

**EFFECTS OF FINANCIAL INNOVATIONS AND FIRM SIZE ON
AGENCY COSTS AMONGST
COMMERCIAL BANKS IN KENYA**

BY

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DECLARATION

I declare that this research is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

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This Research Project has been submitted for examination with our approval as the University of Nairobi Supervisors.

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DEDICATION

This project is firstly dedicated to God Almighty who is my source of wisdom and understanding. To my husband, Dr. Moses Mwenda for the immense support and guidance. To my children; Victor, Gratia, Brainy and Prosper for their patience and encouragement through the period of study.

LIST OF ABBREVIATIONS

ATM	Automated teller machine
CBK	Central Bank of Kenya
ER	Expense ratio
FCF	Free Cash flows
GDP	Gross domestic product
ICT	Information and Communication Technology
Ksh	Kenya Shilling
NPV	Net Present Value
S&P	Standards and Poors
SFAS	Statement of Financial Accounting Standards

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ABSTRACT

This study examines the effect of financial innovations and firm size on agency costs amongst Kenya's Commercial Banks. The study was motivated by the significant growth in branchless banking innovations in Kenya over the study period coupled with major geographical expansion by commercial banks leading to steep rise in banks' total assets. The focus of the study is on the 11 commercial banks listed at the Nairobi Securities Exchange except for one of the banks which according to the Central Bank of Kenya is also mortgage service provider. The study uses secondary data largely collected from the Central Bank of Kenya Bank Supervision Annual reports and the financial reports of the individual banks. The financial innovations covered include the mobile banking and Automated Teller Machines. The study uses Koyck distributed lag model estimated using system generalized method of moments. The results provide strong empirical evidence linking firm size to agency costs whereby bigger commercial banks account for higher agency costs. The empirical results show that the effect of mobile banking on agency costs is lagged, in that current mobile banking does not show an inverse relationship with agency costs. On the other hand, the lagged (future) mobile banking significantly affects agency costs in an inverse manner. Lastly, no evidence is found linking ATMs with agency costs in Kenya's listed banks over the study period. The study suggests that the management of commercial banks in Kenya should have a long term view of financial innovations such as mobile banking. This is because the evidence provided by this study suggest that the effect of mobile banking on agency costs is felt long after the innovation has been adopted. Lastly, the study recommends future studies covering mobile banking and ATM transactions at firm level and their resultant effect on agency costs in the banking sector.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

This study covers the effects of financial innovations in the form of mobile banking and Automated Teller Machines (ATMs) and agency costs amongst commercial banks in Kenya. The study covers Kenya's banking sector over 8 year period (2008-2015). During the study period commercial banks experienced monumental growth in terms of total assets, branch expansion, employee numbers and technology use among others. In addition, a number of commercial banks have expanded into the East African region with implications on monitoring costs.

The number of ATMs in the banking sector has grown from 166 in year 2002 to 2825 in year 2017, while the banking sector total assets grew from 456,691 million in 2002 to 3,940,615 million in 2017. The banking sector total income rose from Ksh 59659 million in 2002 to Ksh 486,316 million in year 2017 (CBK, 2017). This, no doubt represents a monumental growth in Kenya's banking sector.

Importantly, Central Bank National payment statistics document that the mobile payments have overtaken card payments by a huge margin (CBK, 2015). At the introduction of mobile money in year 2007, commercial banks strongly resisted the idea of money being transferred through cell phones under the control of mobile phone service providers (Hughes & Lonie, 2007). The bone of contention between commercial banks and mobile phone service providers was that if telecommunications companies are allowed to transfer money, then they should be subject to CBK regulations such as commercial banks. Interestingly, commercial banks have learnt to partner with mobile phone service providers and the banks have integrated most of their operations with mobile money platforms.

As commercial banks grow geographically and in terms of total assets and employee sizes there is growing concern among shareholders as to whether such growth and expansion only benefits management at the expense of shareholders. For instance, Aggarwal and Samwick (2006) argue that although owners of large corporations ordinarily delegate investment decisions as well as resource allocation to professional managers such decisions are largely unobservable or would lead to significant monitoring costs by owners. Recent studies suggest that financial innovations such as ATMs and mobile banking arise to among other reasons, curtail transaction costs and reduce agency costs (Muthinja & Chipeta, 2017). This study seeks to empirically establish whether as banks increase in sizes as measured by total assets there is a corresponding increase in agency costs. Secondly, the study tests whether financial innovations such as ATMs and mobile banking significantly reduce banking sector aggregate agency costs.

1.1.1 Financial Innovation

The concept of innovation as a field of study dates back to Schumpeter (1934) seminal work linking innovation to firm performance. Schumpeter argues that as a firm successfully introduces new products, new processes and organisational innovations, the firm will overtake the existing firms and effectively expand its market share. A number of studies have attempted to define innovation. For instance, Tushman and Nadler (1986) argue that innovation occurs when a business entity creates any new product, service or process. In effect, Tushman and Nadler classify innovations into product innovation which refers to changes in the service rendered by a company or a change in its product. On the other hand, the study opines that process innovation refers to the change in the way a product is made or the service is rendered. Rogers (1995) defines innovation as an idea perceived by an individual as new and where the individual's reaction is affected by the newness of the idea. The idea, Rogers opines, need not be 'objectively' new to the individual in view of the time passed since the first time it was discovered. Rogers definition suggests that the major consideration with regard to whether an

idea is an innovation depends on whether the individual exposed to it has had prior exposure to the 'new idea'.

Financial innovation occurs when a firm creates and then popularizes new financial instruments new financial technologies as well as institutions and markets (Tufano, 2003). While new financial instruments represent product innovations, Tufano suggests that process innovations occurs when the distribution of the financial products and the execution or pricing transactions is done in new innovative ways. Financial innovations are seen as critical especially in the banking sector where commercial banks have substantially embraced innovations aimed at curtailing transaction costs and cutting on wage bill. Financial innovation and its drivers have emerged as interesting research areas in the recent past. Although there is significant interest in financial innovation research, recent studies document a trend where majority of financial innovation studies have ignored developing countries (Lerner & Tufano, 2011; Tufano, 2003).

This has implications for financial innovation research in developing countries in general and Kenya in Particular. Kenya is seen as the epicentre of recent financial innovations in mobile money (Chipeta & Muthinja, 2018). Although Mwando (2013) contends that there is no clear evidence of what drives financial innovations in Kenya, the role of firm size and agency costs in driving innovations in general has been observed in previous studies. For example, Tufano (2003) as well as Frame and White (2004) opine that firm size and agency costs are among the drivers of financial innovations. However, although the agency costs and firm size have been studied as drivers of financial innovations, the relationship could be bi-directional. This study focuses on the effects of financial innovations in the form of mobile money and Automated Teller Machines (ATMs) on agency costs in Kenya's banking sector.

1.1.2 Firm Size

There is no available literature on the specific definition of ‘firm size’. The available literature largely defines the two terms ‘firm’ and ‘size’ separately while discussing extensively the multiple ways in which ‘firm size’ is operationalized or measured. Firm size may be defined in terms of the definition of ‘size’ which refers to the magnitude or largeness of something (OxfordDictionaries.com, 2018). Firm size therefore refers to the magnitude or largeness of a firm and may be either large or small.

Although there are a number of proxies used to represent firm size, it appears there is no consensus on the most appropriate proxy. However, in some studies, firm size has been represented by employee size (Pagano & Schivardi, 2003) in other studies the proxy for firm size was total assets (Al-Khazali & Zoubi, 2005). This study uses total assets of Kenya’s banking sector as the proxy for firm size. It is expected that firm size has a direct relationship with agency costs

The size of a firm has implications on the firms overall agency costs. Firms are generally heterogeneous in many respects such as the scope of operation, firm size, assets, human capital and networks (Oliveira & Martins, 2011). Large firms control more resources such as the linkages between employees and communications within the firm (Baker, 2011). Empirical literature reviewed suggests a direct relationship between firm size and agency costs. As firms expand geographically or through mergers and acquisitions shareholders incur significant monitoring costs and reduced firm value of them being the principals and providers of capital. The importance of firm size cannot be overemphasized considering large firms have been associated with large monitoring costs and in effect steep agency costs. As commercial banks expand through mergers and acquisitions as well as through geographical expansion, it is

expected that agency costs will continue to grow. This needs to be established through an empirical study to be carried out in this study.

1.1.3 Agency Costs

An agency is a contract which arises where a person (principal) engages another person (the agent) to undertake a given task on behalf of the principal, effectively delegating to the agent some decision making authority (Jensen & Meckling, 1976). According to Jensen and Meckling, agency costs comprise the aggregate costs a principal incurs in order to monitor the agent, residual loss and the agent's bonding costs. Jensen and Meckling (1976) contend that monitoring costs involve budgetary limitations, compensation policies as well as the rules of operation. On the other hand, residual loss arises from the agent's diversion of commitment from the principal's firm. Bonding costs guarantee the principal of compensation by the agent should the agent undertake such acts.

Although owners of large corporations ordinarily delegate investment decisions as well as resource allocation to professional managers, such decisions are largely unobservable or would lead to significant monitoring costs by owners (Aggarwal & Samwick, 2006). Ang, Cole, and Lin (2000) provides evidence that agency costs are higher among firms whose management owns less than 100 % shares and that agency costs increase with decline in equity share of the owner. Agency costs are seen as a resultant loss in value to firm as a result of managers pursuing goals that are at odds with the goals of their firm (Kyerboah-Coleman, 2007).

Agency costs in the banking sector may arise in a number of ways. For instance, Muthinja (2016) argues that such agency costs may arise firstly, where the management is unable to carry out due diligence in the loan appraisal process which leads to bad debts, frauds, poor customer service and poor staff performance. Muthinja (2016) further suggests that poor staff performance may be associated with the systems and processes in use at the commercial bank.

The study posits that if the systems are user friendly and fast, this improves the employee's efficiency score, as measured by the number of customers served by the employee over a given period of time. Nevertheless, Muthinja (2016) contends that any management attempt at resolving such employee performance issues could stir further conflicts between business owners and the management.

According to Ang et al. (2000), most studies have made minimal efforts at measuring agency costs whether in absolute or relative terms. In addition, Ang *et al* (2000) observe wide use of expense ratio in economics and finance studies. The expense ratio measures management's efficiency in controlling operating costs.

1.1.4 Financial Innovations, Firm Size and Agency Costs

Financial innovations, embody the development of a new product, a new service and/or a new production process (Frame & White, 2004). These financial innovations are classified as either product or process innovations (Tufano, 2003). This study focuses on two types of process innovations in the banking sector namely mobile banking or mobile money and Automated Teller Machines (ATMs). Mobile banking entails transferring electronic money without necessarily requiring the customer to have a bank account. While mobile banking does not require the customer to have a bank account, the customer needs an ordinary mobile phone and a mobile money or e-money account with the mobile phone service provider. The e-money account can be opened for free and without any account maintenance fee or a requirement to visit the mobile phone company office or the bank's branch. The role of the bank in mobile banking is limited to securing the funds or deposits for the mobile phone company. Effectively, customers do not have to open an account with a bank or transact directly with commercial banks (Tomášková, 2010). Banks use ATMs as an instrument to access a bank account, making the ATMs as just an extension of traditional banking which uses physical bank branches (Mwando, 2013; Siedek, 2008). Mobile banking is measured in terms of the number of

transactions in mobile banking for each of the 8 years (2008-2015) covered by the study. On the other hand, ATM is measured in terms of total number of ATMs operated by the banking sector in each of the years under study.

The size of a firm largely explains how it uses and adopts innovations designed to curtail agency costs by the firm. For example, A review of literature documents that most of the innovations are accounted for by large firms (Malerba & Orsenigo, 1997). In addition, large banks in the USA were the main adopters of small credit scoring technology (Akhavein, Frame, & White, 2005). High levels of agency costs among large commercial banks motivate banks to adopt and use financial innovations so as to cut the costs. Therefore, firms adoption and usage of financial innovations among other reasons, aimed at reducing agency costs. While large firms generally have high agency costs owing to high monitoring costs by the principal and overinvestments by the agents, financial innovations such as mobile money and ATMs reduce agency costs.

1.1.5 Commercial Banks in Kenya

Kenya's banking sector has experienced monumental growth in terms of total assets and technology adoption over the 8 year study period. The CBK set the pace for technology adoption in the year 2005 when it introduced Real Time Gross Settlement (RTGS) system (CBK, 2005). In addition, the system curtails the risks emanating from payment exposure effectively stimulating efficiency and safety of exchange in value between parties. Lastly, KEPSS is online system enabling individuals and banks to electronically transfer funds on real time basis. The CBK observes a trend where commercial banks have greatly leveraged on technology to attract new customers in addition to cross-selling their products to existing ones (CBK, 2009).

The monumental growth in telecommunications sector in general and mobile in particular, is documented as a major development in Kenya's National Payment system (CBK, 2015). These developments in telecommunications sector have significantly enabled banks to conveniently serve customers while reducing service delivery costs.

The growth in ATMs in the industry grew from about 230 in December, 2003 (CBK, 2003) to 2825 in December, 2017 (CBK, 2017). According to CBK (2016), ATM growth has not kept pace with the growth in mobile banking accounts. However, growth in banking sector number of ATMs increased by 169 from 2656 in 2016 to 2825 in 2017. The CBK observes that the increase in ATM numbers in 2017 provides evidence of banks' strategic cost reduction decisions of opening new ATM centres as opposed to new bank branches. According to CBK (2017), commercial banks closed many branches, cut employee numbers and adopted effective delivery channels in further attempts to ensure efficiency in service delivery and curtail costs. The increase in ATM numbers by banks is matched by steep increase in the adoption of mobile money channels also considered cost effective in the delivery of financial services by banks. These innovations in mobile money have been largely supported by Kenya's regulatory framework in the banking and telecommunications sectors (Kimenyi & Kibe, 2014; Muthinja, 2016).

The overall banking sector total expenses which have direct implications on the banking sector agency costs as measured by expense ratio, grew from Ksh 54029 million in year 2002 to 346097 million Kenya shillings in 2017. Although this may reflect normal growth in the banking sector, it also shows marked growth in agency costs. Between year 2002 and 2017, the size of Kenya's banking sector grew from total assets Ksh 45661 millions in 2002 to Ksh 3940615 millions in year 2017. On the other hand total income grew from Ksh 59659 millions in 2002 to Ksh 486316 millions in 2017. Lastly, total employment in the banking sector grew from 11340 in 2002 to 30903 in 2017 (CBK, 2002, 2017)

Kenya's banking sector has grown tremendously over the period covering year 2003-2016. A number of banks have merged while others have been listed at the Nairobi Securities Exchange. This has implications for the overall agency costs in the banks cost structure. As firms grow in terms of total assets and employee sizes, the degree of complexity increases which calls for financial innovations to stream line their operations. This may to some extent explain the rapid growth in the adoption and usage of mobile money and other innovations by commercial banks

1.2 Research Problem

The objective of this study is to establish the effect of financial innovations and firm size on agency costs amongst commercial banks in Kenya. The study focuses on two types of financial innovations which can be classified as both product and process innovations but are largely seen as process innovations. These innovations are mobile banking and ATMs. The two financial innovations represent a departure from the traditional methods of delivering bank services to customers through physical bank branches.

The study of agency theory in general and agency costs in particular has broadened over the years. For instance Jensen (1986) focuses on managerial actions when faced with huge free cash flows (FCF) and finds that when faced with higher levels of FCFs the management is more likely to invest in operations and loss making projects. This implies that as a firm grows in terms of FCFs, the shareholders incur more agency costs to monitor the nature of investments made by the management. Jensen (1986) findings are buttressed by Aggarwal and Samwick (2006) work which opines that decisions made by management on behalf of owners are largely unobservable and may lead to large monitoring costs. The study finds that both firm investments and firm performance increase with increase in incentives. Firms may enlarge through mergers and acquisitions or geographical expansion. However, Chen, Lu, and Sougiannis (2012) find that this expansion amounts to empire building by the management at

the expense of the shareholders which increases cost asymmetry due to agency costs. Chen et al finds that this cost asymmetry has a direct relationship with FCFs. Agency costs have therefore been studied broadly from the point of view of FCFs and firm size in developed countries.

Recent studies focusing on financial innovations in Kenya's banking sector have made interesting findings. For instance these empirical studies find that among others, firm size and agency costs are drivers of branchless banking in Kenya. In addition, the adoption of financial innovations in Kenya's banking sector has grown over time (Chipeta & Muthinja, 2018; Muthinja & Chipeta, 2017). Although these studies make significant findings with regard to the effect of firm size on financial innovations, there exists a research gap with regard to effect of financial innovations on agency costs and the effect of firm size on agency costs. This is especially so when viewed from banking sector perspective. Importantly, although the emergence of mobile money and agency banking has been hailed as Kenya's success story, majority of studies have concentrated on financial innovations in developed countries. Nevertheless, a number of studies such as Siedek (2008), Mwando (2013) and Jepkorir (2011) have reviewed the two financial innovations (ATMs and mobile banking) in Kenya. The studies however provide descriptive statistics with limited empirical rigour.

A number of financial innovation studies have been carried out in Kenya in the recent past. For instance Siedek (2008), Mwando (2013) and Muthinja (2016) studies have focused on branchless banking models such as non-bank led models, bank led models and bank focused models. On the other hand, Jepkorir (2011) study focuses on the challenges that Kenyan commercial banks face when adopting financial innovations. Although this represents a significant interest in the study of financial innovations, no existing study has focused on the effect of financial innovation and firm size on agency costs. This study sought to address these

observed gaps in the existing literature with regard to commercial banks listed in Nairobi Securities Exchange.

1.3 Research Objective

The main objective of the study was to establish the effects of financial innovations and firm size on agency costs amongst commercial banks in Kenya.

1.4 Value of the Study

This study has both managerial and policy implications. The study would guide the management of commercial banks in making decisions regarding investment in financial innovations. For instance, if we find a strong link between firm size and agency costs, then management will perhaps need to factor this finding in their regional expansion plans. In addition if mobile banking and ATMs have the effect of reducing agency costs, then banks' management would work to ensure their banks make proper use of the two financial innovations.

Secondly, at policy level, the government can use the findings to guide policies and legislation for regulating the banking sector. The findings can also guide the Central Bank of Kenya in making guidelines for managing commercial banks in Kenya especially with regard to commercial banks regional and branch expansion.

Lastly, this study findings would stimulate research interest and intellectual curiosity with regard to financial innovation, firm size and agency costs. This would hopefully continue to broaden the knowledge base in the study of agency theory and financial innovation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature of financial innovations, firm size and agency costs. The chapter also reviews empirical literature on the links between the three variables as well as an overview of Kenya's banking sector. Lastly, a conceptual framework which conceptualizes the relationships between variables is developed in form of diagrammatic representation.

2.2 Theoretical Review

This section reviews the theoretical underpinnings upon which the study is grounded. The focus of the theoretical review is on the theories that explain the relationship between the providers of capital and their business managers. From the reviewed literature, the relationship is covered under the agency theory and no evidence is found of other theories addressing the principal agent relationship.

2.2.1 Agency Theory

This study is grounded on the agency theory which explains the relationship between company owners (principals) and the management appointed by the principal to manage the company on their behalf (agents). Agency problems are observed where there is a misalignment between the principal's interests and the agent's interests, effectively making it hard for the activities of the agent to be monitored or controlled by the principal (Banks, Woznyj, Kepes, Batchelor, & McDaniel, 2016).

The principal ordinarily incurs bonding costs by rewarding the agent to discourage the agent from engaging in activities considered a conflict of interest and to penalise the agent if he or she undertakes such acts. The penalty is in form of adequate compensation to the principal by agent. There is evidence linking managerial ownership and agency costs in the sense that

agency costs increase as managerial ownership declines. For instance, Ang et al. (2000) opines that agency costs increase as equity ownership declines and that firms whose management owns less than 100 % shares record higher agency costs.

According to Berle and Means (1932), management's thirst for power has the potential of fuelling agency conflicts. For instance, the authors observe that conflict of interest between owners and management may occur if management re-invests the company's profits to enlarge the management's power. Consequently, Berle and Means argue that conflict of interest may arise if out of professional pride, the management increases employee benefits above the competitive standards in the respective industry where the company operates. Additionally, management may increase labour quality above the level where shareholders would make profits. French et al. (2010) work links agency problem to the global financial crisis experienced in 2007 evidenced by substantial expenditures in perquisites by executives of the top companies at the heart of the financial crisis. The study argues that conflicts of interest that cannot be easily addressed through contracts may lead to the collapse of the entire financial system.

2.3 Determinants of Financial Innovation and Firm Size

This section reviews the determinants of financial innovations and firm size identified in the literature. Financial innovations and firm size constitute the key predictor variables in this study. The section also reviews the determinants of the control variables. This is because agency costs may be affected by a number of factors over and above the key independent variables covered in this study.

2.3.1 Financial Innovations

According to Tufano (2003) as well as Frame and White (2004), financial innovations are developed to among other things reduce agency costs and information asymmetry. The

relationship between financial innovations (such as mobile banking and ATMs) and agency costs is inverse since the innovations are meant to curtail agency costs.

2.3.2 Firm Size

Firm size is seen as having significant impact in driving branchless banking (Muthinja & Chipeta, 2017, 2018). Firm size increases with increase in total assets. As the firm or bank grows, monitoring costs increase effectively increasing agency costs.

2.3.3 Agency Costs

As the firm grows or expands, shareholders incur significant monitoring costs and losses due to overinvestment by the management, implying a direct relationship between the size of a firm and the firm's agency costs

2.3.4 Gross Domestic Product (GDP)

The effect of a country's economic performance as measured by GDP can affect the performance of banks. This is consistent with Chipeta and Muthinja (2018) work on Kenya's banking sector. As performance of banks improve, this has implications on firm size. This study therefore uses GDP as a control variable.

2.3.5 Employment Level

The number of employees has direct implications on agency costs as observed in previous studies (Chen et al., 2012). Since incentives are paid to employees and/or management, it implies a direct relationship between the level of employment in the banking sector and agency costs. This study therefore controls for the effect of employee size on agency costs.

2.4 Empirical Review

This section reviews empirical literature on financial innovations, firm size and agency costs being the key variables of interest to this study.

2.4.1 Agency Problems and Firm size

There is considerable literature linking agency problems in general and agency cost in particular to firm size. This strand of literature suggests that managers' decision to over invest free cash flows (FCF) in mergers and acquisitions succeed in building empires with no resultant gains to the companies' shareholders. According to Jensen (1986), free cash flows refers to excess cash above the cash required to finance all available positive NPV projects. Jensen argues that FCF arises when a firm's growth prospects are misaligned with the firm's available funds. There are two implications of Jensen (1986) FCF hypothesis. Firstly, the higher the levels of FCF held by managers the more likely the managers are to invest the FCF in operations or negative NPV projects. Secondly, investment in operations and negative NPV projects rewards managers with increased perquisites instead of paying the FCF to shareholders (Chen et al., 2012).

The use of FCF in the study of agency problems has increased in recent years. For instance, Chen et al. (2012) have used FCF as a proxy for the agency problem and the resultant incentives to build empires. The study tests its prediction by analysing year 1996–2005 financial and governance data relating to firms listed in the Standards and Poors (S&P) 1500 index. The study finds that manager's incentives to build empires leads to an increase in cost asymmetry due to the agency problem. In particular the study observes that cost asymmetry has a direct relationship with free cash flow.

Information asymmetry between owners and managers is an incentive for the management to build empires. This information asymmetry is as result of the variations in the amount and quality of information held by the management and what is known by the shareholders and/or investors (Boot & Thakor, 1997; Healy & Palepu, 2001; Muthinja, 2016; Oluwabiyi, 2014). Secondly, although the principal raises the required capital, the management acting as agents

possess more information compared to the principal which explains the use of incentive contracts by the principal to check transaction costs (Holmstrom, 1989). Although owners of large corporations ordinarily delegate investment decisions as well as resource allocation to professional managers such decisions are largely unobservable or would lead to significant monitoring costs by owners (Aggarwal & Samwick, 2006). Managers generally excel where there is close monitoring by multiple major family owners rather than by a single owner as evidenced by a study of 893 Italian family firms (Miller, Breton- Miller, Minichilli, Corbetta, & Pittino, 2014)

Empirical studies provide conclusive evidence that increased firm size through geographical expansion may lead to increased turnover but reduced profitability. For example, Hope and Thomas (2008) observe that where managers are not monitored by shareholders, managers make sub-optimal decisions that may be a mismatch with shareholders' interest. According to the authors such decisions include aggressive firm expansion effectively reducing profitability and lowering firm value as evidenced by Geographic earnings disclosure requirements in the USA. Hope and Thomas (2008) observe that as per Statement of Financial Accounting Standards (SFAS 131) there is no longer a requirement for U.S. multinational firms to disclose earnings by geographic segments. They find that such nondisclosure constrains the ability of shareholders in monitoring the effect of management decisions to invest in foreign segments.

In sum, empirical literature reviewed suggests a direct relationship between firm size and agency costs. As firms expand geographically or through mergers and acquisitions shareholders incur significant monitoring costs and reduced firm value. Nevertheless, Ang et al. (2000) have found that the actual measurement of agency costs whether in absolute or relative terms in most studies has been minimal. According to Ang et al. (2000), expense ratio

is widely used in financial economics and accounting to measure agency costs. The ratio measures the efficiency with which management controls operating costs, such as expenditure on perquisites as well as other direct agency costs. Expense ratio is given as operating expenses divided by annual sales. To fit this equation in the banking sector, total annual income is used in place of annual sales.

Although there are a number of proxies used to represent firm size, there is no consensus on the most appropriate proxy. For instance, while some studies have used total turnover and total assets, other studies have used employee size as proxy for firm size (Pagano & Schivardi, 2003). This study uses total assets of Kenya's banking sector as the proxy for firm size. It is expected that firm size has a direct relationship with agency costs

2.4.2 Financial Innovations and Agency Costs

The study of financial innovations can be carried out in the broader context of innovation literature. According to Rogers (1995), innovation is seen as an idea perceived by an individual as new but where the individual's reaction to it depends on the newness of the idea. The idea, Rodgers (1995) suggests, need not be 'objectively' new to the person in view of the time gone since its first discovery.

The importance of financial innovation in any financial system has led to numerous studies in the subject for decades. Financial innovations have historically been viewed as a foundation of any financial system and the critical element for a responsive and efficient capital market (Horne, 1985). Arguably, since finance is a driver of virtually all production and consumption activities, financial sector development positively affect the entire economy (Frame & White, 2014). Frame and White argue that financial innovations indirectly and positively benefit the economy, by encouraging productive investment as well as savings decisions. Mobile banking is common in developing countries where majority of the population are unbanked. Lyman,

Ivatury, and Staschen (2006) argue that customers deal with mobile phone service providers, with agents acting as the customer's first contact point. Nevertheless, Mobile phone companies hold customers' money in form of virtual e-money held at mobile phone company's servers which are not linked to the bank account in customers' names.

A number of studies on the diffusion of ATMs and the characteristics of banks that adopt them have encapsulated various findings (Frame & White, 2004; Hannan & McDowell, 1984, 1987; Olatokun & Igbinedion, 2009; Saloner & Shepard, 1992; Sinha & Chandrashekar, 1992). Hannan and McDowell (1984) work covering about 4,000 USA banks for the period 1971-1979 observe that big banks largely located in local markets were more likely to adopt the use of ATMs. They find that the probability of adoption is affected by other factors with regulatory environment within which the bank operates largely shaping its adoption decisions. Although the use of ATMs has been popular in most African countries, there has been concerns with regard to ATM related frauds (Jegade, 2014; Ogbuji, Onuoha, & Izogo, 2012).

The Kenyan context, within which this study will be carried out, has experienced rapid growth in mobile money in recent past. Mobile money was introduced in Kenya in the year 2007 when the concept was least understood and was aggressively resisted by commercial banks (Hughes & Lonie, 2007). According to the Central Bank of Kenya statistics, mobile money has grown in leaps and bounds and earned global accolades for its role in stimulating financial inclusion. Kenya Commercial banks continue to expand both locally and regionally with implications for firm sizes, agency costs and service delivery.

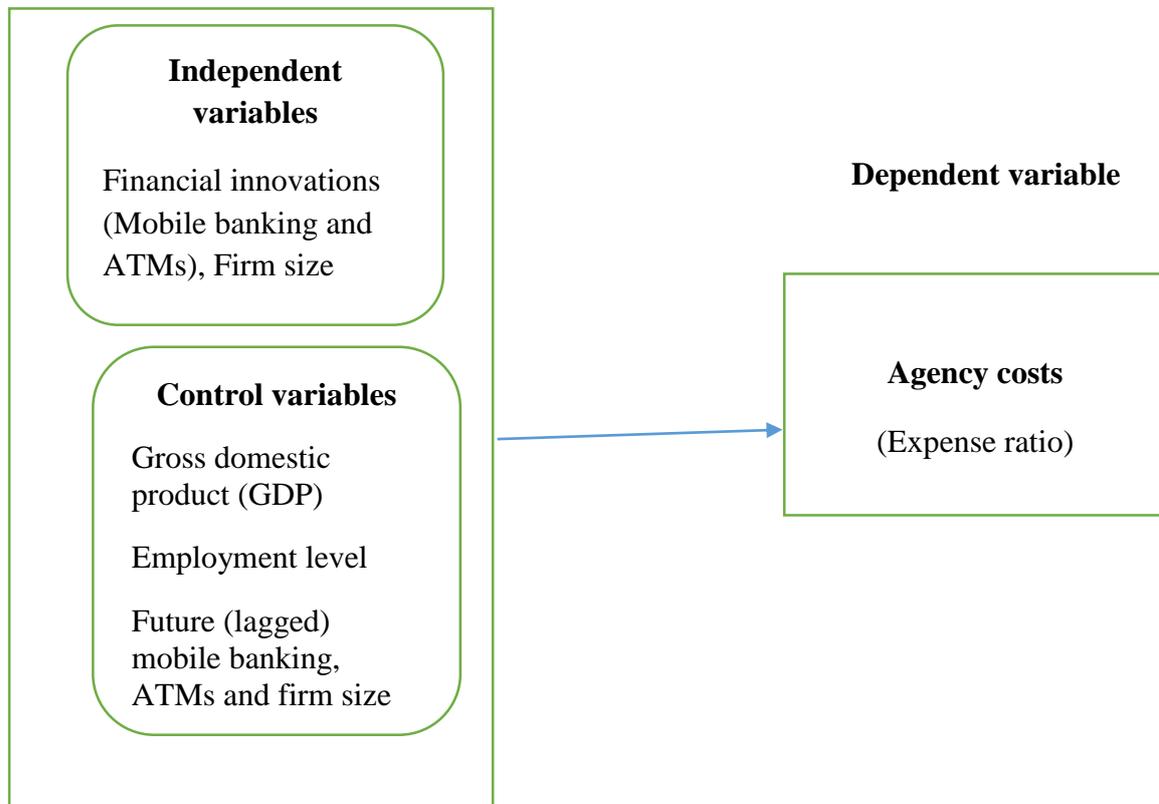
In general, every employee is an agent of the shareholders and hence, failure or refusal of the employee to perform well would lead to agency problems. In the banking sector, agency problems arise where: The management fails either knowingly or unknowingly to carry out due diligence when appraising loan applicants leading to bad debts, frauds, poor customer service

or low staff efficiency with regard to customer service rate per staff member. In such cases, banking halls get congested, customer dissatisfaction grows, and staff morale goes down resulting in bank's poor financial performance in the long run. Poor staff performance could be related to the systems and processes in use at the bank. If the systems are user friendly and fast, this has positive implications in terms of efficiency score per staff, which is measured by the number of customers served by an employee over a given time period. However, an attempt by the management to resolve staff performance issues could be a recipe for further conflict of interest between shareholders and management.

2.5 Conceptual Framework

Figure 2.1 shows the conceptualized relationships between the key variables under study as well as the control variables.

Figure 2.1: Conceptual framework



Source: Author

As figure 2.1 shows, the study covers financial innovation variables as well as firm size. The literature reviewed in chapter two suggests that there is a causal relationship between the financial innovations whereby, increased financial innovation have the effect of reducing agency cost. Conversely, literature suggests that agency costs increase with increase in firm size due increased perquisites and empire building at the expense of the shareholders. The effect of financial innovation, ATMs and firm size on agency costs may be felt in later years implying that the effect is lagged.

2.6 Summary of the Empirical Review

Table 2.1 summarizes the key findings gleaned from the empirical studies reviewed in this study and the gaps the study intends to fill.

Table 2.1: Summary of the empirical Review

Author of study	Focus of Study	Methodology	Findings	Knowledge Gaps	Focus of current study
Jensen (1986)	The study focuses on effect large volume of FCF has on agency costs.	Descriptive statistics and review of economic literature.	The higher the levels of FCF held by managers the more likely the managers are to invest the FCF in operations or negative NPV projects.	Does not review the role of financial innovation in curtailing agency costs. Jensen (1986) does not address banking sector agency.	The effect of financial innovation on banking sector agency costs. This study uses expense ratio instead of free cash flows with focus on the banking sector
Chen et al. (2012)	Focuses on managers' incentives to create business empires	Analysis of year 1996–2005 financial and governance data relating to firms listed in the Standards and Poors (S&P).	The study finds that manager's incentives to build empires leads to an increase in cost asymmetry due to the agency problem. In particular the study observes that cost asymmetry has a direct relationship with free cash flows.	Chen et al focus on empire building largely explained by mergers and acquisition. The study does not consider firms that grow in size without necessarily entering into mergers and acquisitions.	To address the knowledge gaps in Chen et. al (2012), this study covers growth in firm/bank size whether organically or through mergers and acquisitions.
Aggarwal and Samwick (2006)	Focuses on the performance of investment firms and incentives of managers	Estimates the joint relationships between incentives and firm performance and between incentives and investment.	Although owners of large corporations ordinarily delegate investment decisions as well as resource allocation to professional managers	The study does not cover managerial incentives in non-family businesses. In addition, the study covers only one aspect of agency costs- managerial incentives	This study covers all agency costs in banks whether family owned or otherwise.

			such decisions are largely unobservable or would lead to significant monitoring costs by owners. The study shows that investment increases with incentives and that firm performance increases with increase in incentives at all levels.		
Muthinja (2016)	The financial innovation and performance of commercial banks in kenya.	Uses dynamic panel estimation of firm/bank data for the period (2003-2013). The model is estimated using System generalized method of moments (GMM)	Financial innovations significantly affect firm performance as measured by industry adjusted ROA and ROE	The study focuses on commercial banks at firm level over 10 year period (2003-2013)	The focus of this study will be on listed commercial banks over 8 year period
Muthinja and Chipeta (2017)	Focuses on the micro and macro drivers of financial innovations in commercial banks based in kenya.	Uses dynamic panel estimation of firm/bank data for the period (2003-2013). The model is estimated using System generalized method of moments (GMM)	Agency cost is a significant driver of financial innovations.	The study does not test the effect of reverse causation. i.e whether financial innovation affects agency costs	This study focuses on the effect of agency financial innovation on agency costs
Muthinja and	Focuses on the speed with which	Uses dynamic panel estimation of	Tests the speed with which firm	Mobile banking takes close to three years while	Uses 8 year data as from listed banks

Chipeta (2018)	firm performance adjusts to financial innovation and the speed with which financial innovation adjusts to various innovation drivers.	firm/bank data for the period (2003-2013). The model is estimated using System generalized method of moments (GMM). Tests the speeds of adjustments using Koyck (1954) mean and median lags	performance adjusts to financial innovations such as mobile banking and ATMs	ATMs take five years to adjust to financial innovation drivers at bank level.	compared to 10 year firm data used in Muthinja and Chipeta work.
Hope and Thomas (2008)	The study focuses more on the quality of financial disclosures with regard to firm's geographical expansion and firm value.	Multiple regression.	Increased firm size through geographical expansion may lead to increased turnover but reduced profitability. Aggressive firm expansion effectively reduces profitability and lowers firm value.	The focus of the study is more the effect of managers' discretion in disclosing or not disclosing segmental earnings. The study does cover the effect of non-disclosure of segment earnings on agency costs. expansion into new segments increases firm size but no link is made between firm size and agency costs	This study tests whether firm expansion which increases firm size (banking sector total assets) increases agency costs as measured by expense ratio.
Jepkorir (2011)	Challenges of implementing financial innovations by commercial banks in Kenya	Descriptive statistics	The study make a general observation that financial innovations are seen as a threat to employment in the banking sector.	The study uses descriptive statistics covering wide issues sees as challenges to the implementation of findings. It does not address the issue of agency costs and financial innovation	This study uses dynamic panel estimation to test the relationship between financial innovation, firm size and agency costs

Aduda and Kingoo (2012)	Focuses on electronic banking and Kenyan commercial banks' financial performance	The study uses both descriptive and explanatory research design by describing the trend of bank performance, adoption, use and investment of ICT in banking sector over covering year 2006 to 2010. The study uses both primary and secondary data	Finds a positive relationship between e-banking as represented by ATMs and debit cards and bank performance	The study covers a very short time frame (4 years) and does not cover the effect of ATMs and mobile banking on agency costs.	This study covers a longer time frame (8 years). It also uses published secondary data which affords the ease of replication in future studies.
Berger and Hann (2007)	Examines whether manager's proprietary and agency cost reasons for hiding segmental profits affects their segment level disclosure decisions	The study compares a sample of restated Statements of Financial Accounting Standards (SFAS) number 131 segments with historical SFAS number 14 segments.	The disclosure of a segment that generates low or abnormal profits highlights unsettled agency problems resulting in increased external monitoring and exposure to agency costs of disclosing the segment.	The study focuses more on the reason for the non-disclosure of segment information relating underperforming segments for the reason that such disclosure may highlight agency costs issues. However the study does show whether increase in the number of segments (firm size) increases agency costs.	The study seeks to establish whether as the firm increases its segments or grows in other means there is a corresponding increase in agency costs.

Source: Author

The reviewed literature summarises the theoretical framework upon which this study is grounded. The study is grounded on agency theory which explains the relationship between the providers of capital or shareholders (principal) and the managers of shareholders' interests (agents). According to the literature reviewed in this section, shareholders incur substantial costs in an attempt to monitor the management who are tempted to overinvest FCFs in projects

with negative NPV out of professional pride. This has implications on agency costs and therefore calls for a need to use financial innovations to curtail agency costs. The review of literature finds that significant attempt has been made at studying financial innovations in Kenya. Such studies have addressed the drivers of financial innovations such as mobile money and ATMs as well as agency banking. With Kenyan banks rapidly expanding in the East African region and entering into mergers and acquisitions, it is expected that the size of the banks will continue to grow with negative implications for agency costs. Although there have been studies covering agency banking and agency costs, this study finds no evidence of studies covering the effect of financial innovations and firm size on agency costs especially in the banking sector. This study thus strives to address the current gaps in the reviewed literature.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the proposed research methodology to be used for the study. Section 3.2 covers the research design, section 3.3 discusses the population of study, section 3.4 discusses the sampling technique adopted, section 3.5 covers the data collection approach, section 3.6 discusses the diagnostic tests and lastly section 3.7 covers the data analysis and the a analytical model applied.

3.2 Research Design

Research design is entire strategy adopted by a researcher for a logical integration of various study components so as to address the research questions or objectives (De Vaus & de Vaus, 2001). The authors argue that the research design is determined by the research question and not the other way round. This study seeks to establish a causal link between financial innovation, firm size and agency costs. The study uses a quantitative research design using dynamic panel estimation with 8 years (2008-2015) data. This design is appropriate so as observe the trend of the relationship between variables over a long period of time.

3.3 Population

According to the CBK (2017) Kenya had 43 commercial banks (42 commercial banks and one mortgage finance company). The focus of this study was on commercial banks listed at the Nairobi Securities Exchange (NSE) over the study period (2008-2015). Over the duration of this study, there were 11 commercial banks listed at the NSE including one institution classified

by CBK as a mortgage finance company. The population therefore comprises 11 commercial banks.

3.4 Sample

The sample comprises 10 out of 11 listed commercial banks in Kenya, which represents 91% of listed banks. One of the 11 banks was excluded since it was classified by the CBK as being both a commercial bank and a mortgage financing company. The elimination of the mortgage financing firm ensured that the commercial banks under study had similar observable characteristics. The choice of listed banks was largely informed by data availability and the fact that according to CBK (2017), listed banks accounted for more than 60% of the total banking sector total assets. The listed banks were therefore a fair representation of the banking sector performance, size as well as financial innovation adoption.

3.5 Data Collection

The study uses quantitative secondary data collected from the Central Bank of Kenya banking supervision Annual reports for each of the eight years under study. Additional data was collected from individual Annual financial reports downloaded from the respective bank's websites and the Capital Markets Authority (CMA) website. Hard copies of financial reports were also obtained from the CMA library. To compute the agency cost proxy-expense ratio, the researcher used operating expenses and annual sales/income. The study used aggregate mobile banking number of transactions to proxy mobile banking. The number of mobile banking transactions relates to the aggregate (macro) extracted from the Central Bank of Kenya National payment statistics available from the CBK website. The number of mobile banking transactions as well as total assets figures were log transformed due to their sheer magnitude

compared to other variables. To measure firm size, this study uses the log of total assets in bank i over time t over the 8 years study period.

3.6 Diagnostic Tests

Validity is the extent to which the data measures what it intends to measure (i.e., accuracy), while reliability refers to the extent to which the researcher gets similar results from repeated measurements (i.e., precision or reproducibility). In other words, reliability implies that a repeated test should generate the same results (Rothman, Greenland, & Lash, 2008). The researcher generated summary statistics showing the mean, standard deviations, kurtosis and the number of observations for each variable. Importantly, the study sought to establish whether there was the existence of outliers in the data. An outlier refers to an observation positioned at an unusual distance from the rest of the observations in a given sample (Gladwell, 2008). Outliers generally apply unbalanced influence on major conclusions reached with regard to how the variables relate with one another (Aguinis, Gottfredson, & Joo, 2013).

To reduce the risks posed by possible outliers, the study adopted methods consistent with a number of previous as well as recent studies (Muthinja, 2016; Muthinja & Chipeta, 2017; Pindyck & Rubinfeld, 1998; Rousseeuw & Leroy, 2005; Williams, 2015). Firstly, the study ensured there were no coding errors in outlying cases, such as addition of zeros. Secondly, the researcher checked whether or not there were significantly different results when regression was run with missing data and without the missing data. Thirdly, a log transformation of explanatory variables with extreme values (such as total assets and number of mobile banking transactions) was carried out. Lastly, the addition of more control variables helped mitigate the challenge posed by large outliers.

3.7 Data Analysis

This section covers the approach used in analysing the data used in this study. The approach used in this analysis is consistent with approaches adopted in recent studies with regard to financial innovation and agency costs studies. This approach uses autoregressive models where a dependent variable is included among the predictor variables but in its lagged form. This is explained by the fact that the effect of financial innovations is largely lagged and therefore their impact is felt in later years. This approach is explained in this section.

3.7.1 Analytical model

The study uses Koyck (1954) distributed lag model estimated using system generalized method of moment (GMM) (Blundell & Bond, 1998; Blundell, Griffith, & Van Reenen, 1995). The Arellano and Bond (1991) dynamic GMM developed addresses the possible problem of endogeneity among independent variables. Importantly, system GMM has been observed to be robust with regard to measurement errors and is preferable where the study has small t and large n . The structure of the panel data used in this study is such that $t=8$ and $n= 10$ and therefore dynamic GMM estimation technique is the most appropriate. This approach is consistent with the methodology used in recent innovation studies (Chipeta & Muthinja, 2018; German-Soto & Flores, 2015).

The Koyck (1954) distributed lag model is expressed as

$$Y_{i,t} = \alpha_i(1-\lambda) + \lambda Y_{i,t-1} + \beta_0 X_{i,t} + \theta Z_{i,t} + \mu_{1,t} \dots\dots\dots \text{equation 1}$$

$$\mu_{i,t} = (u_t - \lambda u_{t-1}), \text{ a moving average of } u_t \text{ and } u_{t-1}$$

u_t = time t error term

u_{t-1} = time $t - 1$ error term

$Y_{i,t}$ = Agency costs represented the ratio of total operating expenses to total revenue for firm i over time t

$Y_{i,t-1}$ = Lagged values of $Y_{i,t}$

$X_{i,t}$ = Lagged values (X_1, X_2, X_3) for firm i over time t where

X_1, X_2, X_3 are independent variables; mobile banking, ATMs and firm size respectively

Mobile banking is represented by the log mobile banking transactions over time t

$Z_{i,t}$ = Vector of control variables¹ for firm i over time t

α_i , is the constant

β_0 , is coefficient of X_1, X_2, X_3

ϵ is the error term

As discussed in the literature, the dependent variable (agency costs) is measured using expense ratio expressed as;

$$\text{Expense ratio (er)} = \frac{\text{Operating Expenses}}{\text{Annual total income}} \dots \dots \dots \text{equation 2}$$

It is expected that as financial innovations increase, expense ratio decreases and vice versa.

Expense ratio measures the efficiency of the management of the banks in monitoring operating costs such as expenditure on privileges and other benefits.

On the other hand, the regression model will have three independent variables namely mobile banking (mb) and Automated Teller Machines (ATMs) and firm size. It is expected that overall agency costs may be affected by other factors other than the predictor or independent variables.

¹ Refer section 2.3 figure 2.1 Conceptual framework

Consequently, the regression model includes control variables namely the Gross Domestic Product (GDP) and total employment for each bank as well as the lagged values of the independent variables. The lagged values of the independent variables represent future financial innovations (studied) and future firm size.

3.7.2 Test of Significance

The statistical significance of each independent variable explaining agency costs will be tested using student t-test three conventional levels of significance (1%, 5% and 10%). F-test tests the general significance of the regression model.

Table 3.1 Operationalization of the variables

Classification of variable	Name of variable	Proxy
Dependent	Agency costs	Expense ratio
Independent	Mobile banking	Log of the number of mobile banking transactions in Kenya for each year
	Automated teller machines (ATMs)	Number of each bank's ATMs for each year
	Firm size	Log of each bank's total assets for each year
Control	Gross domestic product	Real annual Kenya GDP rates.
	Employment level	Number of employees for each bank for each year
	Lagged values of firm size, mobile banking and ATMs	

Source: Author

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF FINDINGS

4.0 Introduction

This chapter presents findings gleaned from the analysis of collected data. Section 4.1 presents the summary statistics. Section 4.2 presents the correlational matrix. Section 4.3 presents the regression results

4.1 Summary Statistics

Table 4.1 summary statistics for all the variables used in the analysis. As discussed in chapter three, the dependent variable is the agency costs represented by expense ratio. Expense ratio is given as total expenses divided by total income for a given bank in year t.

Table 4.1: Summary Statistics

Summary statistics						
Variable	Observations	Mean	Std. Dev.	Kurtosis	Min	Max
Agency costs	80	0.431445	0.181266	6.069	0.004485	1.177972
Lagged agency costs	70	0.41388	0.157742	4.055	0.004485	0.871087
M.banking	80	19.81561	0.889904	2.850	17.95452	20.83138
Firm size	80	1.55E+11	9.05E+10	3.706	2.12E+10	4.68E+11
ATMs	77	225.013	267.4663	3.367	12	962
Lagged M.banking	70	19.67051	0.857791	2.718	17.95452	20.63042
Number of staff	80	2617.6	2137.861	3.139	397	8690
GDP	80	5.0375	2.010062	2.484	1.5	8.4

Source: Regression output

The summary statistics show a balanced panel data with respect to most of the variables as evidenced by the number of observations totaling to 80. Mobile banking commenced in year 2007 while ATMs have been in use over a much longer period. The agency costs are

represented by agency ratio. The mean agency cost as shown in table 4.1 is 0.43 implying that the mean agency costs for the studied banks in 43% of total revenue with a standard deviation of 18%. We find that the mean number of staff is 2618 with a standard deviation of 2138. However employment levels among the listed banks show a wide range of 8293 (i.e 397-8690). The variations in employment levels is largely explained by variations in bank sizes. Kenya's banking sector is highly concentrated among six large banks.

Large banks account for a significant number of ATMs as well. For instance, ATM numbers range between 12 and 962. Each of the listed banks has at least an ATM. The mobile banking data is aggregate for all the mobile banking transactions executed in the country as a whole. Effectively, these transactions are not specific to individual banks. All mobile money (emoney) is backed by actual cash deposited in commercial banks since mobile telecommunication providers are not allowed to store the cash used in mobile money transactions.

4.2 Diagnostic tests

The summary statistics presented in table show the mean, standard deviations, kurtosis and the number of observations for each variable. The summary statistics confirm that the panel data is fairly balanced and no significant standard deviation with the regard to the mean for each variable. The existence of outliers in the data was observed in the data evidenced by large figures for total assets and the number of mobile banking transactions. To address the problem of outliers, the researcher carried out log transformation of the data.

4.3 Correlational Matrix

The correlation matrix presented in table 4.2 shows the strength of the relationships among variables. Although correlation does not necessarily imply causation, it provides a snapshot of the strength of the relationships.

Table 4.2: Correlational Matrix

Correlational Matrix								
	Agency costs	Future Agency costs	Mobile banking	Firm size	ATM	Lagged Mobile banking	Number of staff	GDP
Agency costs	1							
Lagged Agency costs	0.621	1						
Mobile banking	0.160	0.006	1					
Firm size	-0.1	-0.144	0.565	1				
ATMs	0.070	0.043	0.189	-0.296	1			
Lagged M. banking	0.106	-0.003	0.984	0.532	0.180	1		
Number of staff	0.148	0.124	0.151	-0.233	0.866	0.146	1	
GDP	-0.047	0.074	0.211	0.076	0.025	0.341	0.036	1

Source: Regression output

4.4 Regression Output

The detailed regression output is presented in table 4.3 and later summarized in table 5.1. As discussed in section 3.7.1, the analytical model has been estimated using System dynamic panel-data estimation approach. The results from the analysis is discussed in more details in section 5.1.

The analytical model was stated as;

$$Y_{i,t} = \alpha_i(1-\lambda) + \lambda Y_{i,t-1} + \beta_0 X_{i,t} + \theta Z_{i,t} + \mu_{1,t}$$

The dynamic panel estimation does not restate or provide the output of the analytical model. Instead the p. values and co-efficients of dependent and predictor variables are read from the regression output. This approach has been followed in a number of studies (Blundell & Bond, 1998; Blundell et al., 1995; Chipeta & Muthinja, 2018; German-Soto & Flores, 2015)

Table 4.3: Regression Output

System dynamic panel-data estimation				Number of obs =	67	
Group variable: countrysum				Number of groups =	10	
Time variable: year						
Obs per group:				min =	5	
				avg =	6.7	
				max =	7	
Number of instruments = 43				Wald chi2(7) =	77.35	
Prob > chi2 = 0.0000						
Two-step results						
WC-Robust						
Expense ratio (er)	Coef.	Std. Err.	z	P>z	[99% Conf.	Interval]
er						
L1.	0.334084	0.578077	0.58	0.563	-1.15494	1.823112
gdp						
L1.	-0.00387	0.009872	-0.39	0.695	-0.0293	0.021555
M banking	0.542263	0.125035	4.34	0	0.220194	0.864332
Firm size	1.50E-12	6.08E-13	2.46	0.014	-7.00E-14	3.06E-12
ATMs	0.001137	0.00037	3.07	0.002	0.000184	0.002089
Lag M.banking	-0.57477	0.133031	-4.32	0	-0.91743	-0.2321
No of staff	1.45E-05	2.77E-05	0.52	0.601	-5.7E-05	8.59E-05
GDP	0.037732	0.009326	4.05	0	0.01371	0.061753

Source: Regression output

4.5 Conclusion

This chapter has provided the summary statistics and the correlational matrix showing the strengths of the relationships among variables. Chapter 5 provides the regression results from the analytical model.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter provides a summary of the study findings, the conclusion made by the researcher as well as the suggestions for further future research. It also highlights the limitations of the study. Section 5.1 provides the summary of findings, section 5.2 provides a conclusion of the study, Section 5.3 discusses the recommendations from the study, Section 5.4 highlights the limitations of the study and lastly, section 5.5 makes suggestions for further research.

5.1 Summary of Findings

This section presents the summary of findings from this study are shown in table 5.1.

The regression results from the analytical model are presented in table 5.1 have been generated using System GMM. The results show that firm size significantly (p. value of 0.014) drives agency costs 5% level of significance. This is consistent with the literature which find that as firms grow in size in a number of ways such as geographical expansions and through mergers and acquisition, agency costs increase. For instance, the Hope and Thomas (2008) contends that where managers are rarely monitored by shareholders, managers make sub optimal decisions which may not be in tandem with shareholders interest. As such, the results from this study suggest that where geographical or regional expansion by banks has occurred will ultimately lead to increased agency costs.

The results show an interesting findings in the sense that the effect of mobile banking is not felt in the year in which banks adopt mobile usage. As encapsulated in table 5.1 mobile banking has a p.value of 0.000 which is significant at all the three conventional levels of significance. However the coefficient is positive, implying a direct relationship between mobile banking and

agency costs. The reviewed literature suggests a negative relationship between mobile banking. For instance, Muthinja and Chipeta (2017) observe that mobile banking reduces agency costs and therefore agency costs is a key driver of mobile banking. Muthinja and Chipeta suggest that as agency costs go up, the management of firms adopt innovations such as mobile banking so as to curtail such costs. This implies a negative relationship between agency costs and mobile banking. The results of this study are consistent with this strain of literature as evidenced p.value of 0.000 which is significant at all the three conventional levels of significance with regard to future (lagged) mobile banking. The future mobile banking has a co-efficient of -0.575 suggesting an inverse relationship between mobile banking and agency costs. These results confirm that mobile banking effectively curtails agency costs with regard to Kenya’s listed banks over the study period. On the other hand, ATMs do not provide evidence of reducing agency costs as evidenced by the positive coefficient of 0.001. The control variables have no effect on the analytical model and the regression results thereof.

Table 5.1: Regression Results

Agency costs	Coef.	St.Err	t-value	p-value	Sig.
Future agency costs	0.334	0.578	0.58	0.563	
Future GDP	-0.004	0.010	-0.39	0.695	
Mbanking	0.542	0.125	4.34	0.000	***
Firm size	0.000	0.000	2.46	0.014	**
ATMs	0.001	0.000	3.08	0.002	***
Future M.banking	-0.575	0.133	-4.32	0.000	***
Number of staff	0.000	0.000	0.52	0.601	
GDP	0.038	0.009	4.05	0.000	***
Mean dependent var	0.439		SD dependent var		0.181
Number of observations	67.000		Chi-square		77.352

Source: Regression output

5.2 Conclusion

The objective of this study was to establish the effect of financial innovations and firm size on agency costs amongst commercial banks in Kenya. The study has established a conclusive empirical evidence linking firm size to agency costs. The results from this study suggest that as banks grow in terms of total assets and geographical expansion, shareholders have to contend with increased agency costs which surge even more in the absence of sufficient monitoring by shareholders. Although agency costs may not be entirely eliminated, they can be retained at manageable levels through monitoring by shareholders.

We find an inverse relationship between mobile banking and agency costs as well as a direct relationship between firm size and agency costs. The results from this study are consistent with the strand of literature which observe that the effect of mobile banking on agency costs is lagged. The nature of innovations in general is such that their effect is not necessarily felt in the year they are introduced. This is because as Rogers (1995) observes, it takes considerable time for innovations to be fully diffused or spread.

Lastly, we find no conclusive empirical evidence linking ATMs to agency costs is observed in Kenya's listed banks over the study period. Perhaps this may be explained by the CBK (2017) National Payment Statistics which show that mobile payments have significantly dwarfed the use credit cards as well other cards used through the ATMs. Importantly, ATM infrastructure is shared across most banks making it hard to observe the effects of ATMs on individual bank's agency costs.

5.3 Recommendations

In view of the results from this study, the researcher suggests a number of recommendations. Firstly, these results have policy implications. The results may be useful in guiding the Central Bank of Kenya in determining the extent to which commercial banks are allowed to expand in terms of branches and regional expansion. This is because the results suggest that unchecked growth in firm size has a direct relationship with agency costs. The long term implication of this finding is that commercial banks may collapse if agency costs are not properly checked.

Secondly, the study recommends more investments and adoption of mobile banking by commercial banks since the resultant effect is the reduction of agency costs. However, in practice, the management of commercial banks need to be aware that the effect of mobile banking on agency costs is lagged and will therefore be felt at a later date. This means the management should always have a long term view with regard to investments in financial innovations.

Lastly, this study confirms the sufficiency of agency theory in explaining the principal agent relationship. The researcher recommends more research aimed at developing more understanding with respect to the link between agency costs and ATMs.

5.4 Limitation of the Study

Although the study used firm data with regard to all other variables, it was not practically possible to obtain firm specific data with regard to mobile banking. As such, the study used aggregate number of the mobile banking transactions in the country for the respective years as proxy for mobile banking. Obtaining the number of mobile banking transactions at bank level was impossible since only one commercial bank published such data.

In addition, some ATMs data could not be obtained. However, the effect of the missing data was not statistically significant. A number of commercial banks have shared ATM infrastructure such as *Kenswitch*, the effect of which could not be established in this study. The researcher would have to establish the effect of shared ATM networks on agency costs, this was not possible in this study.

Lastly, a number of commercial banks have adopted internet banking in the recent past enabling their customers to access bank accounts online. Although internet banking has been classified as one of (process) financial innovations, it was not possible to get an appropriate proxy for internet banking.

5.5 Suggestions for Further Research

The researcher suggests that future studies establish mobile banking transactions at firm level as well as ATM number of transactions. Although this may be a daunting task, it can perhaps help establish greater effect of ATMs and mobile banking at firm/bank level. This will no doubt require a strong and close collaboration between commercial banks, mobile phone service providers and the relevant regulators.

Secondly, the researcher suggests further research on Managerial empire building and firm disclosure in Kenya's commercial banks. This is will not only possibly buttress the results of this study but also validate Hope and Thomas (2008) work on the issue. A number of commercial banks have acquired other entities such as insurance companies in an attempt to offer insurance products. The effect of these mergers may be shown through such research.

Lastly, further research on the effect of financial innovations on employment in the banking sector. This is because the reviewed literature observes persistent decline in staff numbers employed by banks over the study period. This trend is contrary to the trend observed in mobile banking and ATM usage where the trend has been rising. The researcher contends that perhaps these will be interesting areas for future studies.

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Appendix one: List of equations

Equation 1

$$Y_{i,t} = \alpha_i(1 - \lambda) + \lambda Y_{i,t-1} + \beta_0 X_{i,t} + \theta Z_{i,t} + \mu_{1,t}$$

Equation 2

$$\text{Expense ratio (er)} = \frac{\text{Operating Expenses}}{\text{Annual total income}}$$

Appendix Two: Panel Data Collection Instrument

Bank	Year	Total Assets	Total expenses	Total Income	Expense ratio	No. of ATMs	MBTN*	No. of staff	Kenya GDP
Barclays	2008								
Barclays	2009								
Barclays	2010								
Barclays	2011								
Barclays	2012								
Barclays	2013								
Barclays	2014								
Barclays	2015								
Stanbic	2008								
Stanbic	2009								
Stanbic	2010								
Stanbic	2011								
Stanbic	2012								
Stanbic	2013								
Stanbic	2014								
Stanbic	2015								
I&M	2008								
I&M	2009								
I&M	2010								
I&M	2011								
I&M	2012								
I&M	2013								
I&M	2014								
I&M	2015								
DTB	2008								
DTB	2009								
DTB	2010								
DTB	2011								
DTB	2012								
DTB	2013								
DTB	2014								
DTB	2015								
KCB	2008								
KCB	2009								
KCB	2010								
KCB	2011								
KCB	2012								
KCB	2013								
KCB	2014								
KCB	2015								

NBK	2008								
NBK	2009								
NBK	2010								
NBK	2011								
NBK	2012								
NBK	2013								
NBK	2014								
NBK	2015								
NIC	2008								
NIC	2009								
NIC	2010								
NIC	2011								
NIC	2012								
NIC	2013								
NIC	2014								
NIC	2015								
SCB	2008								
SCB	2009								
SCB	2010								
SCB	2011								
SCB	2012								
SCB	2013								
SCB	2014								
SCB	2015								
Equity	2008								
Equity	2009								
Equity	2010								
Equity	2011								
Equity	2012								
Equity	2013								
Equity	2014								
Equity	2015								
CO-OP	2008								
CO-OP	2009								
CO-OP	2010								
CO-OP	2011								
CO-OP	2012								
CO-OP	2013								
CO-OP	2014								
CO-OP	2015								

*MBTN: Number of mobile banking transactions in Kenya in year t (not specific to

individual bank).

Source: Author