EFFECT OF FINANCIAL INNOVATIONS ON FINANCIAL PERFORMANCE

OF COMMERCIAL BANKS IN KENYA

DAVID MUNENE

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or for any other award.

David Munene   Reg. No. 15/03297

Signature...

Date..

APPROVAL BY UNIVERSITY SUPERVISOR

I do hereby confirm that I have examined the masters' proposal of David Munene

Signed: _____   Date: _____

Supervisor

Dr. Edward Owino

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LIST OF ABBREVIATIONS

ACH   Automated Clearing House

ATM   Automated Teller Machine

CTS   Cheque Truncation System CBK

EFT   Electronic Funds Transfer

IDT   Innovation Diffusion Theory

MICR   Magnetic Ink Character Recognition

MVNO   Mobile Virtual Network Operator

ROA   Return on assets

ROE   Return on Equity

ROI   Return on investment

RTGS   Real Time Gross Settlement

TAM   Technology Acceptance Model

OECD   Organization for Economic Cooperation and Development

OPERATIONAL DEFINITION OF TERMS

Financial innovation   novel improvement in the class of financial instruments and products as a strategy to meet changing customer needs, regulations, tax policy and changes in technology (Bhattacharyya & Nanda, 2000)

Financial Performance   the steps used to measure or quantify how efficient or effective a business action is. To measure organizational performance, the actual value that assets gain is weighed against the value expected by investors (Margaritis&Psillaki, 2010).

Organizational innovation   is the move by an organisation to pursue neworganizational method to handle the firm's external relations, workplace organization or business practices(OECD, 2005)

Process innovation   is the move by an organisation to pursue new delivery methods or production processes that would offer significant improvement from the way the organisation has been handling its business aspects in the past. It may entail reengineering work through information technology (Davenport, 1993)

Product innovation   introducing service products or goods as improvements in the user qualities or functional qualitiesfor prior existing products (OECD, 2005)

ABSTRACT

Innovation sets an organization on the path of transformation, growth and prosperity in the context of changes in the external environment and internal environment. This also applies to banking organisations. The banking industry has been transforming radically in recent times due to innovations made by the commercial banks on their business models, services, products, regulation, processes, technology, systems and governance. This study's main research objective wasto investigate the influence that financial innovations have onKenyan commercial banks' financial performance. Specifically, the study pursued objectives to determine the effect that product innovations have on Kenyan commercial banks' financial performance; to investigate the effect that service innovations have on Kenyan commercial banks' financial performance and to investigate the effect that organizational innovations have on Kenyan commercial banks' financial performanceand to evaluate whether firm size has a moderating effect on financial innovations and Kenyan commercial banks' financial performance.The study adopted an explanatory research since the objective of the study was to determine the mechanisms and characteristics evident in the dependent- independent variables' relationship. The study focused on all the 40 commercial banks in Kenya by the year 2016. Data spanning five years from 2012 to 2016 was used. Panel data analysis was also used to achieve the study objectives. The study findings indicated that product innovation has a positive significant effect on financial performance of commercial banks in Kenya. Both organizational and service innovations had positive insignificant effect on financial performance of commercial banks in Kenya. Firm size was established to have significant moderating effect on financial performance of commercial banks in Kenya.The study recommends that commercial banks should consider revising their investment and decisions and invest more in product innovations such as ATMS, Mobile money transfer products and Credit Cards. This is following the results that product innovation will significantly influence their financial performance. Since firm size (Assets base) has a significant moderating effect on how financial innovations relates to financial performance of commercial banks, the study suggests that the commercial banks should be keen to evaluate their firm size whenever they are pursuing financial innovations strategy to improve their financial performance.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Innovation sets an organization on the path of transformation, prosperity and growth that happens alongside internal and external changes that happen internally or externally in a bank. This reality also applies to the banking sector. In recent times, banks have been transforming through innovative approaches applied on systems, governance, products, processes, regulation technology, services, and business models. The most notable change is the banking revolution created by information technology (Kumar, 2011).Financial markets have been liberalizing by embracing financial information systems and non-financial technologies. Hwang *et al.*, (2004) notes that this liberalization and globalization is occasioned by economic and political circumstances that created increased competition amongst the African banks. Consequently, the government authorities moved to relax banking regulations to allow the domestic banking industry to be restructured.

Commercial banks were previously faced with financial crises ranging from increasing nonperforming loan ratio, decreasing profitability, excess competition that led to overbanking, loose credit, lack of innovation, and low capital adequacy ratio. The modern commercial banks are trying to improve their financial performance by innovating in products, governance and services among other innovations. Gorton and Metrick (2010) states that the main reasons that have led to an increase in the innovations are tax advantages, fall in bankruptcy costs, lower regulatory costs, transparency, reduced moral hazard and customization. According to them, when businesses operate in very turbulent

environment, they pursue innovation with increased success chances – elevating them to better competitive position. They then strive to retain this balance to maintain their competitive advantage and achieve superior performance.

In the Kenyan financial markets, all profit-oriented organizations pursue better improved services, products and organizational structures. These are meant to lower the organizations' production costs, increase profits and meet the needs of customers optimally. Bank customers always seek out services that offer convenience, variety and new service options. The service products need to be able to address their unique individual needs with precision. Good enough, the increased societal embrace for technology in the past has been instrumental in making banks respond to the challenge that is optimal service delivery. The new emerging trend in the banking sector is increased competition levels between financial institutions and commercial banks. The eminent need to modify the condition and structure of financial systems has been occasioned by increased globalization and development of the financial markets. There is much focus on modifying financial regulations to eliminate or reduce financial constraints, for instance, the liberalization of interest rates. All these steps are taken by commercial banks in order to be at par and not lag behind in competition (Gitau, 2011).

1.1 1 Financial Innovations

Financial innovation can be defined as a continuous way of creating new financial procedures, services and products; and differentiating standardized products as a reaction to changes that happen in the economic environment (Philippas, 2011).However, innovation in the financial sector is defined as the creation and popularization of new

financial technologies, financial instruments, markets and institutions (Tufano, 2002). Sandvik (2003) indicates that financial innovations are a critical competitive approach in banking due to their perception of demonstrating a banking firm's capability to deliver its core values. Financial innovations are effective in improving the productivity levels of a firm that faces resource constraints.

Ignazio (2007) groups financial innovations into; new products for example adjustable rate mortgages and exchange-traded index funds; new services for example on-line securities trading and Internet banking; new "production" processes for example electronic record keeping for securities and credit scoring and new organizational forms for example a new type ofelectronic exchange for trading securities and Internet-only banks. Most of these financial innovations are used in the financial sector in Kenya by key market players including the commercial banks. The study will focus on product innovation, service innovation and organizational innovations.

Classifications of financial innovations include new production processes, new products, new organizational form, and new services. Any new service or intermediate product developed within a sector may easily be absorbed within new financial production procedures (DeYoung, 2001). According to Merton (1992), the prevailing institutional and economic environment determines the levels of financial innovations and creations that end up shaping economic mechanisms, complexity, political decisions and technical availability. Presently, financial markets require technological development for the systems to grow and be able to restructure market regulation.

Commercial banks in Kenya have continuously been innovating new products, services and governance as a strategy for improving financial performance in the sector. The financial sector has over time developed successfully with innovative products and services available in financial market. Some of these products are debit cards, credit cards, ATM cards, M-pesa and others that provide opportunity for electronic payment and sometimes replace the need to exchange physical cash. Similarly these products gain a wider recognition in financial market leading to reduction of holding amount of money in physical form (Makur, 2014).

1.1.2 Financial performance

Within the financial sector, performance has always been assessed along three dimensions – adaptability, efficiency and effectiveness (Bredrup, 2004).Financial Performance entails evaluating the extent of effectiveness and efficiency of intervention processes pursued by institutions within the sector. Improved organizational performance may be determined by assessing the tangible value generated by organisation assets against the expected performance by the investors (Margaritis&Psillaki, 2010).

Robinson (2003) indicates two ways of measuring performance: subjectively and objectively. Financial data can be relied on to obtain objective measurements. Miller (2007) suggests that the fact that most accounting information for firms are often less accessible makes subjective measurements more preferred than objective measurements. Even in cases where accounting information is available, it is susceptible to manipulation by the firm owners. There are a number of indicators by which departmental performance may be judged. The balanced scorecard offers both quantitative and qualitative

assessment approaches that recognize varied stakeholder expectations and the motive of assessing performance. These steps link process management and short-term outputs to the firm's performance (Johnson *et al*., 2006). There is great benefit associated with a firm's measurement system. Its nature shapes the employee and management's behavior. It is important to understand that financial accounting measures used traditionally in the sectormay sometimes give wrong perception that a firm is undergoing innovation and continuous improvement within the present day competitive business environment(Kaplan & Norton, 2001).Balanced scorecard provides an opportunity for managers to assess a firm along four perspectives: the customer perspective which deals with critical success factors which include market share, customer retention rates and relevant products; the internal business perspective deals with critical success factors which include process cycle times, and productivity or capacity utilization; the financial perspective deals with critical success factors which include survival, profitability and revenues; the innovation and learning perspective which takes into consideration the critical success factors which include training, quality improvement and service leadership. The importance of the innovation and learning perspective lies in the direct link between the company's value and its innovation ability, and capacity for learningand improving. A firm that is able to create customer value, launch new products and increase operating efficiencies continually will ultimately achieve penetration of new markets, increase in revenues and margins.

1.1.3Commercial Banks in Kenya

Kenya currently has 40 commercial banks, with one bank being under receivership that is Chase bank and Charter house, Dubai bank and Imperial banks having closed. Banks in

Kenya are classified into three strata; large peer, Medium peer group and small peer group(Central Bank of Kenya Report, 2015). The main laws that govern and regulate the Kenyan banking industry in Kenya are the micro finance Act 2006, Companies Act, Banking Act Cap 488 and the Central Bank of Kenya Act Cap 491. In most cases, these laws are applied alongside policy guidelines developed by the Central Bank of Kenya. The laws register commercial banks as deposit-accepting firms that generate profit by giving loans to businesses and charging interest on the loans. Central Bank of Kenya (CBK) has a responsibility of creating and implementing fiscal and monetary policies. Apart from policy formulation; CBK also acts as a bank that accepts deposits from commercial banks, and offers them loans as a lender of last resort.

The Kenyan banking sector has seen a range of financial innovations but not limited to: electronic money that was implemented in 2007; the debit cards and ATMs implemented in the last years of 1990s; Cheque Truncation System (CTS) introducedin2012;agent banking model (2010); T+1 introduced in 2013 (CBK report, 2013); and bank value caps introduced in 2009. In addition, other innovations include retail banking, mobile banking, internet banking, ACH, fund transfers, sale of insurance policies, travelers' cheque, free advisory services, RTGS, free cheque books, EFT, easy payment for utility bills, telephone banking, MICR, executing standing instructions to customers and increased value-added services (CBK report, 2013).The most recent banking innovation in Kenya is by Equity bank. This bank is among the pioneer African banks to pursue Mobile Virtual Network Operator (MVNO) standards. The bankutilizes Airtel mobile network capacity to run its MVNO banking suite so as to reach its customers - thus having less cost of delivering the service.

1.2 Statement of the Problem

Many developments in the Kenyan financial sector, more specifically in commercial banks has not only led to an increased number of successful financial institutions, and improved the sophistication levels in the sector through asset alternatives for value, and novel payment systems. Notably, many radical changes have been witnessed in the banking sector. What remains unclear is if the innovations seen are the main determinants of financial performance. Despite the significance of financial innovation, the effect of innovation on the banking sector's financial performance remains unclear for the following reasons: untested impact of innovations on financial performance, and poor cognition of innovation drivers (Mabrouk and Mamoghli, 2010).Despite its significance, financial innovation's effect on financial performance of commercial banks is viewed as a double edged sword.

According to Franscesa and Claeys (2010) and Pooja and Singh (2009), financial innovations only has a minimal impact on banks' financial performance. This contrasts findings by Batiz-Lazo and Woldesenbet (2006) that indicates significant contribution of innovations to improved financial performance. Llewellyn (2009) blames innovations for breeding financial crisis. Boot &Marinč (2010) reveal both dark and bright side of innovations. In addition, other studies reveal positive contributions of innovations towards bank performance (Simiyu et al., 2014; Cherotich et al., 2015).

Even though Mugambi (2006) attests that much research work has been conducted for different aspects of customer satisfaction and service excellence in the Kenyan banking sector, little has been done on the effect of financial innovation on bank performance.

According to Kihumba (2008) and Kamotho (2009) among others, stiff competition and technology are major drivers of financial innovations. However, discussion on how these innovations affect performance of commercial banks was given little attention, creating researchable gap for study.

Otoo (2013) notes that financial innovations have come with disadvantages that may affect the commercial banks' performance in Kenya.Circumstances in the global market and competitions in the banking sector exposes commercial banks in Kenya to operational challenges like cybercrime and other internet related frauds including identity thefts. The impact of such crimes is detailed as opportunity costs and losses by the commercial banks and individuals. Expenditures to curb these risks increase operational costs which affects financial performance.On the other hand, Mwania and Muganda (2011) reiterates that the benefits of financial innovations far outweighs the disadvantages and hence financial innovation has significant contribution to financial performance. Otoo (2013) states that Kenyan commercial banks have seen a triple increase in cyber-crimes and credit related crimes with increase in financial innovations by the year 2010.This findings show that the financial innovationsaffect performance of Kenyan commercial banks is a paradox.

Empirical scrutiny of findings in studies done in the past concerning whether innovation has impacts on financial performance remains inconclusive. The findings have always appeared to have mixed results on the effect of innovation on financial performance of banks. These inconclusive findings were the motivation for carrying a study in Kenya's banking sector to determine the effect of innovations on financial performance of commercial banks. The purpose of the study was to investigate whetherfinancial

innovations pursued by the Kenyan commercial banks have an effecton their financial performance.

1.3 Research Objectives

For purposes of this research, the main objectivewas pursuing an investigation on whether financial innovationsaffectfinancial performance of Kenyan commercial banks.

1.3.1   Specific Research Objectives

i.   To establish theeffect of product innovations on the Kenyan commercial banks' financial performance.

ii.   To determine whether service innovations affectthe Kenyan commercial banks' financial performance.

iii.   To find out whether organizational innovations affect Kenyan commercial banks' financial performance.

iv.   To examine the moderating effect of firm size on the relationship between financial innovations and financial performance in Kenyan commercial banks

1.4 Research Questions

i.   How does product innovationaffect the Kenyan commercial banks' financial performance?

ii.   What is the effectof service innovations on the Kenyan commercial banks' financial performance?

iii. To what extent doesorganizational innovationaffectKenyan commercial banks' financial performance?

iv. Whatis the moderating effect of firm size on the relationship between financial innovations and Kenyan commercial banks' financial performance?

1.5 Scope of the Study

The limit of this study was to establishlevels of the effectoffinancial innovations on the Kenyan commercial banks' financial performance. This study focused on all the 40Kenyan commercial banks by the year 2016.

1.6 Significanceof the Study

Bank managers are expected to understand the effect that financial innovations have on commercial banks' financial performance and take steps to promote or diminishbanking innovationdepending on the research findings. This study's findings are expected to behelpful to banking service consumers – who often gain from the sector's innovations. Innovations like M-Shwaribring positive contribution to the country's economy – and cuts back on the population of unbanked citizens.

Academicians also stand to benefit on this study's findings. More knowledge would be generated in relation to finance. The study findings are expected to be a point of reference for the government policy makers in formulating solid, broad and balanced policies that lay foundation for banking innovation. The policies will enhance global competitiveness of the country, resilient economy and attainment of essential national goals.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Theliterature in this chapter discusses the effect of financial innovations on Kenyan commercial banks' financial performance. The chapter starts by presentingseveral theories behind financial innovations in the banking sector. It proceeds to evaluate past empirical studies with information on the perceived link that connects banking innovations with financial performance of commercial banks.

2.2 Theoretical Review

The innovation theories reviewed in this part include the Schumpeter Theory of Innovation,technology acceptance theoryand the Market power theory.

2.2.1 Schumpeter Theory of Innovation

According to Schumpeter (1928), most entrepreneurs in different industries can apply innovation to create new profit opportunities. When opportunities for profit-making increase, more investors will imitate the innovation and increase their investment – eventually reducing the big profit margins that were generated by a particular business innovation.

Schumpeter (1934) reiterates the importance of entrepreneurship and increased ability to seek out opportunities for new activities that generate value. This approach allows for expansion and change in circular flow of income. This can only happen if there is distinction between discovery/invention and entrepreneurship, innovation or

commercialization. Such a distinction is in line with the institutional model of innovation set in the 19th Century. This model perceives new independent investor discoveries as production input by entrepreneurs. According to the author, innovations serve the purpose of creative destruction in a perpetual manner that ends up spurring growth in capitalists systems.

The theory distinguishes entrepreneurs that develop innovations meant to give opportunity for new profitable enterprises from bankerswho develop credit facilities that would be used to finance the innovations (Schumpeter, 1939). Schumpeter highlights the past historical banking innovations that demonstrate the connection between financial innovations and increased entrepreneurial growth. Among the key innovations in the 1800s was the joint stock banking model (Schumpeter, 1939). Despite the incisive insights on the role and importance of banking innovations given by Schumpeter, he fails to expressly define the source of innovation.

Scholars such as Abramovitz (1956) and Solow (1957) have also been able to explain the importance of innovation using neoclassical economics. Solow(1957) uses 1909-49 US economic data to demonstrate that capital increase contributed just about 12.5% increase in per capita output – leaving 87.5 % as the percentage which Solow (1957) attributes to innovation in technology.

The theory is relevant to the study as it explains the relationship between innovation and performance. The theory argues that innovation is a very important factor that drives a country's competitive advantage and economic growth in the long term. As the study

seeks to establish whether financial innovations affect financial performance of Kenyan commercial banks, the theory is relevant.

2.2.2Technology Acceptance Model

Technology Acceptance Model was developed by Davis (1989)to describe the factors that determine the level of acceptance that users accord new end-user computer technologies. Davis (1989) identifies Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) as critical factors that influence users' intention to use a computer system. Davis (1989) identifies a positive correlation between PU and adoption intention, while Venkatesh (2000) identifies a positive correlation between PU and continuance intention. Studies done after new computer systems adoption reveal that PU directly influences the levels of satisfaction (Anol, 2001) and the users' perception or attitude concerning the new computing technology (Anol and Hikmet, 2008).Davis (1989)points out that PU influences both the adoption intention of computer users and the perceived use. Other studies by Thong, Hong and Tam,(2006) to investigate post-adoption studies, reveal the influence that PEOU has on user satisfaction.PEOU was found to influence continuance usage(Agarwal, 2000; Lippert, 2007) PEOU also influences continuance intention (Venkatesh & Davis,2000).

The Technology Acceptance Model isrelevant in the context of this study, since it explains how perceived usefulness and perceived ease of use of an innovation affects satisfaction and ultimately performance. As the study seeks to establish how various innovations have affected performance of commercial banks, the theory argues that

perceived ease of use of the innovation and perceived usefulness of the innovation is also key. The theory is hence relevant to the study.

2.2.3 The Market Power Theory

The theory is mostly applied in banking and it states that the market structure of a banking industry influences individual banks' performance. According to Tregenna (2009), this theory holds on two major approaches to define market power: Relative Market Power hypothesis (RMP) and Structure-Conduct-Performance (SCP).

RMP hypothesis explains that profitability for individual commercial banks is influenced by market share. The assumption underlying this hypothesis is that, big banks with the capacity to differentiate their products have the ability to influence the industry's market prices and make more profits as corporates. They do this by exercising their market power that affords them high non-competitive profits. Smaller banks don't have the ability to influence prices and increase profits (Tregenna, 2009).

The SCP approach on the other hand, states that when clients are highly concentrated in a banking market, they create potential market power for the banks and increase bank profitability. Banks that operate in highly concentrated markets will potentially make very high profits. This is because they have the viable option of charging high interest rates through monopolistic or collusive approaches; or lowering their rates charged on bank deposits (Tregenna, 2009).

This theory is relevant to the study as it explains some of the determinants of profitability of the commercial banks. The theory argues that profitability of commercial banks is not only established internally but also externally. External forces other than internal forces determine commercial banks profitability. Innovations can be categorized as both internal and external factor in the sense of its receptability by the customers. That can hence affect its adoption and performance of the commercial banks.

2.3 Empirical Review

This is a literature review section that highlights scholarly studies done in the past in relation to the effectthat financial innovation has on the levels of a bank's financial performance.

2.3.1 Product Innovations and Financial Performance

Nwokah, UgojiandOfoegbu (2009) studied the effect that product development done through innovations had on the organizational performance of brewing firms in the Nigerian industry. The study relied on 32 officials as sample population on which data would be collected. The officials were from different departments in 4 breweries - production, research and development and marketing departments. They were given questionnaires to fill, and data analysis done using Spearman rank order correlation. The analysis gave findings that pointed to the positive correlation between product development aspects (product mix, product quality) and corporate performance aspects (sales volume, profitability and customer loyalty). Its findings concluded that there is a positive correlation between product mix, product quality, sales volume, profitability and customer loyalty.

Dan (2007) studied the effect that knowledge intensive service activities (KISA) had on the level of product innovation achieved by manufacturing firms. This study found that firms increasingly rely on externally supplied knowledge and service, which indicates the significance of external knowledge intensive service activities (KISA). The research was aimed at creating enhanced understanding on how external KISA can benefit manufacturing firms. Results from a study of Chinese manufacturing firms and KISA suggested that knowledge integration serves as a mediator between external KISA and innovation. The study only focused on product innovation as the only variable that affects manufacturing of firms. This presents a conceptual gap.

Ettlie and Reza (2002) reiterate the importance of product innovation in shaping the success levels achieved by a firm. Product innovation and new product development can be used as a good strategy for firms to improve their performance and grow their market share. The study only focused on product innovation as the only variable that affects manufacturing of firms. This presents a conceptual gap. The current study will focus on other variables which will include process innovation, service innovation and organization innovation.

Gakure and Ngumi (2013) did a study on whether bank product innovations influence profitability of commercial banks in Kenya and concluded that bank product innovations had a statistically significant influence on bank profitability. This means that the combined effect of the bank innovations in this research is statistically significant in explaining the profits of commercial banks in Kenya.

In another study, Aduda and Kingoo (2012) investigated the Relationship between Electronic Banking and Financial Performance among Commercial Banks in Kenya. The study used primary data for analysis. Correlation and regression analysis was used. The study findings indicated that there exists positive relationship between e-banking and bank performance.

Nyamwembe (2011) conducted a study on factors hindering the adoption of technological innovation by commercial banks in Kenya and took a case study of Kenya commercial bank (KCB). The author concluded that resistance to change, internal politics and fear of cannibalizing existing products hindered adoption. However, the study however didn't link innovation to financial performance.

2.3.2 ServiceInnovations and Financial Performance

Francesca and Claeys (2010) examined the factors that determine the choice of strategy taken by banking groups whenever they set to offer online services. The study involved 60 large banking corporates in the EU between 1995 and 2005. Its findings indicated that financial innovations like internet banking are more preferred by banks that have a huge large client deposits (big market share), heavy cost structures, and a high volume of non-interest activities. Internet banking is favored by banks in highly concentrated markets. Through competition, every bank would strive to establish new small internet banks at the start. This far, little information exists in whether the ICT technologies applied by banks bring economies of scope. Banking corporates that operate small internet banks have been posting poor performance in recent times – because of the high cost of initial technology investments. The study concluded thatthis trend seen in internet banks is

because of increased failure to build synergies between internet banking and other banking activities hence financial innovations in the internet banking does not improve banks financial performance.

Another study was conducted in the Kenyan context by Mwangi (2013). It also dwelled on the relationship between financial performance of Kenyan commercial banks and their innovation strategy. The study's findings showed the significant influence that bank innovations have on bank profitability, income, customer deposits, and return on assetsofKenyan commercial banks. The influence was determined to be statistically significant. This study also found out the higher moderation effect of mobile phones as compared to internet banking in determining the Kenyan commercial banks' financial performance. The study's findings led to the conclusion that banking innovations positively influence Kenyan commercial banks' financial performance.

In their examination of the dynamic of financial innovation in the banking industry in the U.K, Batiz-Lazo&Woldesenbet (2006) stipulated that a distinction between product innovation and service innovation is necessary as much as the adoption of each type of innovation has its own characteristics and has a different impact on banking performance. They argue that product innovations have a market focus and are effectiveness driven, while service innovations have an internal focus and are efficiency driven. In fact, product innovations are introduced to satisfy an external user or market need. They are essentially introduced by the firm with a view towards improving its efficiency.

A study by Kamau (2009) on the efficiency in the Banking Sector indicated that banks need to be more innovative in their product and service offering to increase their share in the millions of consumers. African demands for financial services will increase in future and although banks with an established African presence have an inherent advantage, they will face increasing competition not only from their traditional competitors but also from novel and innovative ways of providing financial services (Kamau, 2009). Banks have increased their presence and hence their financial performance through having innovative products and services.

King'ori (2008) conducted a study on the determinants of income velocity of money in Kenya studied financial institutions across Kenyan financial sector. Findings indicated that innovations and changes are taking over the Kenyan financial sector by storm. As a result of all these changes, the sector has become very competitive. Access to banking and financial services has improved greatly and charges are coming down. The greater circulation of money also means more businesses are coming up and helps investors feel a little bit more comfortable about investment prospects.

Nyathira (2012) sought to assess the effect of financial innovation on commercial bank's financial performance as the key players in the banking sector over a period of 4 years. Kenya's financial sector has undergone significant transformation in the last few years. The causal research design was used to carry out this study. The population of study was all the 43 commercial banks in Kenya as at 30th June 2012. The study used secondary data from published central banks' annual reports. The independent variable was financial innovations unique to commercial banks while dependent variable was consolidated financial performance of all banks. Study results indicated that financial

innovation indeed contributes to and is positively correlated to profitability in the banking sector particularly that of commercial banks. This is further supported by high uptake of more efficient financial systems in substitution for the less efficient traditional systems. This is evidenced by the negative correlation between Real Time Gross Settlement and Automated Clearing House (Cheques& EFTs) throughput over time; as well as that of profitability and Automated Clearing House throughput.

Shirley and Sushanta (2006) studied the impact of information technology on the banking industry and analyzed both theoretically and empirically how information technology (IT related products are internet banking, electronic payments, security investments, information exchanges, Berger, 2003) related spending can affect bank profits via competition in financial services that are offered by the banks. Using a panel of 68 US banks for a period of over 20 years to estimate the impact of IT on profitability of banks, they found out that though IT might lead to cost saving, higher IT spending can create network effects lowering bank profits. They further contend that the relationship between IT expenditures and bank's financial performance is conditional to the extent of network effect. They say that if network effect is too low, IT expenditures are likely to; reduce payroll expenses, increase market share, and increase revenue and profit.

2.3.3 OrganizationalInnovations and Financial Performance

Zheng, Yang and McLean, (2010) conducted a study on the mediating role that management plays in linking organizational strategy, organizational culture, organizational effectiveness and organizational structure. Their study established the invaluable importance of organizational knowledge. Most organizations understand this,

and would always strive to identify crucial elements for knowledge management as a way to achieve optimal organizational effectiveness. The study aimed to establish the exact effects that organizational structure, organizational strategy and organizational culture have on the levels of organizational effectiveness that a firm would achieve if it pursued knowledge management.

Mabrouk and Mamoghli (2010) carried out a study on Dynamics of Financial Innovation and Performance of Banking Firms: Context of an Emerging Banking Industry. The study analyzed the effect of the adoption of two types of financial innovations namely; product innovation (telephone banking and SMS banking etc.) and process innovation (Magnetic strip card (debit, ATM and credit card), Automatic cash dispenser; (Automatic teller machine; Electronic payment terminal etc.) on the performance of banks. The study analysis included two adoption behaviors, first mover in adoption of the financial innovation and imitator of the first movers. The study findings revealed that first mover initiative in product innovation improves profitability while process initiative has a positive effect on profitability and efficiency. Banks that imitate are less profitable and less efficient than first movers.

An empirical study by Lin and Chen (2007) on SMEs in Taiwan found out that innovation capabilities that a firm possesses greatly determine their marketing performance, business performance and financial performance.

Shu and Strassmann (2005) conducted a survey on 12 banks in the US for the period of 1989-1997. They noticed that even though Information Technology has been one of the most essential dynamic factors relating all efforts, it cannot improve banks' earnings.

Kozak (2005) investigates the influence of the evolution in Information Technology on the profit and cost effectiveness of the US banking sector during the period of 1992-2003. The study indicates optimistic relationship among the executed Information Technology and together productivity and cost savings.

Nader (2011) analyzed the profit efficiency of the Saudi Arabia Commercial banks during the period 1998- 2007. The results of his study indicated that availability of organizational innovations had a positive effect on profit efficiency of Saudi banks. On the contrary he found that the number of point of sale terminals (POSs), availability of PC banking and availability of mobile banking did not improve profit efficiency.

Hernando and Nieto (2006) while studying whether internet delivery channels change bank's performance, found out that adoption of internet as a delivery channel involved gradual reduction in overhead expenses (particularly, staff, marketing and IT) which translates to an improvement in banks´ profitability. The study also indicates that internet is used as a complement to, rather than a substitute for, physical branches. The profitability gains associated with the adoption of a transactional web site are mainly explained by a significant reduction in overhead expenses. This effect is gradual, becoming significant eighteen months after adoption and reaching a maximum generally two and a half years after adoption. Their study showed that multichannel banks present statistically significant evidence of efficiency gains, that is, reduction in general expenses per unit of output. Banks would further profit from cost reductions to the extent that the Internet delivery channel functions as a substitute for traditional distribution channels. Their analysis shows that this effect varies over time and explains, in terms of cost and income structure, the main drivers of better performance.

2.3.4Moderating effect of firm size

Abbasi and Malik (2015) pinpointed the moderating effect that firm size had on firm performance and firm growth. The authors used alternative hypothesis and null hypothesis to guide their research study. The null hypothesis negated the moderating effect that firm size had on firm growth and firm performance. The alternative hypothesis put the moderating effect in the affirmative.50 firms were studied to obtain cross sectional data. These are listed companies in the Karachi Stock Exchange. The researchers moved to fulfill the formality required for stationary data. They then applied regression and addressed multi-collinearity to get results that affirmed the alternative hypothesis. Firm size was determined to have a moderating inspiration on firm performance and firm growth. Management of firms should be keen to evaluate their firm size whenever they are pursuing firm growth as a strategy to improve their firm performance.

Ali et al (2016) conducted a study to establish the moderating effect of firm size on the relationship between management participation practices and performance of manufacturing firms in a developing country context. The study used descriptive survey approach. The findings revealed that performance of manufacturing firms was significantly related to the nature and extent of management participation in strategic planning. Furthermore, the study established that, while firm size is a predictor in management participation and firm performance relationship, it is not moderator in the relationship between management participation and firm performance and therefore there may be other moderators not dealt with in the study.

Park (2012) conducted a study to examine the moderating effect of firm size on the relationship between board structure and financial performance of Deposit Money Banks in Nigeria. This study investigated the role of bank size (log of the asset) as a moderator of the relationship between board size and board independence with Deposit Money Banks ((DMB) financial performance in Nigeria. Data of the study were obtained from the financial statement of the Nigerian Deposit Money Banks for the period 2005-2015. The data were analyzed by regression models using Stata SE 12 software. The results show that the relationship between determinants of board structure (board size, and board independence) and financial performance was significantly moderated by firm size. Therefore, the study recommends that firm's size should be considered in the aspect of financial performance of DMBs because of it moderates the relationship between board independence and board size on firm financial performance.

Lopez-Valeiras, Gomez-Conde & Fernandez-Rodriguez (2016) conducted a study to explore the role of firm size on the relationship between indebtedness and financial performance of agricultural firms. Using archival data collected from 83 companies belonging to livestock industries, the empirical findings confirm the hypothesis that firm size moderates the relationship between indebtedness and financial performance. Indebtedness was also found to moderate the relationship between firm size and financial performance That is to say; indebtedness can enhance the realization of the potential benefits of a larger organizational size. Contrary to expectations, these results reveal that the relationship between size and financial performance is negatively mediated by indebtedness.

2.3.5 Financial innovations and Financial Performance

Financial innovation is used by commercial banks to be able to compete in financial markets and as a result it can improve their performance and maintain their effectiveness in market (Batiz-Lazo and Woldesenbet, 2006).Various Studies evaluating whether innovations have an effect on individual firms' financial performance have been reporting that innovation relates positively with firm financial performance.In recent times, most studies in this area have focused on the complex innovation channels and process where inputs are taken as innovation for better performance (Loof*et al.*, 2006).

The claim that innovations have a positive influence on performance is echoed by Grundiche (2004) who argued that a firm must develop product lines continuously to meet the changing customer needs and desires. This would enable it to achieve high profitability, huge market share, increased sales volume and increased competitive advantage. The Kenyan banking sector has demonstrated a solid growth since 2003 when most of the financial innovations were adopted. The industry offered significant profit opportunities for the major participants; profit after tax for the overall banking sector grew by 38.61 % or 5.08 Billion from 13.15 Billion to 18.22 Billion in December 2005 (The Kenya banking sector report,2007). Innovations generally appear to increase individual firms' financial performance. But since innovations take place every now and then, it is interesting to understand its effect on Kenyan commercial banks' financial performance at the present time.

2.4 Knowledge Gap

Nwokah, UgojiandOfoegbu (2009) studied the effect of product development through innovations and organizational performance in the Nigerian brewing industry. This study was conducted in Nigeria thus presenting a geographical gap. The current study will focus on Kenya.Another study was conducted in the Kenyan context by Mwangi (2013) on the overall banks' financial performance and banking innovations in Kenya's financial sector. This study focused on the financial industry thus presenting a scope gap. The current study focused on commercial banks.

Dioh (2013) studied the extent to which product and process innovation was related to Kenyan commercial banks' financial performance. This study focused on process and product innovation as variables that affect financial performance. The current study will focus on other variables which will include service innovation, organizational innovation and production process innovation. Njoroge (2012) studied the effect of firm size on Kenyan pension schemes' financial performance. This research study focused on firm size as the only variable that affects financial performance. The current study focused on other variables which include product innovation, service innovation and organizational innovation.

Various research conducted in this topic have limitations ranging from scope gap, geographical gap, limitation of variables to measure financial performance as well as the industry under consideration.

2.5Conceptual Framework

Kombo and Tromp (2009) define a concept as some general or abstract idea that people develop after deriving them from known cases or inferring to related cases. In this regard, conceptual framework entails principles and ideas developed from disciplines considered to be relevant to the topic; and which are employed in structuring subsequent presentations. According to Mugenda and Mugenda (2003) and Smith (2004), conceptual framework is a model that hypothesizes the real idea being studied, and the independent variable-dependent variable relationships involved. Kothari (2004) defines independent variable as the causative factor assumed to be creating the changes seen in the dependent variable. On the other hand, dependent variable defines that factor that is the subject of the research − what the researcher wants to explain. A conceptual framework serves a purpose of categorizing and describing concepts within the context of a given study. It also describes relations between the concepts. This approach allows researchers to describe concepts, develop conceptual scope, know any existing literature gaps, and create a system of relations for concepts (Creswell, 2003). Figure 2.1 represents the variables explored by this study.

Product Innovation
- Number of transactions made through ATMS, mobile transactions and

Service Innovation
- The value transacted through agency banking services

Organizational Innovation
- Number of transactions involving diversified services like payment of utility bills

Financial Performance of commercial banks
- ROA

Firm Size
- Asset value
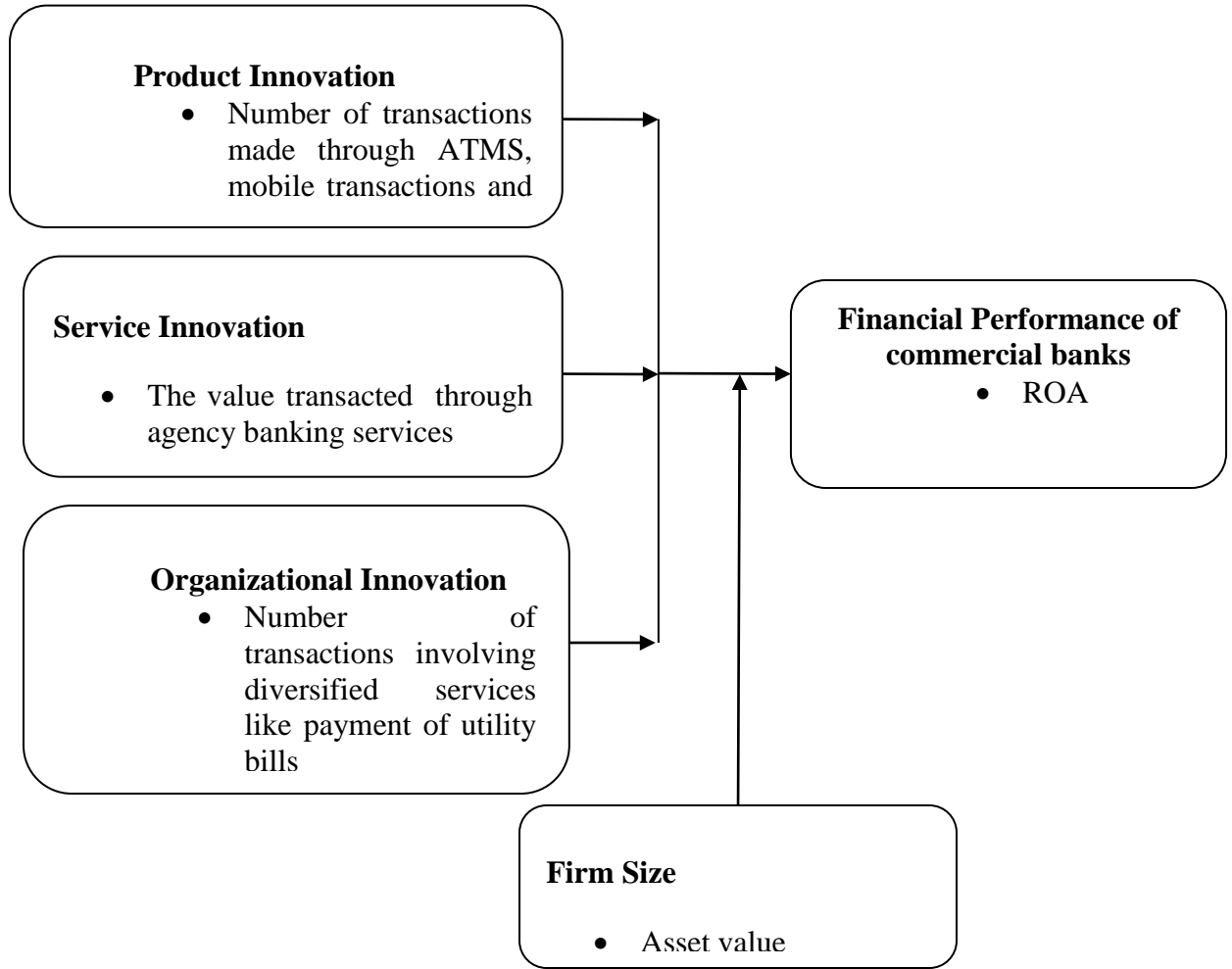
Independent Variables   Moderating Variable   Dependent

VariableFigure 2.1: Conceptual Framework

2.6 Research Hypothesis

H_{01} : The effect of product innovations on financial performance of firms is not significant

H_{02}: The effect of service innovations on financial performance of firms is not significant

H_{03}: The effect of production process innovations on financial performance of firms is not significant

H_{04}: The effect of organizational innovations on financial performance of firms is not significant

2.7 Operationalization of Variables

The study operationalized the effect that innovation variables have on Kenyan commercial banks' financial performance. For this study, independent variables are product innovations, service innovations, production process and organizational innovations. The dependent variable for the study was set to be the commercial banks' financial performance. The following operationalization table gives insights on how the various variables will be measured, analyzed and conclusions drawn thereafter.

Table 2.1: Operationalization of the Study Variables

Independent Variable	Measurement / Indicators
Product innovation	• Number of transactions made through ATMS and Credit Cards
Service innovations	• The value transacted through agency banking services
Organisational innovations	• Number of transactions involving diversified services like payment of utility bills
Firm size	• Asset value
Financial performance of commercial banks	• ROA

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used to achieve study objectives. It covers the research design, the target population, data collection procedure and data analysis methods.

3.2 Research Design

Research design is important in holding the whole research study together. It structures the research into major project parts to address the main objective of the study. Major research project parts include measures, methods of assignment, samples, and programs/treatments. This study adopted an explanatory research since the objective of the study was to understand the association and relationship that exists between dependent and independent variables.

Cooper and Schindler (2006) argue that this type of research design is suitable for the present study since it describes the relationship between two variables in which one variable lead to a specified effect on the other variable. Explanatory research is usually aimed at identifying and clarifying the existence of any significant causal association. It answers the "how" questions. The relationship that was being investigated in the study is the effect offinancial innovation on Kenyan commercial banks' financial performance.

3.3 Population

Ngechu (2004) described target population as a set of events, services, people,and group of things, elements or households that are under study. The importance of this definition is the need for population under study to be homogenous. This definition ensures that population of interest is homogeneous.For purposes of this study, the population investigated was40 Kenyan commercial banks sampled for the period ending December 2016.There were 40licensed commercial banks in Kenya as at December 2016.

A census on all the 40 commercial banks was considered for the study. The choice of a census is because the target population is small. Israel (1992) argued that a census is attractive for small populations (200 or less). A census eliminates sampling error and provides data on all the individuals in the population. For this justification, the study applied a census of all the commercial banks.

3.4 Data Collection Instrument

The study used a data collection sheet to collect secondary data. Secondary data will be collected from central bank of Kenya and other secondary sources like Finscope reports. The secondary data sheet contains all the variables in the study that is financial performance, organizational innovation, product innovation, service innovation and firm size. The data collection sheet is presented in Appendix II.

3.5Data Collection Procedure

This research utilized data about the selected banks from secondary sources. Data on product innovations, service innovations and organizational innovationsfor the period

between the year 2012 and 2016 was obtained from the Central Bank of Kenya.Data on ROA and total assets of commercial banks wasobtained from the commercial banks annual reports. A data collection sheet guided the process of data collection.

3.6 Data Analysis

Data was analyzed using Eviews statistical software. The individual regression coefficients were checked to see whether the independent variable (Financial innovation)significantly affected performance(Return on Asset). The study first conductedHausman test to choose the best model between fixed effect and random effect models.The null hypothesis for Hausman test states that the difference between the coefficients is not consistent. If the value for prob>chi^2 is greater than p value of 0.05, then a fixed effect model is suitable but if the prob>chi^2 is less than p value of 0.05 then a random effect model is suitable. The test revealed that random effect model was suitable for this study.

3.6.1 Fixed effect Model

A fixed effect model is used to analyze the impact ofvariables that vary over time.The model controls for all time-invariantdifferences between the individuals hence its estimated coefficients are not biased in regard to omitted time-invariant characteristics.

The fixed effect model is:

$$Y_{it} = \sum_{i=1}^{3} \beta 1 X it + \alpha_i + u_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(ii)$$

Where

αi (i=1….n) is the unknown intercept for each entity (n entity-specific intercepts).

Yit is the dependent variable where i = entity and t = time.

Xit represents one independent variable

β1 is the coefficient for that independent variable

uit is the error term.

3.6.2 Random effect Model

Unlike the fixed effects model,the variation across entities in Random effect model is assumed to be random and uncorrelated with the predictor or independent variables included in the model.

The random effect model is:

$$Y_{it} = \sum_{i=1}^{3} \beta 1 X it + \alpha + u_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots(iii)$$

U_{it}=Between-entity error

E_{it}=Within-entity error

3.7 Diagnostic tests

Prior to running the regression model, pre estimation tests were conducted to check for the presence of Multicollinearity and stationarity of the data. Since the data was collected on five year duration, unit root pretests was conducted prior to running the fixed effect

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regression model to prevent spurious results. In case of non-stationarity, differencing is performed.

3.7.1 Multicollinearity

There may be a risk of multicollinearity since some of the firms' factors selected and used in the study relate to each other. Multicollinearity is a statistical condition in which the independent variables have a high magnitude of correlation. It is not possible to see the impacts of a change in one variable while the other variables are held constant due to this interrelationship between the variables. Small changes in the data may also cause severe changes in the coefficients. Therefore, it is important to exclude possible multicollinearity from the study (Keller, 2005). The study hence tested for the existence of Multicollinearityamong the predictor variables using a variance inflation factor (VIF). Walker and Maddan (2009) state thatif the VIF is above 10, it indicates that there are problems of multicollinearity in the model.

3.7.2 Unit root test

Since the data to be used in the study had the aspect of time, the study tested for the stationarity of the data by using Unit roots test. The presence of a unit root was tested by using Im-Pesaran-Shin (IPS) test. Of the popular panel unit roots tests (Levin Lin Chu (LLC) and Im-Pesaran-Shin (IPS)), the LLC test is of limited use, because the null hypothesis and the alternative hypothesis are so strict that it is not realistic in practice.Im, Pesaran and Shin (2003) states that IPS test is more powerful than the LLC test.

According to them, the performance of the LLC test is the worst. A better suggestion is the IPS test because although the two tests exhibit size distortion and low power under cross-sectional dependence, the IPS test generally performs better than the LLC and hence the study used IPS test in conducting testing for unit roots.

3.7.3 Autocorrelation

Serial correlation exists when there is a correlation among the error terms due to changes in time. The study used data collected over a period of time and hence there was a need to test for the presence of first order serial autocorrelation. The presence of the same is a violation of the classical linear regression assumptions (Anderson *et al.,* 2007). The study used Wooldridge Test of Autocorrelation. The null hypothesis of the test is no first order correlation. If the p-value is significant (p-value < 0.05), then the null hypothesis is rejected.

3.7.4 Heteroscedasticity

The study tested against violation of the assumption of homoscedasticity. There was a need to ensure that the residuals of the regression model are constant across time and hence the study used Likelihood Ratio Test of Heteroscedasticity. The test has null hypothesis which states that the error term are Homoscedastic. If the Prob> chi^2 value is significant (Less than 0.05), the null hypothesis is rejected.

3.8 Empirical Model

The following general equation was used to link the independent variables to the dependent variable.

$$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \mu_{it} + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (iv)$$

$$Y_{it} = \beta_0 + \sum_{i=1}^{4} \beta 1 X_{it} + \mu_{it} + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (v)$$

Where:

Y = Return on Asset

β_0 = Constant

β_1, β_2, β_3 and β_4 = Regression Coefficients

X_1 = Product innovation

X_2 = Service innovation

X_3 = Organizational innovation

μ = Error term

In testing the moderating effect of firm size, this study adopted the Moderated Multiple Regression (MMR) analysis. MMR technique is implemented in two procedures. The first procedure involves using regression in estimating the predictor effects (X) and the hypothetical moderator (Z). An ordinary regression model was used to test the moderating effect of firm size on the relationship between financial innovations and financial performance of commercial banks in Kenya.

$$Y = a + B_1 X + B_2 Z + e \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where a = the estimated intercept, B_1 = the estimated population regression coefficient for X, B_2 = the estimated population regression coefficient for Z, and e = residual/error factor.

The second procedure entails addition of interaction term to the initial equation above (equation 1):

$$Y = a + B_1X + B_2Z + B_3X*Z + e\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (2)$$

B_3 = is the estimate of the population regression coefficient for the product term (X*Z) (Aguinis, 2005). The analytical section procedure was used to assess the role of the moderator (Z).

This study presents evidence in the importance of applying MMR to evaluate the moderator effect of variables (Evans, 2001). MMR is specifically preferred for cases involving continuous predictor variables (Aguinis, 2005; Stone & Hollenbeck, 2004). On the contrary several scholars have been criticizing the MMR approach, citing low power (Cohen & Cohen, 2003; Evans, 2001). However, counterclaims have also been mounted to reject such criticisms (Stone and Hollenbeck, 2004).

CHAPTER FOUR

ANALYSIS AND FINDINGS

4.0   Introduction

This chapter presents the findings of the study. The chapter begins by conducting an exploratory analysis of the panel data. Diagnostic analysis is then conducted to validate the suitability of panel regression models by testing for presence of time related fixed effect and then presence of Heteroscedasticity and first order serial autocorrelation. Afterwards the chapter presents the Hausman test which is used to determine the choice of the model between fixed effect and random effect model to be used for the study after which panel data analysis is conducted.The last section of the chapter details the chapter summary.

4.1   Exploratory Data Analysis

Chapter four began by exploration analysis to examine the heterogeneity across the commercial banks using trends. The need for exploration analysis was also to determine the most suitable model to use between a pooled effect regression which does not allow for heterogeneity/ individuality among the cross sections(Commercial banks) and panel data models (Fixed effect and random effect models) which allow for heterogeneity/individuality among the cross sections.

4.1.1 Trend analysis of financial performance within firms

Exploration analysis began by trend analysis to study the within-firm behavior of the dependent variable (ROA) after which the combined trend analysis for between-firm was also conducted for the ROA to study the between firm behavior in the changes of ROA over time. The findings in Figure 4.1 indicated that the financial performance of the commercial banks has been unsteady as indicated by increasing and decreasing trends over the 5 year period for each commercial bank. The results also indicated presence of time related fixed effects.The study also established the trends analysis across the years for Product innovation (number of transactions made through ATMS, credit cards and Mobile banking), Service innovation (the value transacted through agency banking services), Organisational innovations (number of transactions involving diversified services like payment of utility bills), Firm size (Asset value) and Financial performance of commercial banks (ROA).

Figure 4.1: Trend analysis of financial performance within firms

ROA
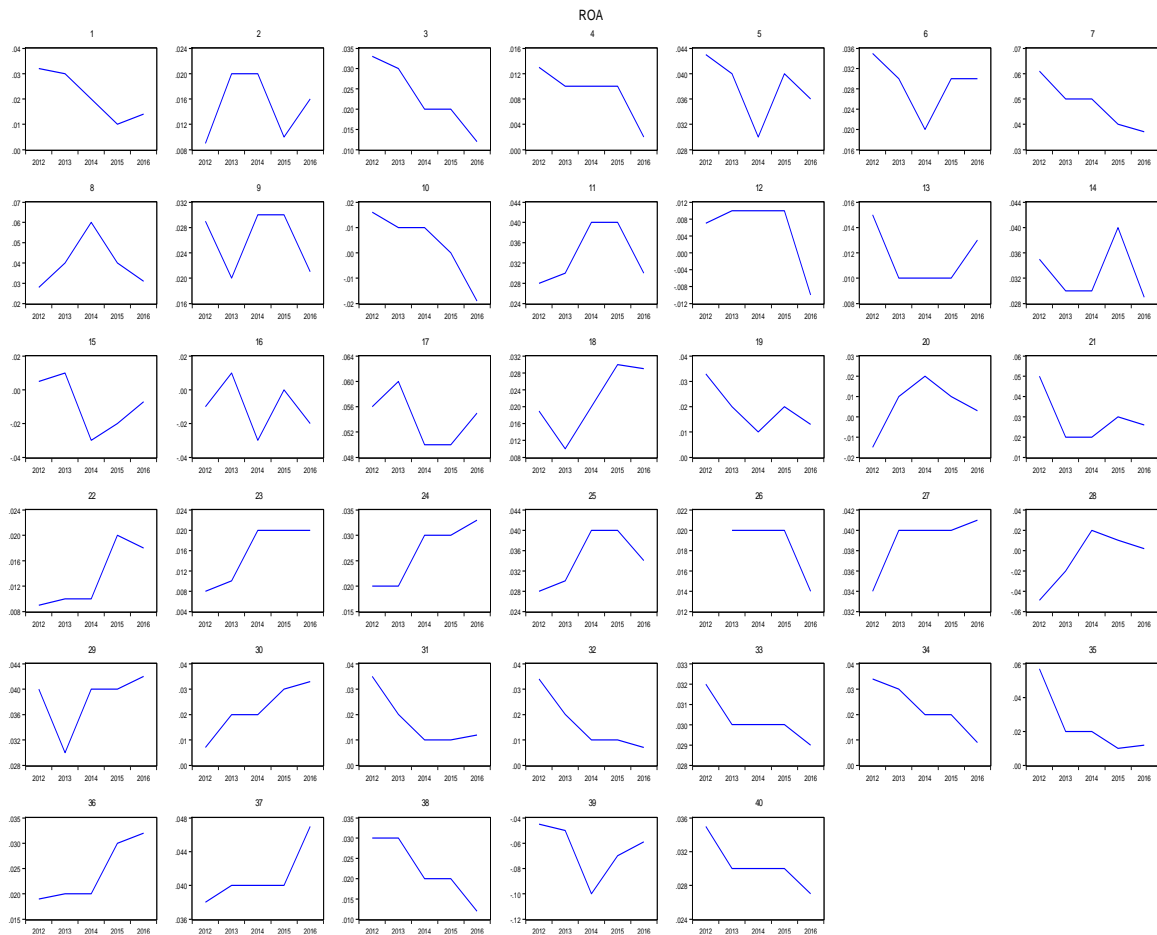
4.1.2 Trend analysis of financial performance between years

The study established the trends of financial performance with regard to the years under study. The study focused on a five year period from the year 2012 to the year 2016. The findings in Figure 4.2 revealed that there has been an unsteady trend in the financial performance of commercial banks with both increasing and decreasing trends being observed over the study period. On average, the performance of commercial banks in terms ROA was the highest in the year 2012 and lowest in the year 2016.

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Figure 4.2: Trend analysis of financial performance between years
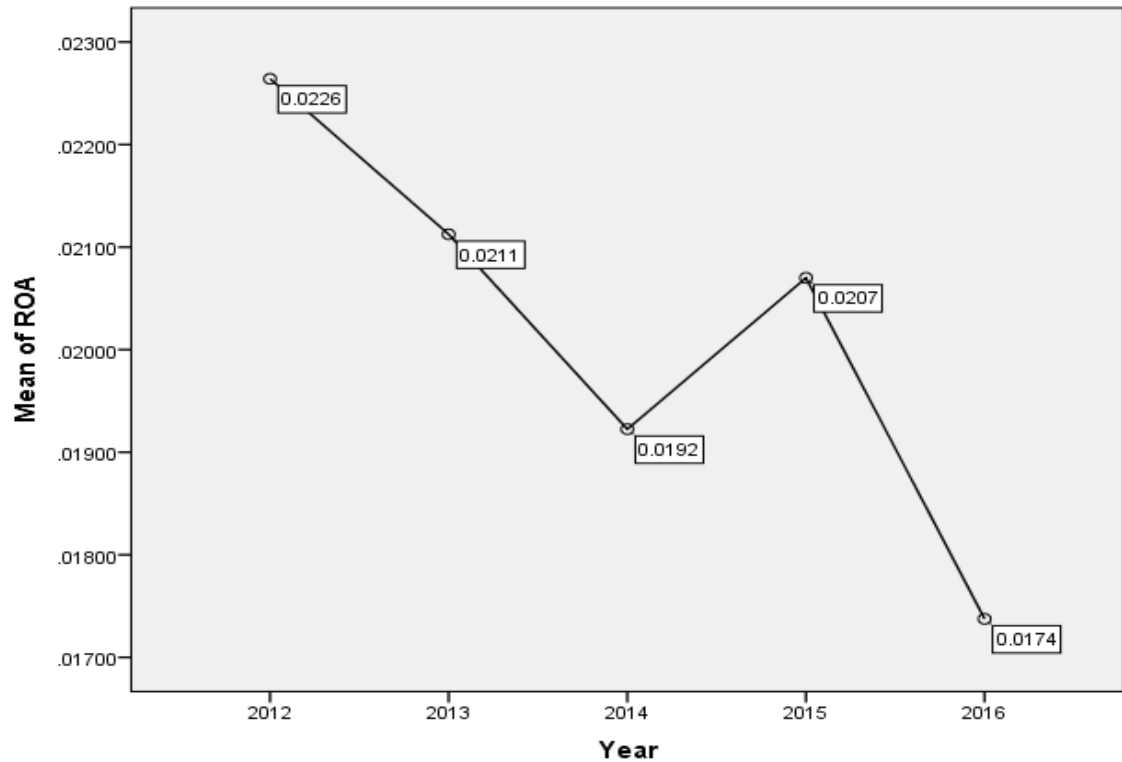
4.1.3 Trend analysis of organizational innovations

The study findings in Figure 4.3 revealed that organisational innovations (number of transactions involving diversified services like payment of utility bills) have also yielded unsteady trends. The highest recorded mean organizational innovations was recorded in the year 2014 while as the year 2016 approached, thewas a decrease in the number of organizational innovations. This can be attributed to an increase in the use of mobile phones to pay bills as compared to over the counter.

Figure 4.3: Trend analysis of organizational innovations
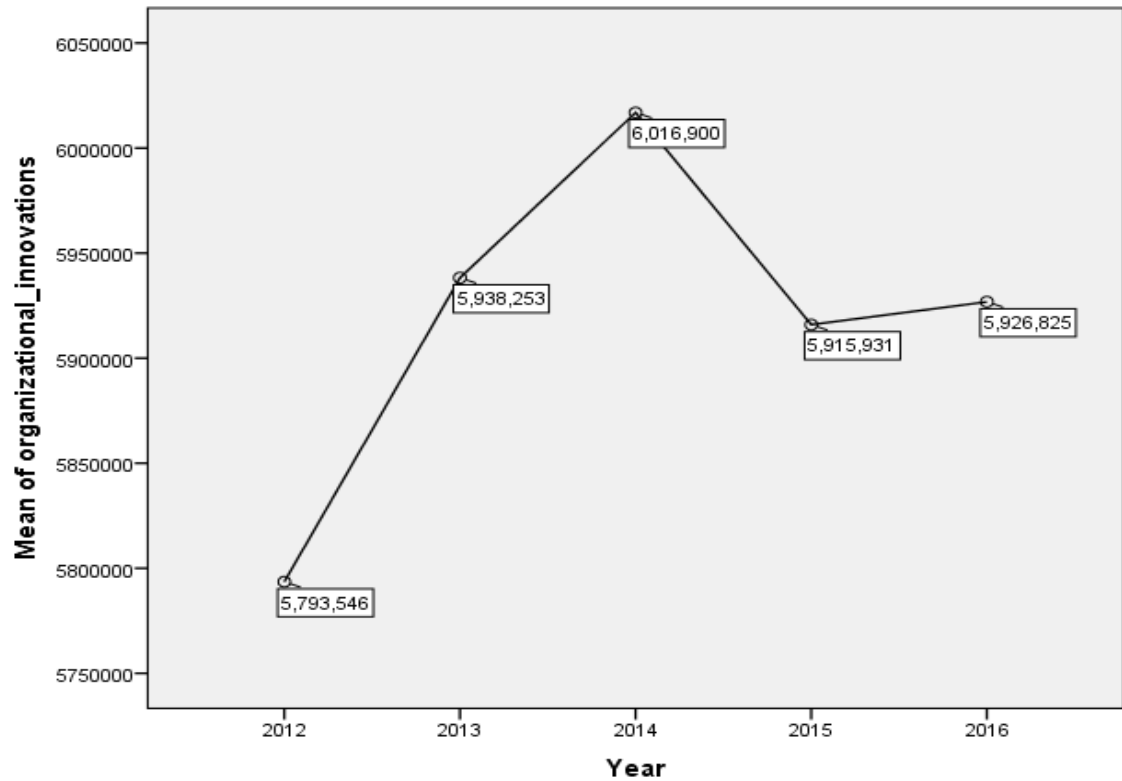
4.1.4   Trend analysis of product innovations

The study findings presented in Figure 4.4 also indicated unsteady trends inproduct innovation (number of transactions made through ATMS Mobile banking and credit cards) over the study period. Between the year 2012 and 2013, there was a decrease in the average product innovations but from the year 2013 to the year 2016, there was an increase in product innovations as measured by the number of transactions made through these channels. This indicates an increase in investments by the commercial banks towards product innovations.

Figure 4.4: Trend analysis of product innovation
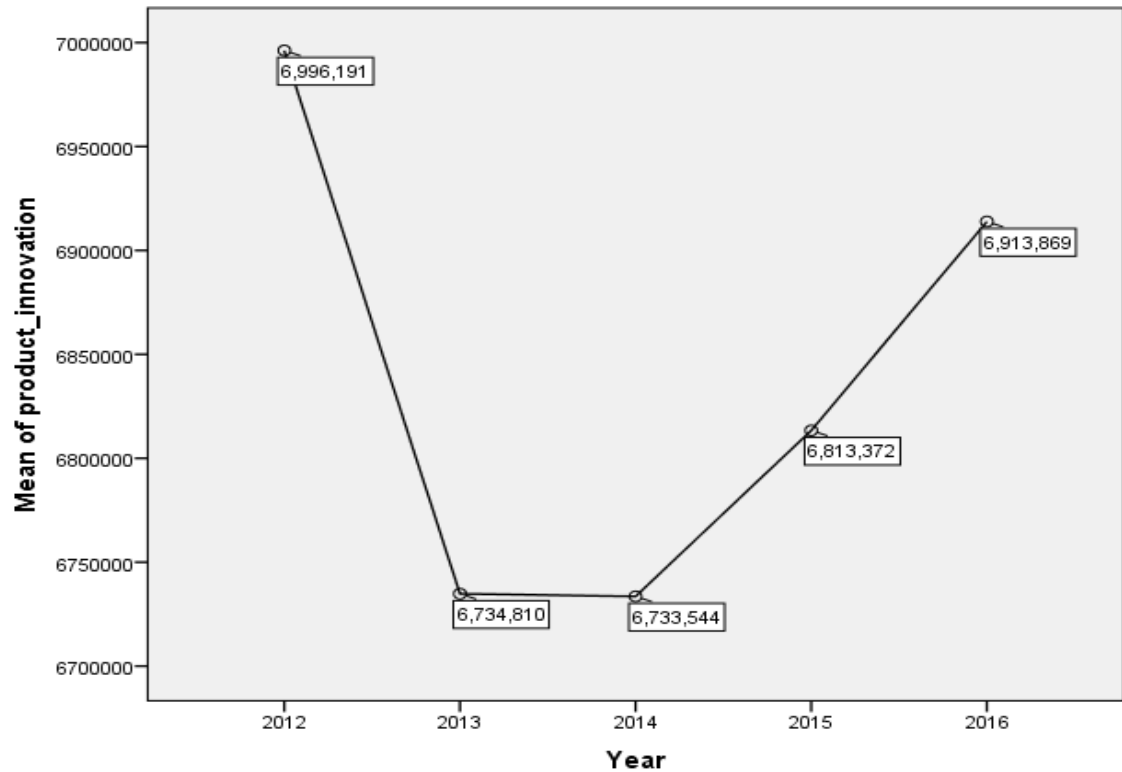
4.1.5 Trend analysis of service innovations

The results in Figure 4.5 indicated that on average, the service innovation (the value transacted through agency banking services) has been increasing with time. Apart from a decrease between 2014 and 2015, there is an increasing trend in the service innovations over the years up to the year 2016. This indicates that with an increase in the number of commercial banks offering agency services to 17, the value transacted using the model has also been increasing over time with an indication of trust in the model by the consumers.

Figure 4.5: Trend analysis of service innovation
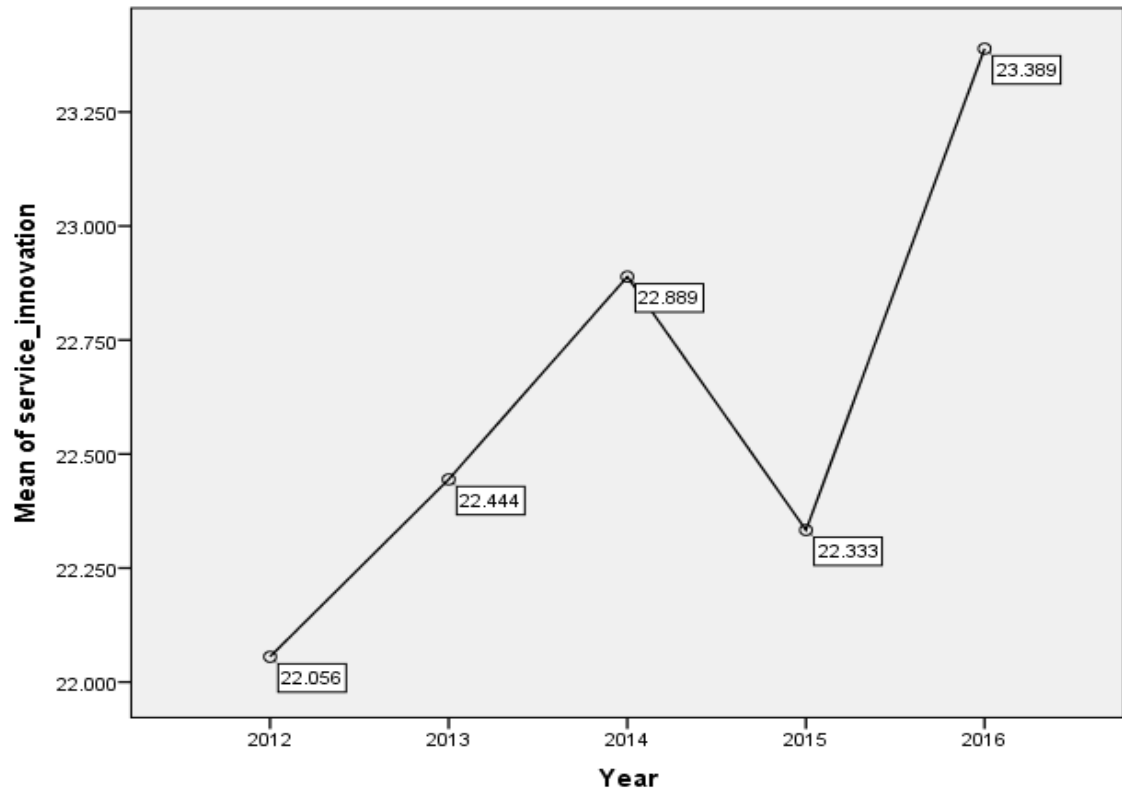
4.1.6   Trend analysis of Firm Size (Assets Value)

The study findings presented in 4.6 revealthat the trends in the firm size have been upwards over the study period from the year 2012 to the year 2016. The findings reveals that commercial banks in Kenya have been investing more and more in the assets over the study period.

Figure 4.6: Trend analysis of Firm Size
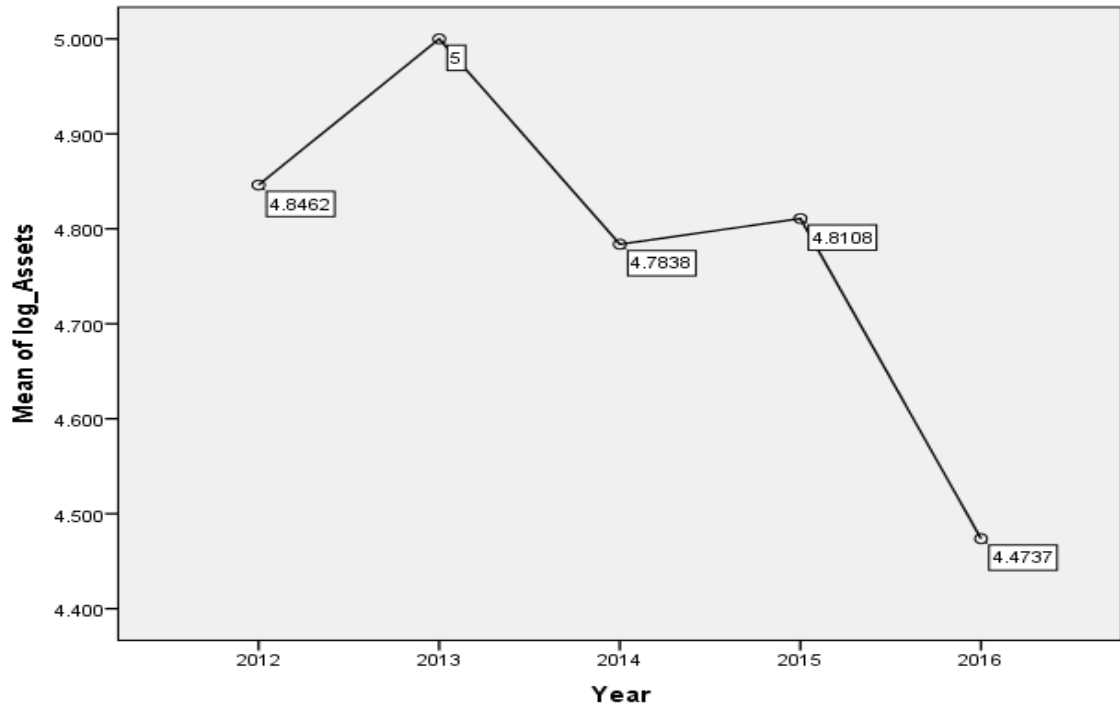
4.2   Diagnostic Tests

Diagnostic tests were conducted to establish whether there was a problem of multicollinearity as well as unit roots in the data. Variance inflation factor was used to test for multicollinearity. The presence of unit root was tested by using Im-Pesaran-Shin (IPS) test.

4.2.1   Correlation Analysis

The study assessed the correlations among the predictor variables using the pair-wise correlation matrix. The correlation analysis helped in determining whether multicollinearity problem existed in the data before a regression model was run. The

result in Table 4.1 shows the correlation matrix of Pearson correlation coefficients. The starred values indicate significance at 5% level of significance.

The results indicate that most of the independent variables are weakly correlated to each other as shown by smaller Pearson coefficients. The correlation among the predictor variables did not exceed 0.8 and hence there was no problem of multicollinearity. Multicollinearity is said to exist between two variables if they have a Pearson correlation value greater than 0.8 (Williams, 2008).

The findings indicated that assets value has a positive significant correlation with financial performance of commercial banks. An increase in the assets value leads to a significant increase in financial performance of commercial banks in Kenya between 2012 and 2016. Product innovation (number of transactions made through ATMS, mobile transaction and credit cards) also has a positive significant effect on financial performance of commercial banks in Kenya. An increase in the number of transactions made through these channels leads to a significantimprovement in financial performance of commercial banks.

The findings also showed that service innovation and organizational innovations have a positive but not significant correlation on financial performance of commercial banks. The results indicate that the value transacted through agency banking services as well as the number of transactions involving diversified services like payment of utility bills doesn't have a significant correlation with financial performance. This compliments the trends analysis which indicated a reduction in service innovation and organizational innovations.

Table 4.1: Correlation Analysis

		Product innovation	Service innovation	Organizational innovations	Firm Size	ROA
Product innovation	Pearson Correlation	1				
	Sig. (2-tailed)					
Service innovation	Pearson Correlation	0.057	1.000			
	Sig. (2-tailed)	0.591				
Organizational innovations	Pearson Correlation	0.051	0.058	1.000		
	Sig. (2-tailed)	0.474	0.584			
Firm Size	Pearson Correlation	.198**	0.039	(0.021)	1.000	
	Sig. (2-tailed)	0.005	0.713	0.763		
ROA	Pearson Correlation	.343**	0.092	0.001	.518**	1
	Sig. (2-tailed)	0.000	0.387	0.998	0.000	
** Correlation is significant at the 0.01 level (2-tailed).						

4.2.2   Multicollinearity Test

The study conducted a multicollinearity test to establish whether the independent variables are highly correlated. A variance inflation factor method was used. A VIF factor value less than 10 indicates no presence of multicollinearity. Since all the independent variables had a VIF value less than 10, there was no multicollinearity.

Table 4.2: Multicollinearity Test

```
. vif

    Variable  |      VIF       1/VIF
--------------+----------------------
  service_in~n |     1.01     0.993337
  organizati~s |     1.01     0.994633
  product_in~n |     1.00     0.995061
--------------+----------------------
     Mean VIF |     1.01
```

4.2.3   Unit Root tests

The presence of a unit root was tested by using Im-Pesaran-Shin (IPS) test. IPS test is based on a null hypothesis of presence of unit root (Data is non stationary). If the value is less than 0.05, then the null hypothesis is rejected implying that the data is stationary. The results presented in Table 4.3 indicate that all the variables apart from firm size were stationary since the null hypothesis of the presence of a unit root was rejected (Probability value was less than 0.05). No differencing was hence required on those variables. Firm size which had non-stationarity was differenced and unit root test conducted on it again.

Table 4.3: Unit Root Test Before differencing

Variable	Method	Statistic	Prob.**	Decision
Organizational Innovation	Im, Pesaran and Shin W-stat	-7.48277	0.000	Stationary
Product Innovation	Im, Pesaran and Shin W-stat	-5.18087	0.000	Stationary
Service Innovation	Im, Pesaran and Shin W-stat	-4.72103	0.000	Stationary
Firm Size	Im, Pesaran and Shin W-stat	-0.94661	0.172	Non-Stationary
Financial Performance	Im, Pesaran and Shin W-stat	-2.97426	0.001	Stationary

Since firm size had non-stationarity at level, first differencing was conducted and unit root tested again to check whether it was stationary. The results in Table 4.4 indicate that the first difference of firm size was stationary. The test of stationarity indicated that the stationary data can be used to establish the short term effect of financial innovations on financial performance of commercial banks in Kenya.

Table 4.4: Unit Root Test after differencing

Variable	Method	Statistic	Prob.**	Decision
D(Firm Size)	Im, Pesaran and Shin W-stat	-8.2461	0.000	Stationary

4.2.4Heteroscedasticity test

The study tested against violation of the assumption of homoscedasticity. There was a need to ensure that the residuals of the regression model are constant across time and hence the study used likelihood ratio test to run the test. It is tested against the null hypothesis of homoscedasticity. The results in Table 4.4 indicate that the null hypothesis of Homoscedastic error terms is rejected as supported by a Prob> chi^2 which is less thanthan the critical p value (0.05)

Table 4.4: Likelihood Ratio Test of Heteroskedasticity

```
. lrtest ( hetero) ., df(3)


Likelihood-ratio test                          LR chi2(3)  =     59.41
(Assumption: . nested in hetero)               Prob > chi2 =    0.0000
```

4.2.5 Autocorrelation test

Autocorrelation test was conducted to make sure that the error terms were not correlated with time since data for a period of 5 years was collected. From the Table 4.5 the null hypothesis of no first order correlation is rejected given that the p-value is significant (p-value = 0.003). Hence there was a need for robust standard errors.

Table 4.5: Wooldridge Test of Autocorrelation

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F( 1,     17) =    20.046
         Prob > F =     0.0003
```

4.3   Panel Data Analysis

The study conductedpanel data analysis afterwards. Prior to conducting panel data analysis, the study first sought to select the right model between a fixed effect and a random effect model using Hausman Specification test. Afterwards, the study established

the relationship between the predictor and the independent variables using a random effect regression model.

4.3.1 Hausman specification test

Hausman specification test was used by the study to select the best regression model between a random effect and a fixed effect regression model. The null hypothesis for Hausman test states that the difference between the coefficients is not consistent meaning that a random effect model is the best while the alternative hypothesis states that the differences are consistent implying that a fixed effect model is the best. Results in Table 4.6 indicates a Prob>chi^{2}value of 0.1056 which is more than critical P value at 5% level of significance which implies that the null hypothesis that a random effect model is the best was not rejected. The study hence used a random effect regression model to establish the effect of financial innovations on financial performance of commercial banks in Kenya.

Table 4.6: Hausman Specification Test

```
                ──── Coefficients ────
                   (b)            (B)            (b-B)       sqrt(diag(V_b-V_B))
                  fixed          random        Difference           S.E.
 ─────────────┼──────────────────────────────────────────────────────────────
 product_in~n    2.22e-09       3.05e-09       -8.33e-10                .
 service_in~n    .0006919       .0004513        .0002407            .0001487
 organizati~s    6.84e-11       5.95e-11        8.99e-12                .
 ─────────────┴──────────────────────────────────────────────────────────────

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

     Test:  Ho:  difference in coefficients not systematic

                chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =          2.62
                Prob>chi2 =       0.1056
                (V_b-V_B is not positive definite)
```

4.4 Random effect regression model

A random effect regression model was used to determine the relationship between the predictor variables (financial innovations) and the dependent variable (financial performance). The research questions were answered based on the results of the model.

The regression results in Table 4.7 indicate an overall coefficient of determination (R squared) of 0.1624 which implies that 16.24% percent of the changes in financial performance of commercial banks (banking sector) are explained cumulatively by their financial innovations that is product, organization and service innovation. This indicates that other factors explain 83.76% of the variation in financial performance of commercial banks in the study period. The results also shows that between the years, financial innovations explains 17.38 % of the changes in financial performance of commercial banks in Kenya but within the commercial banks, financial innovations explains only 15.3% of the variation in financial performance between the commercial banks. This shows that within the commercial banks, financial innovations explain a small variation in the financial performance of the commercial banks. The model had a significant fitness (Prob> Chi ^{2} = 0.0014) which implies that the overall random effect model used fit well. It indicates that financial innovations can be used to predict financial performance of commercial banks.

Further results reveal that product innovation is positively and significantly related to financial performance of commercial banks in Kenya. The results indicate that an increase in the number of transactions made through ATMS, mobile banking and Credit Cards leads to a positive and significant effect on financial performance of commercial banks in Kenya.

The results also showed that service innovation, captured by transaction value through agency models, was also significant and positively related with financial performance of commercial banks in Kenya in the study period. The results indicate that an increase in adoption of agency banking leads to an improvement in financial performance of commercial banks.

Organizational innovation has a positive but non-significant effect on financial performance. This is perhaps because of the fluctuations in the two innovations in the sector with reduced value transacted through agency banking services and reduced number of transactions involving diversified services like payment of utility bills.

Table 4.7: Random Effect Regression Model Results

```
. xtreg roa product_innovation service_innovation organizational_innovations,re

Random-effects GLS regression              Number of obs      =         90
Group variable: bank                       Number of groups   =         18

R-sq:  within  = 0.1530                     Obs per group: min =          5
       between = 0.1738                                    avg =        5.0
       overall = 0.1624                                    max =          5

                                            Wald chi2(3)       =      15.52
corr(u_i, X)   = 0 (assumed)                Prob > chi2        =     0.0014

─────────────────────────────────────────────────────────────────────────────
                      roa │    Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
──────────────────────────┼──────────────────────────────────────────────────
        product_innovation │  3.05e-09   9.73e-10    3.14   0.002    1.15e-09    4.96e-09
        service_innovation │  .0004513   .0002275    1.98   0.047    5.33e-06    .0008972
organizational_innovations │  5.95e-11   5.40e-10    0.11   0.912   -9.99e-10    1.12e-09
                     _cons │ -.0029695   .0087733   -0.34   0.735   -.0201649    .0142259
──────────────────────────┼──────────────────────────────────────────────────
                   sigma_u │  .00954593
                   sigma_e │  .00667504
                       rho │  .67161067   (fraction of variance due to u_i)
─────────────────────────────────────────────────────────────────────────────
```

4.5   Moderating effect of firm Size

In testing the moderating effect of firm size, this study adopted the Moderated Multiple Regression (MMR) analysis. The three predictor variables were combined to financial performance (X) which was interacted with the moderating variable (Z) to form an interacting variable (X*Z). Two regression models were then ran using ols regression technique. The first procedure entailed running a regression model with the independent variable and moderating variable (Aguinis, 2005).

$$Y = a + B_1X + B_2Z + e \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where a = the estimated intercept, B_1 = the estimated population regression coefficient for X, B_2 = the estimated population regression coefficient for Z, and e = residual/error factor.

The second procedure entails addition of interaction term to the initial equation above (equation 1):

$$Y = a + B_1X + B_2Z + B_3X*Z + e \dots\dots\dots\dots\dots\dots\dots\dots\dots.. (2)$$

B_3 = is the estimate of the population regression coefficient for the product term (X*Z) (Aguinis, 2005). The analytical section procedure was used to assess the role of the moderator (Z).

The significance of the beta coefficient of the interacting term was used to test whether firm size has a significant moderating effect. The R-square of the two models was also compared.

Table 4.8: Moderating Effect of Firm Size

Model		Beta	Std. Error	t	Sig.		
	(Constant)	0.029000	0.0040	6.986	0.000		
	Financial innovations	0.000000	0.0003	0.994	0.323		
Y = a +B₁X + B₂Z	Firm Size	(0.001000)	0.0001	-2.763	0.007	R Square	0.111
	(Constant)	0.023000	0.0040	5.43	0.000		
	Financial innovations	(0.000000)	0.00011	-2.967	0.004		
	Firm Size	0.000018	0.0010	0.032	0.975		
Y = a + B₁X + B₂Z + B₃X*Z	Interacting term	0.000000	0.0002	3.205	**0.002**	R Square	0.206

The regression model testing the effect of firm size and financial performance had an R-square value of 0.111 which implies that firm size and financial innovations explain 11.10% of the variations in financial performance of commercial banks in Kenya. With addition of the interacting effect of firm size to the model, the two explain a larger variation that is 20.6% of the financial performance of commercial banks. The interacting term has a significant beta coefficient of 0.002 when tested at 5% level of significance.

This shows that the firm size has a significant moderating effect on the effect of financial innovation on financial performance of commercial banks. It implies that the asset base determines how much to invest in innovation which in turn determines the outcome in terms of financial performance.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.0   Introduction

This chapter presents the summary, conclusion, and recommendations of the study. The chapter also suggested areas for further study. The presentation of the findings followed the research questions. Comparison of the findings with the findings of other scholars was also done.

5.1   Summary of Findings

This section presents the summary of the findings in line with the objectives of the study. The results of the correlation as well as the regression analysis were established. Collaboration of the findings with other studies was also presented under the section.

The study findings revealed that in the study period, there has been a decrease in organisational innovations (number of transactions involving diversified services like payment of utility bills) probably due to an increase in the use of mobile phones to pay bills as compared to over the counter.The study findings also indicated unsteady trends in product innovation (number of transactions made through ATMS and Credit Cards) over the study period although towards 2016, the number of transactions using ATMS, Credit cards and mobile phones has been increasing.

The trends in service innovations (the value transacted through agency banking services) has been unsteady with increasingand decreasing figures in the study period.

Towards the end of the study period, there has been an increase in the value of transacted amount which implies that with an increase in the number of commercial banks offering agency services, the value transacted using the model has also been increasing over time with an indication of trust in the model by the consumers. The findings also revealed that commercial banks in Kenya have been investing more and more in the assets.

The study findings also showed that assets value has a positive significant correlation with financial performance of commercial banks showing that an increase in the assets value leads to a significant increase in financial performance of commercial banks in Kenya. Further findings revealed that product innovation (number of transactions made through ATMS, Mobile transaction and Credit Cards) also has a positive significant effect on financial performance of commercial banks in Kenya which shows that an increase in the number of transactions made through ATMS and Credit Cards leads to a significant improvement in financial performance of commercial banks.

The effect of service innovation on financial performance was positive and significant. This shows that the value transacted through agency banking services has a significant impact on financial performance of commercial banks.

The effect of organizational innovation on financial performance was positive but not significant. This shows that the number of transactions involving diversified services like payment of utility bills has a positive and not significant effect on financial performance.

5.2   Discussion

The study established the effect of product innovations on the Kenyan commercial banks' financial performance. The results showed that product innovations (number of transactions made through ATMS, Mobile transaction and Credit Cards) has a positive significant effect on financial performance of commercial banks in Kenya. This shows that an increase in such transactions leads to a significant improvement in financial performance of commercial banks.

These findings are consistent with the findings of a study by Nwokah, UgojiandOfoegbu (2009) who studied the effect that product development done through innovations on organizational performanceand concluded that there is a positive correlation between product mix, product quality, sales volume, profitability and customer loyalty. The results are also consistent with Ettlie and Reza (2002) reiterated thatproduct innovation and new product development can be used as a good strategy for firms to improve their performance and grow their market share.The findings are also consistent with Gakure and Ngumi (2013) who did a study on whether bank product innovations influence profitability of commercial banks in Kenya and concluded that bank product innovations had a statistically significant influence on bank profitability.

The study also established the effect of service innovation on financial performance of commercial banks in Kenya. It was established that service innovation has a positive and significant effect on financial performance of commercial banks.

The findings of the study are consistent with the findings of a study by Mwangi (2013) which established the relationship between financial performance of Kenyan

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commercial banks and their innovation strategy and concluded that banking innovations positively influence Kenyan commercial banks' financial performance. The findings are also consistent with Kamau (2009) who indicated that commercial banks have improved their financial performance through having innovative products and services.

The results are however inconsistent with Shirley and Sushanta (2006) who indicated that spending on innovation can affect bank profits via competition in financial services that are offered by the banks. They established that althoughfinancial innovationsmight lead to cost saving, higher spending can create network effects lowering bank profits. They further contend that the relationship between financial innovations expenditures and bank's financial performance is conditional to the extent of network effect.

Another objective of the study was to find out whether organizational innovations affect Kenyan commercial banks' financial performance. The results showed that organizational innovations do not have a significant effect on financial performance of commercial banks in Kenya.

The findings are consistent with Mabrouk and Mamoghli (2010) who carried out a study on Dynamics of Financial Innovation and Performance of Banking Firms: Context of an Emerging Banking Industry and revealed that first mover initiative in financial innovation improves profitability. The results are also consistent with Lin and Chen (2007) who established that innovation capabilities that a firm possesses greatly determine their marketing performance, business performance and financial performance.

Furthermore, these results are however not consistent with Nader (2011) who analyzed the profit efficiency of the Saudi Arabia Commercial banks during the period 1998- 2007 and revealed that the number of point of sale terminals (POSs), availability of PC banking and availability of mobile banking did not improve profit efficiency. The findings are also not consistent with the findings of Hernando and Nieto (2006) who indicated that the profitability gains associated with the adoption of a transactional web site are mainly explained by a significant reduction in overhead expenses and not ROA.

The moderating effect of firm size on the relationship between financial innovations and financial performance in Kenyan commercial banks was established. The results showed that firm size has a significant moderating effect on the effect of financial innovation on financial performance of commercial banks. It implies that the asset base determines how much to invest in innovation which in turn determines the outcome in terms of financial performance.

The findings are consistent with the findings of a study by Francesca and Claeys (2010) which revealed that indicated that financial innovations like internet banking are more preferred by banks that have a huge large client deposits (big market share), heavy cost structures, and a high volume of non-interest activities. This determines their investment in financial innovations which ultimately affects their financial performance.

The findings are also consistent with Abbasi and Malik (2015) who pinpointedthat firm size has a moderating inspiration on firm performance and firm growth. Similar results were indicated in Park (2012) who examined the moderating

effect of firm size on financial performance of Deposit Money Banks in Nigeria and established a significant moderating effect.

5.3   Conclusions

The study concludes that product innovations has a positive significant effect on financial performance of commercial banks in Kenya and that if the commercial banks invest more in product innovations, in terms of the ATMS, Mobile products and Credit Cards, they are likely to record improved financial performance in terms of the returns on assets.

The study also concludes that an investment by the commercial banks in service innovationin terms of agency banking models will have a positive significant effect on financial performance of commercial banks in terms of the Returns on Assets. This generally implies that the banking sector should review the innovations to invest in.

The study also concludes that an investment by the commercial banks in organizational innovation in terms of engagement in extra services will have a positive but insignificant effect on financial performance of commercial banks in terms of the Returns on Assets. This generally implies that the banking sector should review the innovations to invest in.

The study lastly established that firm size moderates the relationship between financial innovations and financial performance which implies that the asset base determines how much to invest in innovation which in turn determines the outcome in terms of financial performance. Before investment in an innovation, the total amount of

assets determines how much to invest and that affects the truncations in the involving the innovations which ultimately affects financial performance.

5.4   Recommendations

The study recommends that commercial banks should consider revising their investment and decisions and invest more in product innovations such as ATMS, Mobile money transfer products and Credit Cards. This is following the results that product innovation will significantly influence their financial performance.

Since firm size (Assets base) has a significant moderating effect on how financial innovations relates to financial performance of commercial banks, the study suggests that the commercial banks should be keen to evaluate their firm size whenever they are pursuing financial innovations strategy to improve their financial performance.

5.5   Suggestions for further research.

Further research could be conducted to extend the topic to other sectors apart from the banking sector. Such sectors can include the micro financial firms, deposit taking firms and credit dealers. This will help to understand the sector specific factors that determine financial performance of various operators in the financial sector.

Another study can also be conducted on the same topic in the same sector to identify the other determinants of financial performance of commercial banks in Kenya apart from the three financial innovations investigated since the coefficient of determination of this study showed that only 16.24% of the variations in financial performance of commercial banks are explained cumulatively by their financial innovations that is product,

organization and service innovation. This indicates that other factors explain 83.76% of the variation in financial performance of commercial banks in the study period. A study can investigate the other determinants which can be both internal such as governance as well as external such as interest rate, inflation as well as exchange rate.

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APPENDICES

Appendix I: Data

Bank	Year	ROA	Firm Size	Product innovation	Service innovation	Organizational innovations
1	2012	0.01	11.697	5451422	29	7841828
1	2013	0.01	11.801	5775276	36	7573485
1	2014	0.02	11.934	5926480	31	5085273
1	2015	0.03	12.051	6969795	29	5548091
1	2016	0.03	12.199	8042151	35	5400088
2	2012	0.01	9.657	5497495	.	6154220
2	2013	0.01	9.750	5535336	.	4192011
2	2014	0.02	8.553	5783531	.	4662509
2	2015	0.02	7.608	5947615	.	5943512
2	2016	0.02	6.663	5956847	.	4364489
3	2012	0.01	9.595	5646376	21	3898202
3	2013	0.02	9.856	5647090	23	7955258
3	2014	0.02	9.916	5772279	30	6552935
3	2015	0.03	9.973	7203644	34	4439577
3	2016	0.03	10.001	7419654	35	7497864
4	2012	0.00	10.541	5450723	21	6387936
4	2013	0.01	10.799	5635142	35	4384703
4	2014	0.01	10.926	5671001	32	5023256
4	2015	0.01	11.038	5774253	32	7152911
4	2016	0.01	11.146	5824593	27	5613071
5	2012	0.03	10.577	7471207	29	5586104
5	2013	0.04	10.739	7483452	32	7664127
5	2014	0.04	10.898	7819838	35	7432629
5	2015	0.04	11.034	7877580	36	4268747
5	2016	0.04	11.130	7889511	36	5003462
6	2012	0.02	10.445	5471556	31	6856617
6	2013	0.03	10.296	7197866	34	5080277
6	2014	0.03	10.122	7525288	34	7063967
6	2015	0.03	10.011	7796602	34	5446114
6	2016	0.04	10.649	8077678	35	7245600
7	2012	0.04	12.095	7252559	29	4091830
7	2013	0.04	12.129	7266185	31	6070592
7	2014	0.05	12.234	7508168	34	6312594

Bank	Year	ROA	Firm Size	Product innovation	Service innovation	Organizational innovations
7	2015	0.05	12.328	7563284	35	7578738
7	2016	0.06	12.393	8295124	35	3908742
8	2012	0.03	11.095	7040852	.	4562760
8	2013	0.03	11.150	7359761	.	3663420
8	2014	0.04	11.218	7459240	.	5540104
8	2015	0.04	11.282	8188271	.	7902954
8	2016	0.06	11.387	8300665	.	3892654
9	2012	0.03	11.315	7059909	.	5063229
9	2013	0.02	11.517	5756058	.	7589916
9	2014	0.03	11.836	8285497	.	3971344
9	2015	0.03	12.077	8345085	.	7296017
9	2016	0.02	12.198	7275892	.	7691666
10	2012	0.02	9.564	5482257	17.9625	7511702
10	2013	0.01	9.798	5658027	15.6097	4892840
10	2014	0.01	9.713	5690223	14.1801	3516667
10	2015	0.00	9.621	5430673	17.8487	6469759
10	2016	-0.02	9.556	5831294	17.0701	5639131
11	2012	0.03	12.083	7048775	20.0747	4167699
11	2013	0.03	12.204	6993603	17.1137	7981161
11	2014	0.04	12.393	7889050	19.9574	4033738
11	2015	0.04	12.552	7292510	18.0128	7522697
11	2016	0.03	12.735	8326030	17.6519	5723690
12	2012	0.01	8.607	5766570	.	8137370
12	2013	0.01	8.765	5860494	.	4739240
12	2014	0.01	8.941	5453781	.	7672242
12	2015	0.01	9.090	5441379	.	4020569
12	2016	-0.01	9.239	5720178	.	7996223
13	2012	0.02	9.395	5945562	.	4074788
13	2013	0.01	9.504	5831271	.	4125158
13	2014	0.01	9.628	5411014	.	4777244
13	2015	0.01	9.738	5771647	.	7441756
13	2016	0.01	9.738	5645415	.	5155734
14	2012	0.04	11.246	7724436	16.9256	5326968
14	2013	0.03	11.456	7776292	17.6162	4455948
14	2014	0.03	11.677	7916104	14.0035	6254555
14	2015	0.04	11.858	7155149	19.863	6776601
14	2016	0.03	12.160	7628259	21.9397	7789894
15	2012	0.01	10.867	5634641	.	3584313

Bank	Year	ROA	Firm Size	Product innovation	Service innovation	Organizational innovations
15	2013	0.01	10.735	5989381	.	8051616
15	2014	-0.03	10.568	5760842	.	4802760
15	2015	-0.02	10.366	5638547	.	5187564
15	2016	-0.01	10.286	5422762	.	5798996
16	2012	-0.01	9.414	5997971	.	6486527
16	2013	0.01	9.555	5743170	.	4360919
16	2014	-0.03	9.639	5779238	.	3374393
16	2015	0.00	9.716	5888153	.	4597388
16	2016	-0.02	9.580	5472898	.	3555379
17	2012	0.06	12.072	7962281	16.6012	3631210
17	2013	0.06	12.282	8419293	14.9856	6850721
17	2014	0.05	12.415	7435974	14.7594	6820604
17	2015	0.05	12.532	6972264	20.6547	3366647
17	2016	0.06	12.741	7471922	20.424	6181024
18	2012	0.02	10.150	5781615	16.5619	3358937
18	2013	0.01	10.341	5857472	15.085	6788923
18	2014	0.02	10.745	5911291	14.1444	6867507
18	2015	0.03	11.032	7459083	19.3461	3856325
18	2016	0.03	11.305	7979098	18.4313	6885181
19	2012	0.03	9.209	7660569	.	6176994
19	2013	0.02	9.373	6596724	.	5276824
19	2014	0.01	9.557	7097728	.	7971070
19	2015	0.02	9.712	7827022	.	5928052
19	2016	0.01	9.617	6567487	.	7820298
20	2012	-0.02	9.750	7547314	.	4431216
20	2013	0.01	8.749	7305018	.	4194480
20	2014	0.02	8.749	7682612	.	7276797
20	2015	0.01	9.082	7166452	.	4567437
20	2016	0.00	7.748	7916642	.	6653751
21	2012	0.05	9.329	5786726	.	5392733
21	2013	0.02	9.416	5575411	.	7014986
21	2014	0.02	9.524	6229392	.	6397167
21	2015	0.03	9.621	5645694	.	7379875
21	2016	0.03	9.668	8096454	.	4570292
22	2012	0.01	9.199	7046628	.	7125469
22	2013	0.01	9.371	7407055	.	3411122
22	2014	0.01	9.485	7104541	.	7900113
22	2015	0.02	9.587	7003530	.	7871995

Bank	Year	ROA	Firm Size	Product innovation	Service innovation	Organizational innovations
22	2016	0.02	9.589	5862367	.	4589003
23	2012	0.01	9.357	7869303	19.0465	5833171
23	2013	0.01	9.515	5424536	18.5818	6506663
23	2014	0.02	9.721	8205036	18.0908	4469326
23	2015	0.02	9.891	7810927	14.6984	4053781
23	2016	0.02	10.115	7046696	19.1084	7102427
24	2012	0.02	9.095	8149331	16.0626	4539811
24	2013	0.02	9.180	6252526	19.8116	7865035
24	2014	0.03	9.299	7685758	16.7997	7138600
24	2015	0.03	9.405	7751952	14.6813	6940698
24	2016	0.03	9.578	6575951	15.8514	6670286
25	2012	0.03	8.736	8303401	21.9735	6760721
25	2013	0.03	8.856	7312137	16.8682	3546513
25	2014	0.04	9.016	5957903	21.6008	7613653
25	2015	0.04	9.154	6001630	18.5137	3808177
25	2016	0.03	9.233	5735611	20.208	3816797
26	2012	.	8.985	7748586	.	6883853
26	2013	0.02	8.946	6219312	.	5248616
26	2014	0.02	8.907	8103324	.	4124769
26	2015	0.02	8.869	7500165	.	7905285
26	2016	0.01	8.830	7209685	.	6976866
27	2012	0.03	11.252	6687012	.	3937430
27	2013	0.04	11.424	7482672	.	6801613
27	2014	0.04	11.648	7981300	.	5660878
27	2015	0.04	11.830	6891387	.	6031641
27	2016	0.04	11.904	7858165	.	7136442
28	2012	-0.05	7.864	7938809	.	6201128
28	2013	-0.02	8.155	6771041	.	7371204
28	2014	0.02	9.024	6606285	.	7531607
28	2015	0.01	9.482	6918660	.	4844684
28	2016	0.00	9.728	7633520	.	7457920
29	2012	0.04	12.482	8172788	21.1421	7156459
29	2013	0.03	12.625	5809708	16.2723	3816358
29	2014	0.04	12.738	5816524	19.681	4199720
29	2015	0.04	12.840	6358735	19.4464	7413813
29	2016	0.04	13.056	7533092	17.8632	5507796
30	2012	0.01	9.060	6563553	.	6508310
30	2013	0.02	9.164	7729490	.	3788105

Bank	Year	ROA	Firm Size	Product innovation	Service innovation	Organizational innovations
30	2014	0.02	9.447	6381955	.	7964598
30	2015	0.03	9.668	7323701	.	3345047
30	2016	0.03	9.858	5409750	.	4366702
31	2012	0.04	8.506	7309531	.	6541437
31	2013	0.02	8.678	7004531	.	5655194
31	2014	0.01	8.683	6884309	.	7378271
31	2015	0.01	8.689	7522618	.	4240429
31	2016	0.01	8.644	8345348	.	3598058
32	2012	0.03	11.060	5770314	20.8631	6344467
32	2013	0.02	11.115	6743649	18.5232	7544925
32	2014	0.01	11.462	8084000	20.5969	7135163
32	2015	0.01	11.719	5515507	21.1187	4059228
32	2016	0.01	11.738	7673852	17.5559	3510711
33	2012	0.03	11.268	6623609	20.7677	6244734
33	2013	0.03	11.530	7791221	14.0186	7688697
33	2014	0.03	11.690	7130467	18.8884	7968807
33	2015	0.03	11.828	5585202	19.392	4418440
33	2016	0.03	11.962	7384010	20.3079	6242916
34	2012	0.03	8.592	7636647	.	6897351
34	2013	0.03	8.736	6110666	.	5431136
34	2014	0.02	8.859	6072326	.	8204255
34	2015	0.02	8.969	7137234	.	7487827
34	2016	0.01	9.047	7651481	.	6915278
35	2012	0.06	8.672	6340962	.	5366421
35	2013	0.02	8.889	8207999	.	3747474
35	2014	0.02	9.086	7201494	.	4887069
35	2015	0.01	9.250	6926433	.	7727465
35	2016	0.01	9.262	5485106	.	7524888
36	2012	0.02	10.544	8343324	.	4300075
36	2013	0.02	10.680	7066906	.	7879387
36	2014	0.02	10.803	6052455	.	3792710
36	2015	0.03	10.914	7469168	.	5731116
36	2016	0.03	11.082	7554067	.	4763277
37	2012	0.04	12.039	5907722	16.1313	5714931
37	2013	0.04	12.183	6107955	19.7415	6856573
37	2014	0.04	12.250	6192497	16.8571	4934207
37	2015	0.04	12.313	6597517	18.1414	6502031
37	2016	0.05	12.364	8421856	16.1048	8182509

Bank	Year	ROA	Firm Size	Product innovation	Service innovation	Organizational innovations
38	2012	0.03	8.822	7160800	.	7510793
38	2013	0.03	9.083	6171476	.	5720237
38	2014	0.02	9.161	6798755	.	7388036
38	2015	0.02	9.234	6729923	.	5697515
38	2016	0.01	9.262	7328865	.	5652965
39	2012	-0.05	7.880	7884801	.	7932202
39	2013	-0.05	7.981	6183730	.	7860453
39	2014	-0.10	8.253	5610254	.	4122416
39	2015	-0.07	8.467	6727108	.	7983084
39	2016	-0.06	8.959	6374702	.	4589409
40	2012	0.03	10.619	8074779	.	7219876
40	2013	0.03	9.287	7500096	.	7884203
40	2014	0.04	10.398	8149356	.	6852464
40	2015	0.03	11.120	7956167	.	7883653
40	2016	0.02	10.557	5545677	.	8081515