. Bank of Baroda, Nairobi	4. Bank of India, Nairobi
5. Barclays Bank of Kenya, Nairobi	6. CFC Stanbic Bank
7. Chase Bank Ltd, Nairobi	8. Citibank, Nairobi
9. City Finance Bank	10. Co-operative Bank of Kenya, Nairobi
11. Commercial Bank of Africa,	12. Diamond Trust Bank, Nairobi
13. Consolidated Bank of Kenya Ltd,	14. Dubai Bank Kenya Ltd, Nairobi
15. Credit Bank Ltd, Nairobi	16. Equatorial Commercial Bank Ltd
17. Development Bank of Kenya, Nairobi	18. Equity Bank,
19. Guardian Bank, Nairobi	20. Family Bank, Nairobi
21. Gulf African Bank Ltd, Nairobi	22. Fidelity (Commercial) Bank Ltd
23. Habib Bank A.G. Zurich.	24. Fina Bank Ltd, Nairobi
25. Habib Bank Ltd, Nairobi	26. First Community Bank Ltd, Nairobi
27. Housing Finance Co. Ltd,	28. Paramount Universal Bank Ltd
29. Imperial Bank, Nairobi	30. Prime Bank Ltd, Nairobi
31. I&M Bank Ltd	32. Southern Credit Banking Corp. Ltd
33. K-Rep Bank Ltd, Nairobi	34. Standard Chartered Bank, Nairobi
35. Kenya Commercial Bank Ltd	36. Trans-National Bank Ltd, Nairobi
37. Middle East Bank, Nairobi	38. UBA Kenya Bank Ltd., Nairobi
39. Victoria Commercial Bank Ltd.	40. NIC Bank
41. M-Oriental Commercial Bank	42. CharterHouse Bank (Under statutory Management)

Appendix. C: Data Template

BANK	BANKID	YEAR	ROA	AB(No. of Bank Agents)	ATM(No. of ATMs)	CR	BL	TIME
Barclays	1	2012	0.07	0	230	0.03	0.439	1
	1	2013	0.058	0	230	0.01	0.427	2
	1	2014	0.0544	0	239	0.035522	0.44	3
	1	2015	0.0501	0	223	0.035849	0.34	4
	1	2016	0.0402	182	214	0.065053	0.283	5
Diamond Trust	2	2012	0.049	0	90	0.05	0.32	6
	2	2013	0.049	0	98	0.01	0.49	7
	2	2014	0.0447	482	110	0.012587	0.51	8
	2	2015	0.0369	1139	126	0.028503	0.56	9
	2	2016	0.0364	2520	145	0.038955	0.414	10
Equity	3	2012	0.074	3982	421	0.03	0.344	11
	3	2013	0.077	4803	438	0.01	0.34	12
	3	2014	0.0726	5179	502	0.038705	0.291	13
	3	2015	0.0656	8818	512	0.029783	0.477	14
	3	2016	0.06	10190	520	0.069929	0.481	15
Housing Finance	4	2012	0.022	0	83	0.066667	0.368	16
	4	2013	0.026	0	87	0.09	0.3312	17
	4	2014	0.0212	0	91	0.089991	0.2939	18
	4	2015	0.0252	0	93	0.075004	0.247	19
	4	2016	0.0212	0	97	0.109059	0.2105	20
I&M Bank	5	2012	0.052	0	144	0.01	0.375	21
	5	2013	0.055	0	153	0	0.54	22
	5	2014	0.0564	0	161	0.020984	0.52	23
	5	2015	0.0566	0	173	0.048628	0.52	24
	5	2016	0.0527	0	198	0.048628	0.3724	25
KCB	6	2012	0.052	3152	421	0.056	0.456	26
	6	2013	0.055	4803	433	0.08	0.333	27
	6	2014	0.0593	6030	481	0.051935	0.437	28
	6	2015	0.0501	7137	502	0.059482	0.375	29
	6	2016	0.0564	8155	530	0.075953	0.483	30
National Bank	7	2012	0.017	0	368	0.05	0.3	31
	7	2013	0.019	0	371	0.06	0.42	32
	7	2014	0.019	615	387	0.106281	0.315	33
	7	2015	-0.0134	789	391	0.161473	0.21	34
	7	2016	0.0014	932	403	0.437026	0.326	35
NIC	8	2012	0.042	0	174	0.03	0.35	36
	8	2013	0.046	0	183	0.02	0.2912	37
	8	2014	0.0444	0	193	0.060918	0.3514	38
	8	2015	0.0399	0	198	0.118568	0.2922	39
	8	2016	0.0366	0	210	0.112435	0.3874	40

CFC	9	2012	0.035	0	43	0.01	0.2179	41
	9	2013	0.041	0	45	0.01	0.2053	42
	9	2014	0.0431	0	47	0.037529	0.2108	43
	9	2015	0.0356	0	47	0.046921	0.36	44
	9	2016	0.0337	0	49	0.05919	0.55	45
Stanchart	10	2012	0.059	0	97	0.01	0.3812	46
	10	2013	0.06	0	98	0.02	0.3947	47
	10	2014	0.0642	0	95	0.083499	0.3837	48
	10	2015	0.0383	0	98	0.119588	0.4612	49
	10	2016	0.051	0	98	0.113497	0.5693	50
Cooperative	11	2012	0.048	4187	527	0.07	0.353	51
	11	2013	0.047	5224	538	0.04	0.371	52
	11	2014	0.0443	6187	545	0.044009	0.338	53
	11	2015	0.0414	7186	570	0.038498	0.361	54
	11	2016	0.0515	8765	580	0.046699	0.416	55
Consolidated Bank	12	2012	0.01	0	98	0.07	0.2124	56
	12	2013	-0.008	0	102	0.05	0.3187	57
	12	2014	-0.0182	0	107	0.2611	0.2793	58
	12	2015	0.0035	0	110	0.192811	0.2654	59
	12	2016	-0.0199	0	117	0.197538	0.3721	60
Ecobank	13	2012	-0.048	0	56	0.055191	0.2412	61
	13	2013	-0.033	0	58	0.03	0.2347	62
	13	2014	-0.0109	0	61	0.102048	0.3121	63
	13	2015	0.0018	0	63	0.079089	0.3525	64
	13	2016	-0.0613	0	68	0.195634	0.3978	65
Family Bank	14	2012	0.027	0	255	0.075244	0.34	66
	14	2013	0.04	138	260	0.137401	0.365	67
	14	2014	0.0424	873	264	0.071747	0.33	68
	14	2015	0.0355	988	268	0.06063	0.36	69
	14	2016	0.0091	2236	273	0.131158	0.144	70
CBA Bank	15	2012	0.04	0	49	0.026329	0.3915	71
	15	2013	0.036	0	54	0.036687	0.4112	72
	15	2014	0.0257	0	58	0.040683	0.34	73
	15	2015	0.0314	0	63	0.04386	0.3673	74
	15	2016	0.036	0	73	0.070897	0.451	75

Source: CBK Report, Commercial Bank Annual Reports, Bank Integrated

Report, Bank Investors Report & Various Commercial bank websites

Appendix D: Prais Winstein Regression Model From STATA

```

Prais-Winsten regression, heteroskedastic panels corrected standard errors

Group variable:  bankid                Number of obs   =    75
Time variable:  year                   Number of groups =    15
Panels:         heteroskedastic (balanced)  Obs per group: min =    5
Autocorrelation: panel-specific AR(1)      avg =    5
                                                max =    5
Estimated covariances =    15           R-squared       =    0.6811
Estimated autocorrelations =    15      Wald chi2(4)    =    84.31
Estimated coefficients =    5           Prob > chi2     =    0.0000
    
```

roa	Het-corrected					
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ab	-1.27e-06	1.66e-06	-0.77	0.442	-4.52e-06	1.97e-06
atm	.0000906	.0000333	2.72	0.006	.0000254	.0001559
cr	-.173858	.0422719	-4.11	0.000	-.2567094	-.0910065
bl	.0710227	.0219077	3.24	0.001	.0280845	.1139609
_cons	.0009293	.0123989	0.07	0.940	-.0233721	.0252306
rhos = .5094077 .1019282 .6714021 1 .1941952 ... -.3225186						

Appendix E: Hausman Test Table Extract from STATA

```
. hausman fe re
```

	— Coefficients —			
	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ab	-2.73e-06	-2.55e-06	-1.84e-07	1.40e-06
atm	.0000594	.0000936	-.0000341	.0001027
cr	-.0754943	-.0973373	.021843	.0006452
bl	.0148745	.0257909	-.0109165	.

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

Test: Ho: difference in coefficients not systematic

$$\text{chi2(4)} = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

= 9.26
Prob>chi2 = 0.0549
(V_b-V_B is not positive definite)

Appendix F: Descriptive Statistics

```
. sum roa ab atm cr bl
```

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	75	.0344413	.0274378	-.0613	.077
ab	75	1395.893	2640.922	0	10190
atm	75	232.4667	161.0309	49	580
cr	75	.0694853	.0653586	0	.4370264
bl	75	.3642733	.0925639	.144	.5693

Appendix G: Regression Model showing R² and adjusted R²

```
. regress roa ab atm cr bl
```

Source	SS	df	MS			
Model	.028844409	4	.007211102	Number of obs =	75	
Residual	.026865413	70	.000383792	F(4, 70) =	18.79	
Total	.055709822	74	.000752835	Prob > F =	0.0000	
				R-squared =	0.5178	
				Adj R-squared =	0.4902	
				Root MSE =	.01959	

roa	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ab	-1.53e-06	1.63e-06	-0.94	0.351	-4.78e-06	1.72e-06
atm	.0000828	.0000263	3.15	0.002	.0000304	.0001352
cr	-.1973085	.036004	-5.48	0.000	-.2691163	-.1255008
bl	.0948887	.0257502	3.68	0.000	.0435315	.146246
_cons	-.0035295	.0114999	-0.31	0.760	-.0264652	.0194063