

**COMPETITION AND PROFITABILITY OF COMMERCIAL BANKS IN
KENYA**

MDOE IDI JACKSON

**ATHESIS SUBMITTED TO THE SCHOOL OF ECONOMICS IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE
DEGREE OF DOCTOR OF PHILOSOPHY IN ECONOMICS OF KENYATTA
UNIVERSITY.**

MAY, 2017

DECLARATION

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

Signature:.....Date:.....

Mdoe Idi Jackson
BED (Arts) (Hons), M. Econ (Kenyatta University)
Reg. No. K96/CTY/PT/22443/2012

We confirm that the work reported in this thesis was carried out by the candidate under our supervision.

Signature:.....Date:.....

Dr. Jacob O. Omolo
Senior Lecturer
Department of Applied Economics
School of Economics
Kenyatta University
Nairobi, Kenya

Signature:.....Date:.....

Professor Nelson H. W. Wawire
Associate Professor of Economics
Department of Applied Economics
School of Economics
Kenyatta University
Nairobi, Kenya

DEDICATION

To all those who to this far stand by me in confronting the challenges of life

ACKNOWLEDGEMENT

First and foremost, I wish to express my profound gratitude and sincere regards to God for granting me the will power and opportunity to write this dissertation. I am deeply and sincerely grateful to my supervisors Prof. Nelson H. W. Wawire and Dr. Jacob O. Omolo for their thought provoking comments and guidance that made the entire process exciting and enjoyable. I am also obliged to staff members of the School of Economics, Kenyatta University for their concern and motivation. Special thanks go to the 2013 Kenyatta University Ph.D Economics cohort. In particular, I wish to highly appreciate Mrs Grace Okara for the help she accorded me during the data collection, cleaning and coding. God bless her abundantly. This dissertation was made possible by a staff development scholarship awarded to me by Kenyatta University without which I would not have been able to pursue my doctoral studies. Long live Kenyatta University. This dissertation benefitted immensely from my family. My mother's, Virginia Wambui Mdoe, moral support and prayers are worth mention and remembrance. I appreciate the patience and understanding exercised by my siblings Abedi, Asha, Kariuki, Kuria and Waithera. The finding, interpretations and conclusions expressed in this dissertation are purely mine and do not essentially reflect the views of my supervisors or the reviewers. Any error(s) and/or omission(s) that may be in this dissertation are strictly mine.

TABLE OF CONTENTS

| | |
|---|------|
| DECLARATION | ii |
| DEDICATION | iii |
| ACKNOWLEDGEMENT | iv |
| TABLE OF CONTENTS | v |
| LIST OF TABLES | x |
| LIST OF FIGURES..... | xi |
| ABBREVIATIONS AND ACRONYMS..... | xii |
| OPERATIONAL DEFINITION OF TERMS | xiii |
| ABSTRACT..... | xiv |
| CHAPTER ONE: BACKGROUND | 1 |
| 1.1 Introduction..... | 1 |
| 1.2 Importance of Bank Competition | 1 |
| 1.3 Banking Sector in Kenya | 3 |
| 1.4 Institutional, Legal and Policy Reforms in the Banking Sector in Kenya..... | 11 |

| | |
|---|--------|
| 1.5 Technological Advancements in Kenyan Banking Sector | 15 |
| 1.6 Statement of the Problem..... | 17 |
| 1.7 Research Questions | 19 |
| 1.8 Objectives of the Study..... | 19 |
| 1.9 Significance of the Study..... | 20 |
| 1.10 Scope of the Study..... | 21 |
| 1.11 Organization of the Study | 21 |
| CHAPTER TWO: LITERATURE REVIEW..... | 22 |
| 2.1 Introduction..... | 22 |
| 2.2 Theoretical Literature | 22 |
| 2.2.1 Risk Bearing Theory of Profits..... | 22 |
| 2.2.2 Innovation Theory of Profits | 23 |
| 2.2.3 The Neo-Classical Theory of Markets..... | 24 |
| 2.2.4 Non-performance Dynamic methods..... | 25 |
| 2.2.5 Performance Dynamic Method..... | 27 |
| 2.3 Empirical Literature..... | 31 |
| 2.4 Overview of the Literature..... | 40 |

| | |
|--|----|
| CHAPTER THREE: METHODOLOGY | 43 |
| 3.1 Introduction | 43 |
| 3.2 Research Design | 43 |
| 3.3 Theoretical Framework..... | 43 |
| 3.3.1 Measuring Persistence of Profits and Bank Competition | 44 |
| 3.3.2 Measuring Speed of Adjustment of Bank profitability to the Competitive Norm | 46 |
| 3.3.3 Competitive Landscape and Bank profitability | 46 |
| 3.4 Empirical Model..... | 47 |
| 3.4.1 Level of Bank Competition in Kenya | 47 |
| 3.4.2 The Speed of Adjustment of Bank profitability to the Competitive Norm..... | 49 |
| 3.4.3 Effect of Changes in the Competitive Landscape on Bank Profitability in Kenya | 51 |
| 3.6 Data Type and Sources | 58 |
| 3.7 Sample Selection | 59 |
| 3.8 Model Stability and Diagnostics Tests | 60 |
| 3.9 Data Analysis | 63 |
| CHAPTER FOUR: EMPIRICAL FINDINGS | 66 |

| | |
|--|-----|
| 4.1 Introduction | 66 |
| 4.2 Descriptive Statistics | 66 |
| 4.2.1 Summary Statistics of Bank Characteristics | 66 |
| 4.2.2 Summary Statistics of Industry Wide Characteristics | 69 |
| 4.2.3 Tabulation of Discrete Variables | 71 |
| 4.3 Diagnostic Tests | 72 |
| 4.3.1 Stationarity Tests | 73 |
| 4.3.2 Data Smoothing | 74 |
| 4.3.3 Choice of Optimal Lags | 75 |
| 4.3.4 Choice of the Number of Instruments..... | 78 |
| 4.3.5 Hausman Test | 81 |
| 4.4 Empirical Results | 82 |
| 4.4.1 The Level of Commercial Banks Competition in Kenya..... | 82 |
| 4.4.2 The Speed of Adjustment of Bank Profitability to the Competitive Norm..... | 86 |
| 4.4.3 The Effect of the Competitive Landscape on Bank Profitability | 88 |
| CHAPTER FIVE: SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS.. | 97 |
| 5.1 Introduction..... | 97 |
| 5.2 Summary..... | 97 |
| 5.3 Conclusions..... | 100 |

| | |
|--------------------------------------|-----|
| 5.4 Policy Implications | 101 |
| 5.5 Contribution to Knowledge..... | 109 |
| 5.6 Areas for Further Research | 111 |
| REFERENCES | 112 |
| Appendix I | 120 |

LIST OF TABLES

| | |
|---|----|
| Table 1.1: Mergers and Acquisitions in the Kenyan Banking Sector | 13 |
| Table 3.1: Definition and Measurement of Variables | 57 |
| Table 4.1: Overall Summary Statistics of Ratio Scaled Variables | 67 |
| Table 4.2: Summary statistics of firm Invariant variables | 70 |
| Table 4.3: Stationarity Test Results | 73 |
| Table 4.4: Determination of Optimal Lags of Normalized Return on Assets | 76 |
| Table 4.5: Determination of Optimal Number of Instrument | 79 |
| Table 4.6: Persistence of Bank Profits in Kenya | 82 |
| Table 4.7: Effect of Technology and Consolidation on Bank Profitability | 89 |
| Table 4.8: Effect of Body of Regulations on Bank profitability in Kenya..... | 94 |

LIST OF FIGURES

| | |
|--|----|
| Figure 1.1: Trends in net assets market share of banks by ownership | 4 |
| Figure 1.2: Market share by bank size | 6 |
| Figure 1.3: Trends in bank profitability and interest rate spread..... | 8 |
| Figure 1.4: Trends in average lending rates and growth in bank profitability | 10 |
| Figure 2.1: Profit generating process | 28 |

ABBREVIATIONS AND ACRONYMS

| | |
|------|-------------------------------------|
| ATM | Automated Teller Machines |
| CBK | Central Bank of Kenya |
| CBR | Central Bank Rate |
| CMSI | Composite Market Share Index |
| DEA | Data Envelopment Analysis |
| EAC | East African Community |
| FE | Fixed Effects Model |
| GDP | Gross Domestic Product |
| GMM | Generalized Method of Moments |
| HHI | Herfindahl-Hirschman Index |
| KBRR | Kenya Bank Reference Rate |
| KNBS | Kenya National Bureau of Statistics |
| LI | Lerner Index |
| LPPR | Long run Projected Profit Rate |
| PCM | Price Cost Margin |
| POLS | Pooled Ordinary Least Squares |
| ROA | Return on Assets |
| RE | Random Effects Model |
| SOA | Speed of Adjustment |
| SSA | Sub-Saharan Africa |

OPERATIONAL DEFINITION OF TERMS

Competitive norm: Profitability that is consistent with long run perfect competition equilibrium. Also, referred to as long run projected profit rate

Competitive landscape: comprises of three components: change in technology, consolidation and regulatory changes

Exceptional profits: Profits that are inconsistent with the competitive level of profitability of a firm. Also, referred to as short run profits or abnormal profits

Intermediation inefficiency: A measure of efficiency of commercial banks' intermediation process. It manifests in form of wide interest rate spreads, high lending rates and exceptional bank profitability

Monopoly power: The ability of a firm to mark up the price above marginal cost

Speed of adjustment: Time elapsed between a move from a given level of a certain variable to a targeted level of the variable

ABSTRACT

The banking sector in Kenya is characterized by intermediation inefficiency in the form of interest driven exceptional bank profitability. Competition among commercial banks should remedy this situation by driving bank profitability to the competitive norm. This study examined how competition is correcting this inefficiency by investigating competition and profitability of commercial banks in Kenya. Specifically, the study ascertained the level of competition among commercial banks; determined the speed of adjustment of commercial banks profitability to the competitive norm; and investigated the effect of changes in the competitive landscape on commercial banks profitability. The study used a balanced panel data set for 36 commercial banks covering the period 2001 to 2014. The study used the performance dynamics approach and the generalized method of moments to estimate the resulting dynamic panel models. The investigation established that the level of competition among commercial banks in Kenya was low and characterized by 96.1 per cent persistence in profitability. The speed of adjustment of commercial banks profitability to the competitive norm was 3.9 per cent per year with a half-life of 17.42 years. The study also found that in the short run, increase in level of technology reduces exceptional bank profitability by 0.852 per cent. The study further found that consolidation has a negative effect on exceptional bank profitability in the short run and a positive effect in the long run. Finally, the study established that the progressive increase in core capital requirement for commercial banks in 2008 enhanced persistence of exceptional bank profitability and reduced bank competition. Arising from the study findings, it is important that the government intervenes to rectify the intermediation inefficiency occasioned by ineffectiveness of competition and the slow speed of adjustment towards the competitive norm. It is also important that small sized banks in the sector voluntarily merge with other smaller banks in order to exert substantial competition to the large and medium sized banks. For effectiveness, the findings imply that intervention by government should target swift adoption of technology by all commercial banks and trigger consolidation among the target tiers of commercial banks up to the optimal level. In addition, the findings imply that banks with exceptionally low levels of profitability should seek other forms of recovery. The options here include exiting the market, or mergers and acquisitions. This is because as established in the study, market forces may not help such commercial banks to return to sustainable profitability in the short run.

CHAPTER ONE

BACKGROUND

1.1 Introduction

This chapter presents the background to the study, statement of the problem, objectives of the study, research questions, significance, scope and the organization of the study.

1.2 Importance of Bank Competition

Competition among commercial banks is critical in enhancing intermediation efficiency. In the long run, competition corrects the negative feature of intermediation inefficiency that manifests in the form of exceptional bank profitability driven by high interest rates and wide interest rate spreads (Flamini, Schumacher and McDonald, 2009). Inherently, therefore, competition among commercial banks determines the level of entrepreneurial activities, access to finance, allocation of capital, development of the productive sector, level of economic growth and banking sector stability (Chronopoulos, Liu, McMillan and Wilson, 2013). Theoretically, economists posit that in the long run, competition should be able to equalize returns to all economic activities through a dynamic process (Mueller, 1977). Therefore, existence of exceptional profits above or below the competitive norm is a purely short run affair, which is simply a transitory condition showing the direction that resources should take for efficient allocation (Chronopoulos *et al.*, 2013). From a theoretical perspective, there should be a tendency for excessively high profits to fall and excessively low profits to rise towards a competitive norm (Pakes, 1987; Mueller, 1977).

Applying the theoretical proposition to commercial banking, then the underpinning argument is that exceptional bank profitability driven by high interest rates and wide interest rate spreads manifested in terms of high lending rates and low deposit rates is a short run affair. Such a phenomenon would be corrected by competition in the long run (Chronopoulos *et al.*, 2013). Competition is inherently determined by the market structure (Goddard, Liu, Molyneux and Wilson, 2011). In this context, it is the market structure that determines the non-competitive activities that a firm can engage in to protect its profit position or performance.

Globally, banks in Africa have been found to be more profitable though the continent continues to experience low levels of financial intermediation (Flamini *et al.*, 2009). This situation holds in all respects whether by country, country income group or individual banks. African countries also experience wide disparities in banking. The level of financial intermediation in South Africa, for example, is nearly twice that of Uganda, Tanzania and Rwanda (Sanya and Gaertner, 2012). Less than one third of the population in Tanzania, Uganda and Rwanda have access to finance compared to two thirds in Kenya and South Africa. The low levels of financial intermediation are well below those of middle income and emerging economies (Sanya and Gaertner, 2012). Within sub-Saharan Africa (SSA), South Africa's banking sector is dominant followed by that of Kenya [Central Bank of Kenya (CBK), 2014]. However, the share of banking of East African countries in SSA has been growing with that of Kenya exceeding the SSA average between 2011 and 2014 (CBK, 2014). The high profitability, low levels of financial intermediation and access to finance in Africa may be explained by risk, obstacles to entry and low levels of competition (Flamini *et al.*, 2009).

1.3 Banking Sector in Kenya

The banking sector in Kenya comprises of the CBK, as the regulator, 43 commercial banks, one mortgage finance company, eight representative offices of foreign banks, nine microfinance banks, two credit reference bureaus, 13 money remittance providers and 87 foreign exchange bureaus (CBK, 2014). In terms of the ratio of private credit to gross domestic product (GDP), the size of Kenya's banking ranged between 28.4 and 40 per cent from 2000 to 2014 (CBK, 2014; CBK, 2000). The size of the banking sector for comparator countries such as Uganda and Tanzania ranged between 10.71 and 16.40 per cent and 10.71 and 24.70 per cent respectively for the period 2000 to 2014 (World Bank, 2014). In SSA, the average size of the banking sector ranged between 33.5 and 30.8 per cent for the period 2000 to 2014 (World Bank, 2014). Regionally, therefore, the Kenyan banking sector is large compared to that of comparator countries and exceeds the SSA average for the period 2011 to 2014.

In terms of commercial banks, Kenya had three government owned banks between 2000 and 2014 (CBK, 2000; CBK, 2014). Domestic privately owned banks were 38 in 2005 and 27 between 2010 and 2014 (CBK, 2005; CBK 2014). Private foreign banks were 11 in 2005 and 13 between 2010 and 2014 (CBK, 2005; CBK 2014). This shows that the Kenyan banking sector is dominated by domestic privately owned banks in terms of numbers. The market share, measured as a percentage of net assets, of domestic privately owned banks increased from 51.3 per cent in 2006 to 64 per cent in 2014. The market share for government owned commercial banks marginally declined from 5.7 per cent in 2006 to 5 per cent in 2014. That of private foreign banks reduced considerably from 43

per cent in 2006 to 31 per cent in 2014(CBK, 2014). These trends show that, indigenous private banks have not only dominated banking sector in terms of numbers but also in terms of net assets market share. The market share by ownership of Kenya’s commercial banks has evolved as illustrated in Figure 1.1

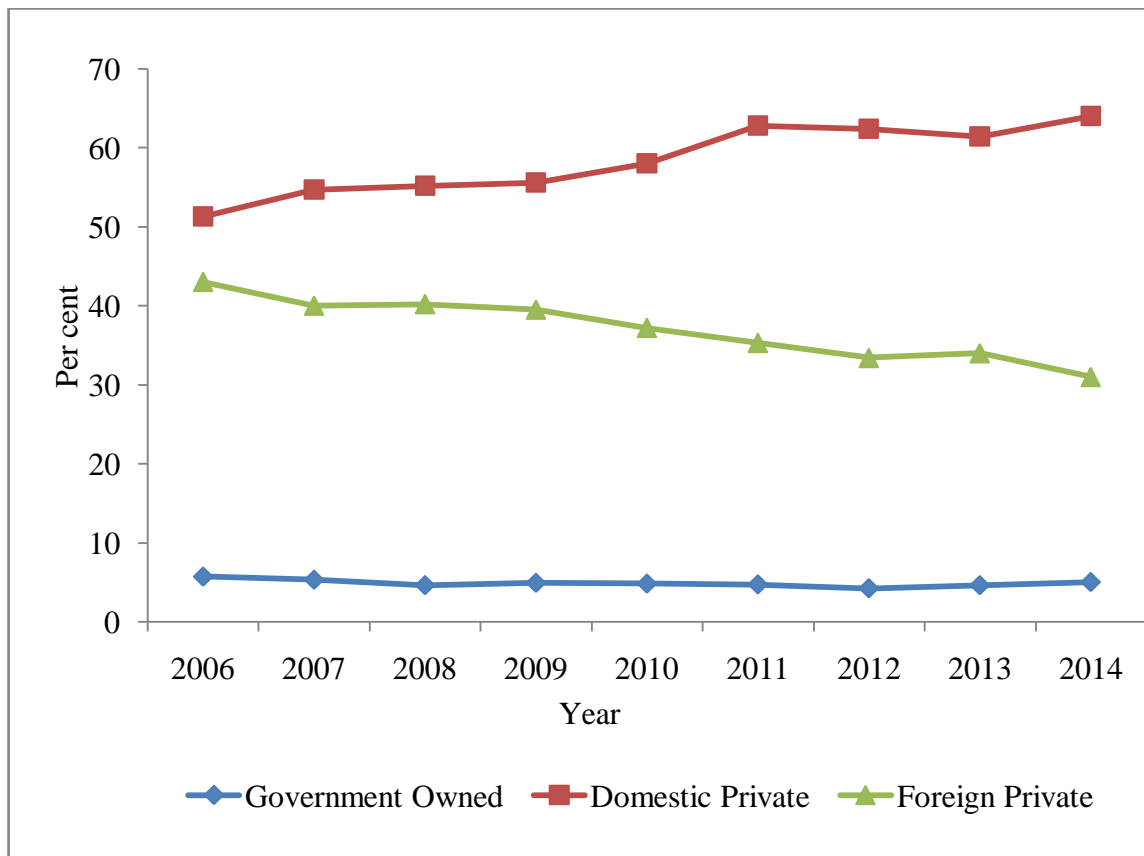


Figure 1.1: Trends in net assets market share of banks by ownership

Source of Data: CBK Bank Supervision Annual Reports (various issues)

Figure 1.1 shows that domestic privately owned banks commanded the largest market share over the period 2006-2014. Figure 1.1 further shows that the dominance by the

domestic privately owned banks is consistent throughout the period. Expansion in the market share of domestic privately owned banks is associated with contractions in the market share of local public and private foreign banks. The contraction and expansion of market share across the ownership categories shows a win for a particular category is characterized by a loss for the other categories. Therefore, competition is apparent among commercial banks in Kenya in relation to ownership.

In terms of bank size, the CBK has categorized the banks into three categories: large, medium and small banks. Between 2006 and 2009, a bank was considered large if its asset base exceeded KES15 billion; medium if its asset base ranged between KES5 billion and KES15 billion; and small if its asset base was less than KES5 billion (CBK, 2006). As of December 2009, the Kenyan banking sector comprised of 19 large sized banks, 14 medium sized banks and 12 small sized banks. The large banks had a cumulative market share of over 80 per cent in deposits, net assets and net advances (CBK, 2009). This means that commercial banking in Kenya was dominated by large banks as of December 2009.

From 2010 onwards, CBK categorized banks using composite market share index (CMSI) which consists of deposits, net assets and advances (CBK, 2010). A bank with a CMSI of over five per cent is considered large, that with a CMSI between one per cent and five per cent is medium and those with a CMSI of less than one per cent are regarded as small. Based on this classification, there were six large banks, 15 medium sized banks and 23 small banks between 2010 and 2014.

The evolution of bank market share based on the CMSI index among these three categories for the period 2010 to 2014 is shown in Figure 1.2.

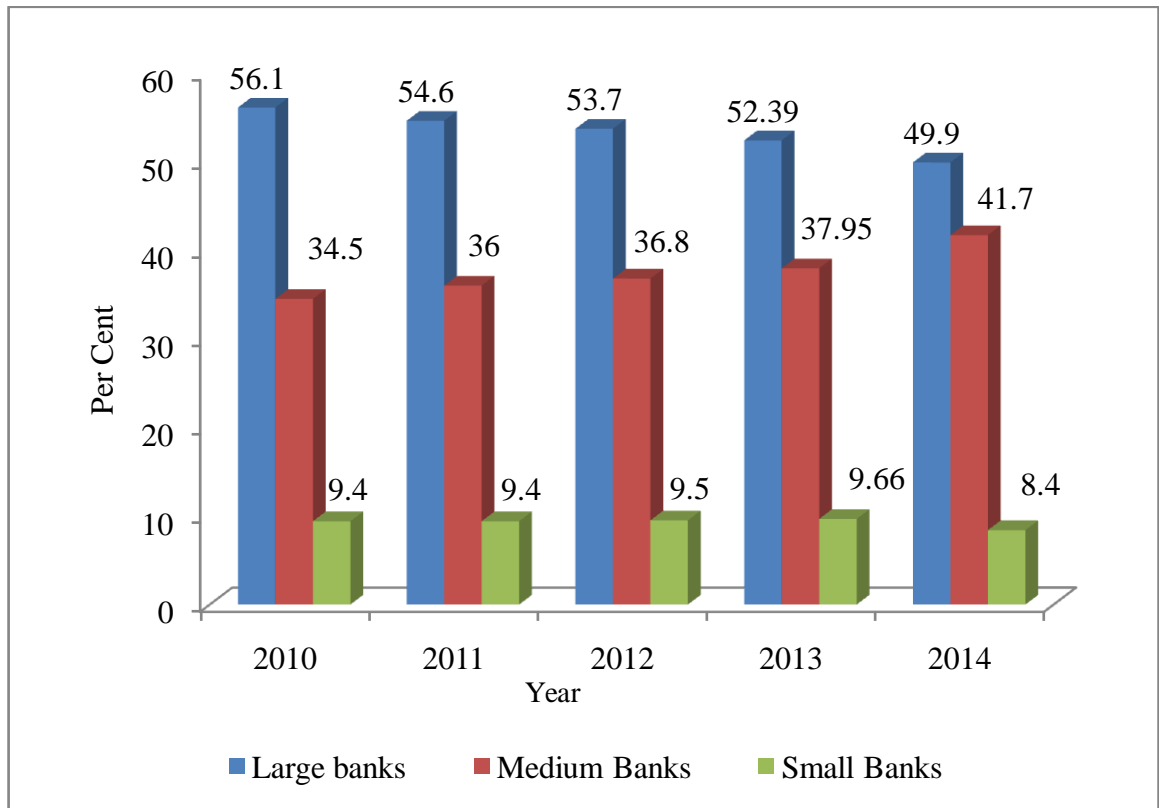


Figure 1.2: Market share by bank size

Source of Data: CBK Bank Supervision Annual Reports (various issues)

Figure 1.2 shows that on average, 53.3 per cent of the banking sector in Kenya was controlled by large sized banks in terms of CMSI. Over the period 2010 to 2014, competition has intensified and the medium sized banks are gradually catching up with the large banks. The market share of medium sized banks has gradually increased from

34.5 per cent in 2010 to 41.7 per cent in 2014 whereas that of large sized banks gradually declined from 56.1 per cent in 2010 to 49.9 per cent in 2014. Figure 1.2 further shows that the market share of small sized banks marginally declined from 9.4 per cent in 2010 to 8.4 per cent in 2014. This implies that though the small banks are the majority in terms of numbers in the banking sector, they do not pose much competition to the large banks. Though the competition posed by small banks to large banks is considered to be inadequate the level is unknown. However, knowledge of this level is significant for policy.

Competition among commercial banks determines the efficiency of the intermediation process. Competition for deposits and lending leads to increased deposit rates and low lending rates and therefore, increased intermediation efficiency which is evidenced by low interest rate spreads and profitability consistent with the competitive norm (Berger, Klapper and Turk Ariss, 2008). Figure 1.3 illustrates the trends in interest rate spreads and profitability of the Kenyan commercial banks over the period 2000-2014.

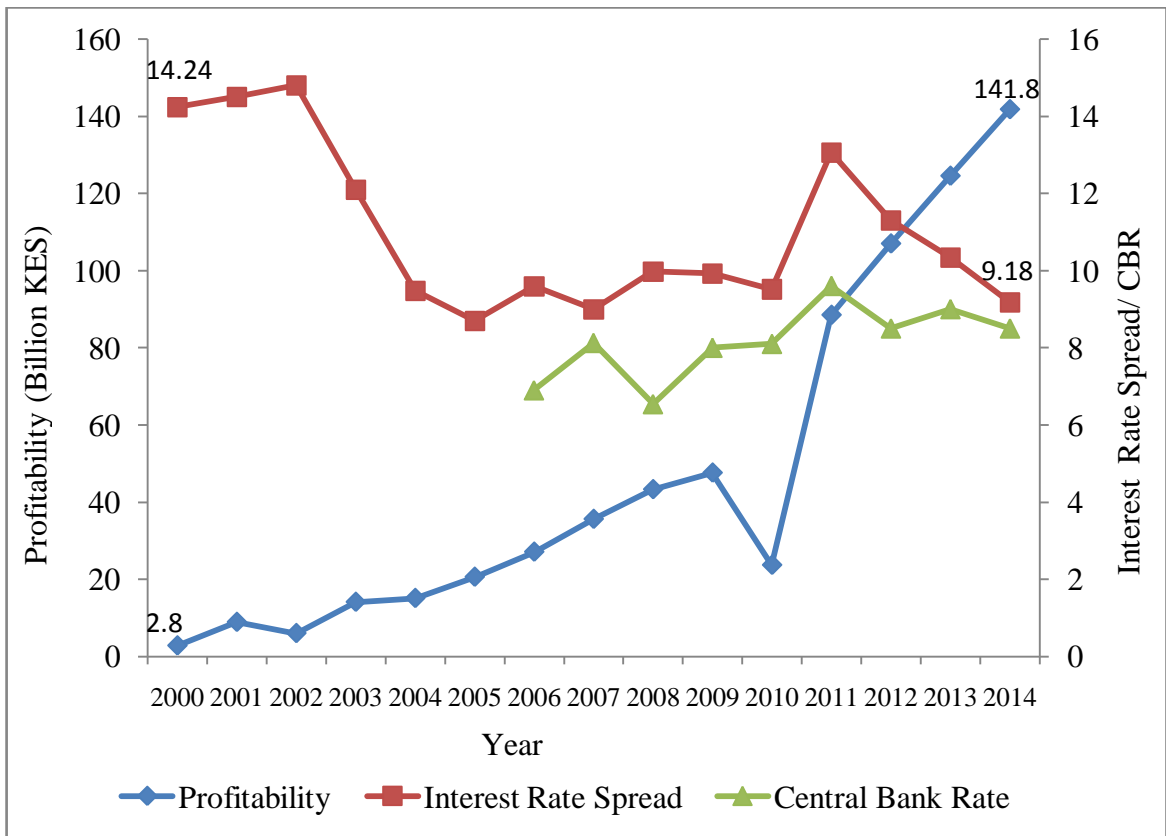


Figure 1.3: Trends in bank profitability and interest rate spread

Source of Data: CBK Bank Supervision Annual Reports (various issues)

Figure 1.3 shows that interest rate spreads were 14.24 per cent in 2000 and 9.18 per cent in 2014. The spread sharply declined between 2002 and 2005 due to improvement in macroeconomic management occasioned by regime change in 2002. Between 2010 and 2011, the spread increased considerably due to the tough monetary policy stance adopted during the currency crisis of 2010 (CBK, 2010). After 2011, the spread declined gradually and assumed a long run trend. During periods of stable macroeconomic conditions such as 2005 and 2010, the spread remained relatively stable but high compared to monetary instruments signals such as the Central bank rate (CBK, 2014).

The persistence of wide interest rate spreads even in periods of stable macroeconomic stability means that Kenyan commercial banks are inefficient in terms of intermediation efficiency. This may be explained by the high segmentation and domination of the banking sector by few large banks that experience inadequate competition from medium and small banks.

Figure 1.3 further shows that commercial banks profitability and interest rate spread are highly correlated during periods of macroeconomic stability and tough monetary policy stance. The relative stable interest rate spread between 2005 and 2009 was, for example, associated with consistent increase in bank profitability. However, the overshoot in interest rate spread between 2010 and 2011 was associated with a jump in profitability. Therefore, persistence and overshoot of interest rate spreads is associated with continued rise in bank profitability. After the shock in interest rate spreads in 2010, bank profitability rose to even exceptional levels, underscoring the importance of high lending rates and low deposit rates in driving bank profitability in Kenya. The close association between wide interest rate spreads and commercial banks profitability means that high cost of credit causes high profitability in the Kenyan banking sector. Figure 1.4 gives an illustration of the trends in average lending rates and growth in bank profitability over the period 2000-2014.

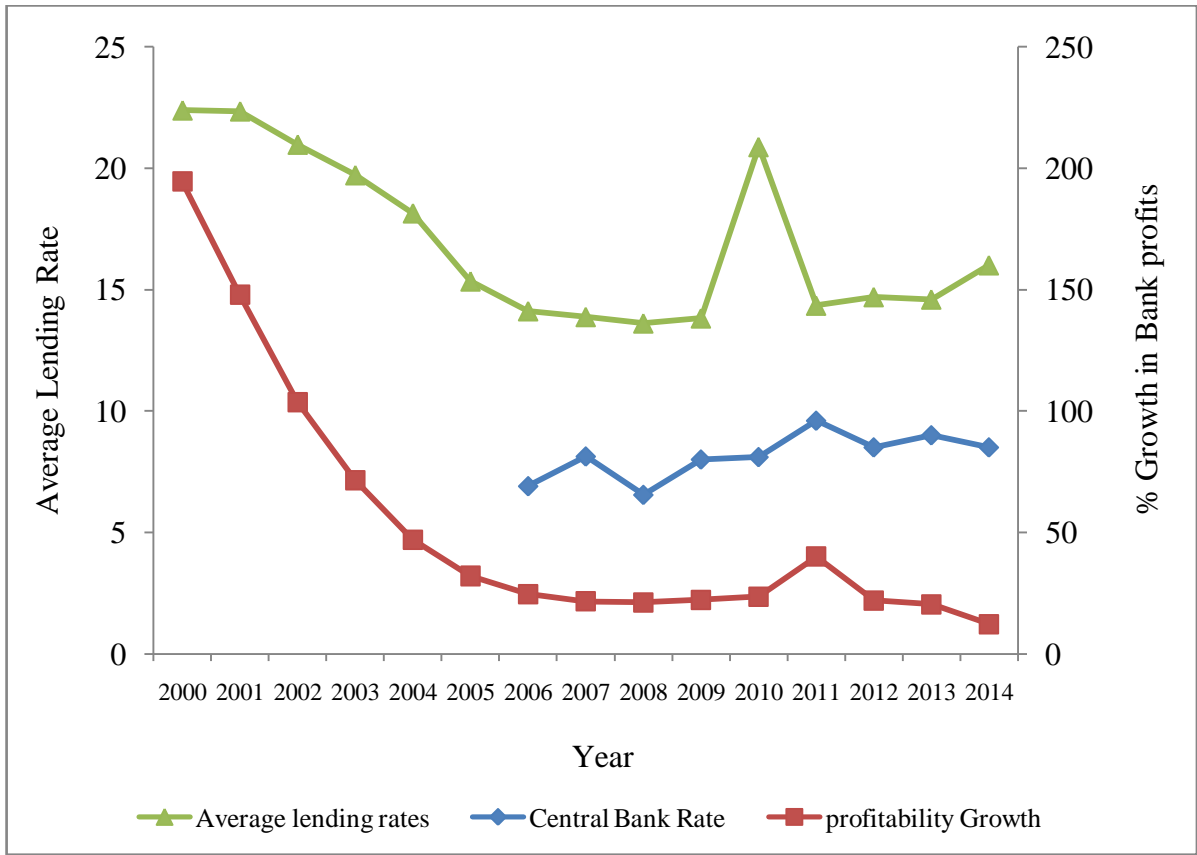


Figure 1.4: Trends in average lending rates and growth in bank profitability

Source of Data: CBKBank Supervision Annual Reports (various issues)

The trends depicted in Figure 1.4 show that there has been a general decline in the lending rates and growth in bank profitability. As illustrated in Figure 1.4, movements in average lending rates and growth in bank profitability are highly correlated. For instance, the general decline in average lending rates between 2000 and 2010 is associated with a decline in profitability growth. Although the trend is generally declining the average lending rates are still high and tend to persist compared to monetary policy signals such as the central bank rate (CBK, 2013). Between 2005 and 2009 the relatively stable lending rates were associated with relatively stable growth in

bank profitability. Therefore, persistence of high average lending rates is associated with persistence of growth in bank profitability. Thus, the price charged on loans is one of the drivers of profitability growth in the Kenyan banking sector. This phenomenon may be explained by the fact that interest income is the core source of revenues among commercial banks in Kenya (CBK, 2014).

Figure 1.4 further shows that the growth in commercial bank profitability is characterized by decay. This means that bank profitability in Kenya is growing but at a declining rate. The decay in profitability growth was rapid between 2000 and 2005 but slowed down afterwards. This shows that commercial banks profitability could be approaching a competitive norm (a long run value) as predicted by economic theory (Chronopoulos *et al.*, 2013). The competitive norm and the speed of adjustment to the competitive norm is yet to be established for the Kenyan banking sector.

1.4 Institutional, Legal and Policy Reforms in the Banking Sector in Kenya

The high interest rate spreads and lending rates coupled by persistent exceptional bank profits have necessitated institutional, legal and policy reforms targeted at the competitive landscape of the Kenya's banking sector. Reforms targeting reduction of interest rate spreads and exceptional bank profitability were first mooted in 2007 and are outlined in the *Kenya Vision 2030* (Republic of Kenya, 2008). The reform objectives have been three fold: increased outreach, improved efficiency and stability of the banking sector (Republic of Kenya, 2007). These objectives are broadly based on international best practices as advanced in Basel I, II and III Accords (CBK, 2007). Basel I and II Accords focused on enhancing bank stability whereas Basel III Accord focused

on resilience and stability of banks. The Accords are international agreements which are not legally binding but are domesticated through legislations and policy guidelines. Basel I Accord was adopted in 1992 and later enhanced to Basel II standards. Basel III was domesticated by the Kenya *Vision 2030*, which focused on bank outreach and improved efficiency for stability and resilience of the Banking sector (CBK, 2008).

Intermediation efficiency in the banking sector is driven by competition (Chronopoulos *et al.*, 2013). As such, institutional, legal and policy reforms have been mooted to spur competition among commercial Banks in Kenya through changes in the competitive landscape. The *Kenya Vision 2030* acknowledges that Kenya's banking sector is highly segmented and dominated by a few large banks, resulting in reduced competition and high credit costs (Republic of Kenya, 2007). The government intervened through creation of incentives for the small banks to consolidate. Consolidation of the small banks was meant to enhance their capacity to compete with large banks and enable them to reap economies of scale in their operations and thereby help in narrowing the interest rate spreads (Republic of Kenya, 2007).

The First Medium Term Plan (2008-2012) of the *Kenya Vision 2030* altered the competitive landscape through consolidation. The medium Term Plan operationalized the desire to consolidate the banking sector by enhancing the capital base from KES250 million in 2008 to KES1 billion by 2012 (Republic of Kenya, 2007). To this end, the Banking Act (Cap 488) laws of Kenya was amended in 2008 (CBK, 2008). The amendment progressively increased the core capital requirement for commercial banks from KES250 million in 2008 to KES1 billion in 2012 (CBK, 2008). The rationale of the

amendment was that high capital requirements would motivate the small banks to merge or seek other forms of consolidation. It was envisaged that the resulting banks from the mergers would be efficient due to economies of scale and enhanced capacity to compete with large banks. The upward revision of core capital to KES1 billion triggered mergers and acquisition as indicated in Table 1.1.

Table 1.1: Mergers and acquisitions in the Kenyan Banking Sector

| Mergers | | | | |
|---------------------|------------------------------|-------------------------------------|-------------------------------|----------------------|
| No. | Institution | Merged With | Institution Formed | Date Approved |
| 1 | Prime Capital & Credit Ltd. | Prime Bank Ltd. | Prime Bank Ltd. | 01.01.2008 |
| 2 | CFC Bank Ltd. | Stanbic Bank Ltd. | CFC Stanbic Bank Ltd. | 01.06.2008 |
| 3 | Savings and Loan (K) Limited | Kenya Commercial Bank Limited | Kenya Commercial Bank Limited | 01.02.2010 |
| 4 | Equatorial Commercial Bank | Southern Credit Banking Corporation | Equatorial Commercial Bank | 01.06.2010 |
| Acquisitions | | | | |
| No. | Institution | Acquired by | Institution Formed | Date approved |
| 1 | EABS Bank LTD | Ecobank Kenya LTD | Ecobank Kenya LTD | 16.06.2008 |

Source of Data: CBKBank Supervision Annual Reports (various issues)

Table 1.1 shows that there have been four mergers and one acquisition after Banking Act (Cap 488) was amended in 2008. Three of the mergers namely, Prime Capital & Credit Ltd and Prime Bank Ltd; CFC Bank Ltd and Stanbic Bank Ltd; and Equatorial Commercial Bank and Southern Credit Banking Corporation were mergers between medium and small banks as envisioned in the *Kenya Vision 2030*. However, contrary to the policy guidelines in the *Kenya vision 2030*, the mergers were not restricted to small banks. Savings and Loans limited, which was a small bank, for example, merged with a large bank, Kenya Commercial Bank. The implication is that the mergers and acquisition may have resulted in unintended gains by the large banks. The effect of this change in the competitive landscape in form of mergers and acquisition on competition and, therefore, profitability in the banking sector is still an empirical question.

The consolidation activities undertaken between 2008 and 2010 reduced the number of commercial banks from 45 in 2008 to 43 in 2012 (CBK, 2012). Between 2012 and 2014, there has not been any mergers and acquisition in the banking sector (CBK, 2014). Therefore, the enhancement of the core capital did not effectively address segmentation in the banking sector. Indeed, the composition of banks by size between 2010 and 2014 has been six large sized banks, 15 medium sized banks and 23 small sized banks (CBK, 2014). Therefore, the composition of banks by size remained the same over the period 2010 to 2014. This means that the banking sector is still dominated by a few large banks, characterized by high cost of credit and exceptional bank profitability.

The *Kenya Vision 2030* also sought to increase the outreach of commercial banks to the rural areas and to the unbanked population in the urban informal settlements. This

was operationalized in 2010 through the roll out of agency banking guidelines. The guidelines allowed commercial banks to contract third parties to conduct banking on their behalf (CBK, 2010). As a result, 13 commercial banks were conducting business through 23,477 agents as of December 2013 which rose to 16 and 35,789 respectively in December 2014.

An evaluation of the distribution of agents revealed that the agents were not evenly distributed between banks (CBK, 2014). The agents are highly skewed in favour of three large banks that controlled 92 per cent of the agents (21,598 out of 23,477) in 2013 and 90 per cent (32,219 out of 35,789) of the agents in 2014 (CBK, 2014). This underscores the dominance that large banks have even on innovative channels that are meant to wrestle their market share. However, the level of competition and bank profitability in the banking sector are dependent on the adoption of agency banking and the skewed distribution of agents among banks, however, remain an empirical question.

1.5 Technological Advancements in Kenyan Banking Sector

Commercial banks independently alter the competitive landscape through adoption of new technologies and financial innovations (Chronopoulos *et al.*, 2013). In Kenya, commercial banks have leveraged on the technological developments by diversifying their products and improving on service delivery. The common forms of technology adopted by Kenyan commercial banks include Automated Teller Machines (ATM), bank websites, online bill payments, ATM cheques and cash deposits, branchless banking, mobile banking, credit and debit cards and internet banking (CBK, 2013).

The motivating factors for adoption of new technologies include extension of banking hours, improving service delivery, connecting customers to the bank system networks during and after working hours, branchless banking, decongesting banking halls and maintenance of big market shares (CBK, 2012). Commercial banks in Kenya, therefore, use technological advancements as a positioning and competition tool.

The most predominant form of technology used by commercial banks in Kenya is ATMs. The ATM system has evolved to become alternative delivery channel for services such as cash and cheques deposits and loan applications and processing. The number of ATMs rapidly increased from 1,827 in 2009 to 2,613 in 2014 (CBK, 2014). This unprecedented growth in the number of ATMs has increased access to consumers and intensified competition among the banks (CBK, 2014).

Large banks control over 80 per cent of the ATMs and mobile banking in the country (CBK, 2014). The use of technology is associated with lowered cost of operation and increased effectiveness of workers. For instance, due to adoption of new technologies a worker who on average served 155 customers in 2002 served 770 customers in 2014 (CBK, 2014). The skewed control of ATMs and mobile banking in favour of the large banks means that much of the gains leveraged from adoption of new technologies such as reduced cost of operations, increased market share and enhanced efficiency are as well skewed towards large banks. Therefore, large banks have motivation to lower the cost of loans and transactions fees unlike the medium and small banks due to their reduced costs of operations. Hence, adoption of technology has implications on bank profitability and competition. The extent to which alteration of the

competitive landscape through adoption of technology has influenced profitability and competition among commercial banks in Kenya is still an empirical question.

1.6 Statement of the Problem

Exceptional bank profitability driven by high interest rates and wide interest rate spreads is a negative feature of financial intermediation (Flamini *et al.*, 2009). Competition among commercial banks is critical in remedying this inefficiency. Over time, competition corrects high interest rate spreads and reduces exceptional profitability in the banking sector. In the long run and due to competition, bank profitability tends towards a long run value, which is the competitive norm (Chronopoulos *et al.*, 2013). This means that, in the long run, bank competition should correct the market inefficiency of high cost of credit associated with exceptional profitability.

In Kenya, the banking sector is dominated by six large privately owned banks that controlled 56.6 per cent of the sector in 2010 and 50 per cent of the sector in 2014. The remaining market share of 43.4 per cent in 2010 and 50 per cent in 2014 was divided among 15 medium sized and 22 small sized commercial banks. An important phenomenon of Kenya's banking sector is wide interest rate spread and high cost of credit: Wide interest rate spreads have persisted between 14.24 and 9.18 per cent over the period 2000 to 2014. Moreover, the cost of credit which is the lending rates, averaged between 22.4 per cent and 16 per cent between 2000 and 2014, respectively. The high cost of credit characterized by wide interest rate spreads has led to interest driven exceptional bank profitability (Republic of Kenya, 2013). This is a negative feature for the banking sector in Kenya. The level of competition

rectifying intermediation inefficiency among commercial banks in Kenya is still unclear. In addition, how fast this level of competition is working on the intermediation inefficiency is also not clear.

To address this inefficiency, the government sought to spur bank competition through consolidation. The core capital requirement for banks was progressively raised from KES250 million in 2008 to KES1 billion in 2012 (CBK, 2008). This was meant to motivate the small sized banks to merge or seek other forms of consolidation. Increased core capital occasioned four mergers and one acquisition between 2008 and 2010. Between 2010 and 2014, there was inactivity in terms of consolidation with bank composition by size consisting of six large sized banks, 15 medium sized banks and 22 small sized banks. To solve intermediation inefficiency, it is important to establish how the negative feature of exceptional interest driven bank profitability and competition have been affected by changes in the competitive landscape in form of consolidation and changes in core capital requirements.

Independently, commercial banks have enhanced or blocked competition through adoption of new technologies and financial innovations. In terms of distribution of adoption of technology, large banks control over 80 per cent of ATMs network and mobile banking leaving a paltry 20 per cent for the small and medium sized banks. How the negative feature of exceptional interest driven bank profitability and competition have been affected by changes in the competitive landscape in form of adoption of new technologies is important in solving intermediation inefficiency.

If unaddressed, persistence of intermediation inefficiency in form of interest driven exceptional bank profitability threatens achievement of improved intermediation efficiency, increased outreach and bank stability as outlined in international best practices. Previous studies on the Kenyan banking sector have focused on technical efficiency (Kamau, 2009); value effects of mergers and acquisitions (Muchai, Mburu and Obere, 2015) and role of increased capital requirements on stability and competition (Gudmundsson *et al.*, 2013). None of these studies focused on competition and profitability of commercial banks in Kenya. This study, therefore, sought to investigate competition and profitability of commercial banks in Kenya.

1.7 Research Questions

This study sought to answer the following research questions:

- i) What is the level of competition among commercial banks in Kenya?
- ii) What is the speed of adjustment of commercial banks' profitability to the competitive norm in the banking sector in Kenya?
- iii) What is the effect of changes in the competitive landscape on commercial bank profitability in Kenya?

1.8 Objectives of the Study

The general objective of the study was to investigate competition and profitability of commercial banks in Kenya. The specific objectives were to:

- i) Ascertain the level of competition among commercial banks in Kenya
- ii) Determine the speed of adjustment of commercial banks' profitability to the competitive norm in Kenya
- iii) Investigate the effect of changes in the competitive landscape on commercial banks profitability in Kenya

1.9 Significance of the Study

This study is significant on several fronts. First, the study contributes to existing literature on competition and persistence of bank profits by presenting the Kenyan case. Secondly, the study contributes to the ongoing debate on interest driven exceptional bank profitability in Kenya. Thirdly, in establishing the relationship between bank profitability and the competitive landscape, the study unravels how bank profitability responds to regulatory, consolidation and technological changes in the Kenya banking sector. This is valuable in making insightful policy recommendations for consideration by the regulator, the CBK.

Fourthly, the study is invaluable to microeconomic theorists. In estimating the level of competition and the speed of adjustment of bank profitability to the competitive norm the study tests hypothesis that free entry and exit are sufficiently enough to eliminate abnormal profits in any industry. Finally, in estimating the pace of elimination of abnormal profits the study explains to the general public why exceptional bank profitability, high lending rates and wide interest rate spread in the Kenyan banking sector appear to persist unduly.

1.10 Scope of the Study

The study investigated competition and profitability of commercial banks in Kenya over the period 2001-2014. The period is significant since it coincides with liberalization of interest rates, implementation of Basel I Accord and enforcement of the Banking Act CAP (488). During this period, commercial banks were allowed to price loans, which are their main commodity. This implies that this study investigated competition and profitability of commercial banks in Kenya when market forces only were correcting inefficiency in the banking sector in Kenya. The study focused on 36 commercial banks that have been in existence since 2001-2014.

1.11 Organization of the Study

The study is organized as follows: Chapter one presents the background to the study, research questions, the objectives and the significance of the study. Chapter two reviews theoretical and empirical literature on persistence of bank profits and competition while chapter three presents the research design, theoretical framework, the empirical models that were estimated, and data collection and estimation procedures. Chapter four presents the study findings while chapter five concludes the study with the summary, conclusions, policy implications and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the theoretical and empirical literature regarding the measurement of competition and the connection between competition and profitability. Section 2.2 reviews theories behind the measurement; Section 2.3 discusses the application of the theories in studies and inclusion of control variables while Section 2.4 concludes with an overview of the literature.

2.2 Theoretical Literature

Several theories have been advanced to explain why firms earn exceptional profits and how competition erodes them. This section reviews these theories and presents the two competing views on the measurement of competition and the connection between competition and profitability.

2.2.1 Risk Bearing Theory of Profits

The risk bearing theory of profits was advanced by Hawley F.B in 1921(Cantwell, 2000). The theory argues that firms or entrepreneurs earn supernormal profits as a reward for bearing risk. The theory holds that the more the risk the higher the reward that is expected. According to this theory, exceptional profits are an inducement to the entrepreneur to suffer the consequences of being exposed to and bearing the risk. Therefore, the theory assumes that profitability is a function of risk borne by an

entrepreneur(Cantwell, 2000). This theory is central to this study since it provides the basis of introducing bank risk exposures as an explanatory variable for profits. However, the theory is too simplistic since it considers profits as a function of risk bearing only while ignoring other explanatory variables. In addition, the theory does not show the connection between profits and bank competition which is fundamental to the present study.

2.2.2 Innovation Theory of Profits

The innovation theory of profits was introduced by Schumpeter in 1943 (Cantwell, 2000). The theory holds that the main function of the entrepreneur is to introduce innovations in the economy and profits are a reward for performing this function. The theory defines innovations as new measures adopted by an entrepreneur to reduce his/her cost of production or to increase the demand for his/her product. Innovations lead to rise in profits through enhancement of demand for the product and reductions in the cost of operations(Cantwell, 2000). In addition, the theory holds that implementation rather than conception of innovations lead to profits which are only temporary and tend to be competed away as others imitate and adopt the innovation. This theory is relevant to the present study to the extent that it introduces adoption of technology as a determinant of profitability and somewhat links profitability to competition. Further, this theory points to the dynamic nature of profitability by admitting that increases in profitability due to innovations are eroded by competition. However, the theory fails to consider other determinants of profitability. It does not also show the measurement of increases in profitability and how fast competition erodes the profits.

2.2.3 The Neo-Classical Theory of Markets

The Neo classical theory can be attributed to seminal contributions of Walras 1889, Marshall 1890, Pareto 1906 and Hicks 1979 (Mitra-Kahn, 2005). The theory argues that depending on a firm's or buyer's ability to influence price, markets can either be competitive, oligopolistic, monopolistic competition, monopsony or monopoly (Varian, 2005). The two extreme cases in the continuum are perfect competition and monopoly. Under perfect competition neither the buyer nor seller (firm) has the ability to influence the price given quantity while under monopoly, the seller (firm) has absolute power to set the price given quantity (Varian, 2005). Measurement of competition is, therefore, a measure of a firm's power to influence price (Gudmundsson *et al.*, 2013). Under perfect competition, the power to influence price is zero and is maximal under monopoly. Competition and the power to influence price are inverse (Varian, 2005). As such, competition is highest when the market structure is perfectly competitive and least under monopoly. This theory is relevant to the present study since it studies profitability and competition in a market set up. Further, it concretely provides for the measurement of competition through estimation of determinants of profitability through the performance dynamic approach and non-performance dynamics approach. However, the theory considers competition and profitability from a market perspective only and does not show how other variables such as adoption of new technology and risk bearing affect profits.

The two competing views on measurement of competition arising from the Neo-classical theory of markets are namely: those of non-performance dynamic methods and performance dynamics approach. These are reviewed in section 2.2.4 and 2.2.5.

2.2.4 Non-performance Dynamic methods

A common index for measuring competition is the Lerner Index (LI) or Price Cost Margin (PCM) attributed to Abba Lerner in 1934 (Elzinga and Mills, 2011). The Lerner Index measures competition using monopoly power. The index calculates competition using the following formula.

$$\text{monopoly power} = \frac{P - MC}{P} \quad (2.1)$$

Where p is price and

MC is the marginal cost

The index takes the value of zero if competition is perfect. The index takes a value greater than zero if a single firm has power to influence the price over and above the marginal costs. The value of the index approaches zero if competition is fierce and diverges away from zero if competition is low (Elzinga and Mills, 2011). For industries, the index is calculated as a simple or weighted mean of individual firm indices (Schiersch and Schmidt-Ehmcke, 2010). The weighted average is derived by calculating market shares of each firm and using them as weights.

Lerner index is criticized for its lack of robustness (Schiersch and Schmidt-Ehmcke, 2010). Amir (2003) showed that an increase in competition through an increase in the number of firms in a market can result in an increasing average LI. Stiglitz (1989) further shows that given certain circumstances, profits per unit sales can rise in a

recession. Thus both, competition among firms and the LI increase during recessions for firms and industries. For these failures, LI is less used as a measure of competition.

The present study borrows as well as deviates from the theoretical framework of LI. The study concurs with the underpinning framework for LI in the assumption that competition reduces a firm's ability to mark up the price above marginal costs. However, the study deviates from LI's static view by considering competition as a dynamic process.

Panzar and Rosse (1987) proposed a measure of competition known as the Panzar Rosse statistic or the H-statistic. The H-statistic is the sum of the elasticities of the reduced-form revenues with respect to the input prices. It ranges from $-\infty$ to 1. A H-statistic equal to or smaller than zero ($-\infty < H \leq 0$) indicates monopoly, whereas a statistic between zero and one ($0 < H < 1$) provides evidence of a range of oligopolistic or monopolistic types of competition. A value of H equal to one ($H = 1$) points to perfect competition. The H-statistic has been criticized for its static nature in contrast to the dynamic nature of competition (Schiersch and Schmidt-Ehmcke, 2010). As such, it only gives the level of competition for cross-sectional rather than time series or panel data.

The present study deviates from Panzar and Rosse (1987) view on two grounds. First, the present study considers competition as a dynamic process rather than static process that can be measured at a particular point in time. Second, the H-statistics' failure to provide for panel data renders the statistic ineffective for the present study.

2.2.5 Performance Dynamic Method

Mueller (1977) is credited for originaive ideas that heralded the measurement of competition via the dynamics of firm performance. The measurement is conceptualized for markets with free entry and exit. Entry and exit are, in this context considered sufficient enough to bring profitability quickly in line with the competitive norm(Mueller, 1977).

Mueller's(1977) starting point is in the short run and with a firm earning exceptional profits above or below the competitive norm. According to Mueller (1977), the competitive process begins with attraction of resources into activities earning more than the competitive norm and flow of resources from activities earning less than the competitive norm. In the long run, the flow of resources into and from an activity brings back profitability which is at the level of the competitive norm. When the competitive norm is achieved no firm is enticed to enter or exit an activity(Mueller, 1977).

Pakes (1987) argues, however, that the competitive process is not sudden but smooth. Profits earned in a particular period provide resources to maintain profits into the future. This occurs as firms erect barriers to entry through alterations in the competitive landscape. The barriers include legal protection and ownership of strategic formulas to protect their profit positions(Chronopoulos *et al.*, 2013). Therefore, profits of all firms slowly converge to the competitive norm with the profitability at one point being directly related to its past profit values even extending the time span far into the past. As such, a firm's evolution of profitability is a measure of competition in an industry (Mueller, 1977).

The dependence of profits at one point on past values makes profitability a data generating process (Mueller, 1977). The process has memory and converges to a long run value overtime as illustrated in Figure 2.1.

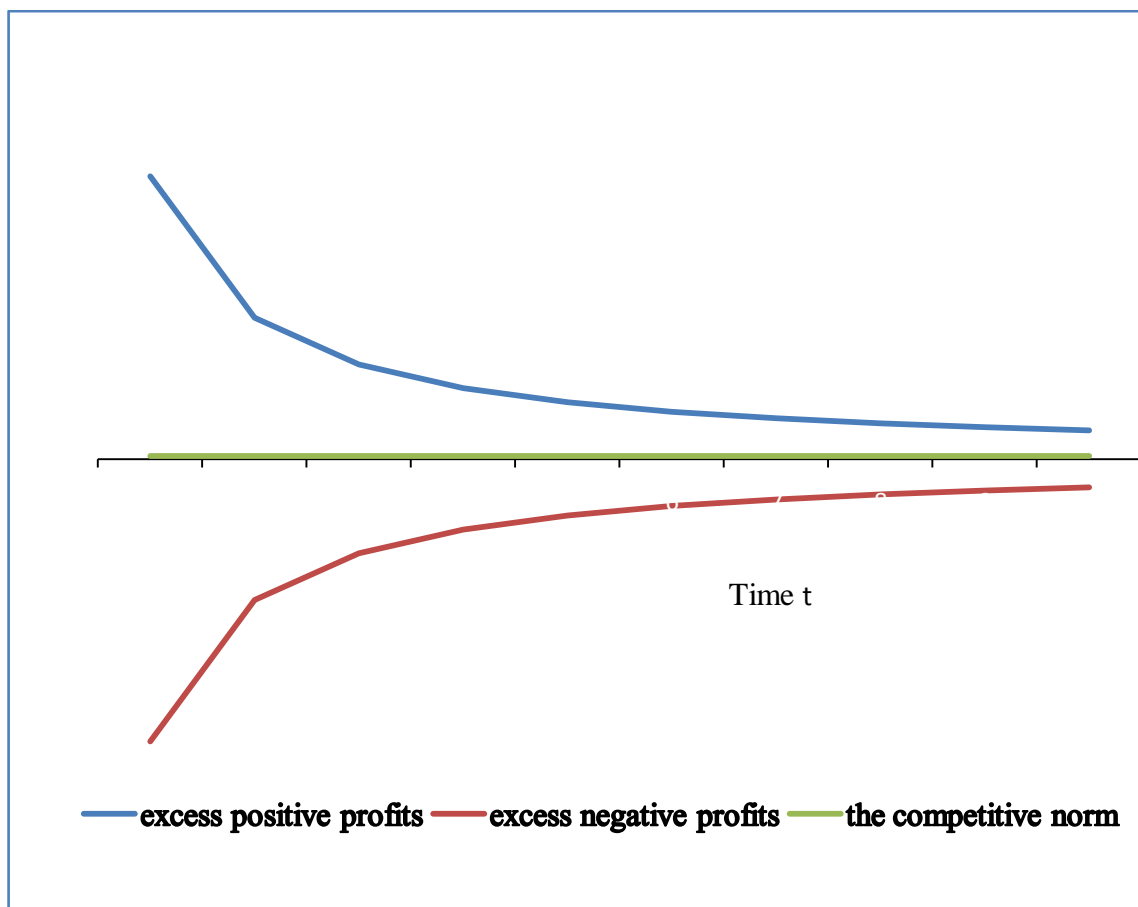


Figure 2.1: Profit generating process

Adopted from Mueller, 1977 Pp 23

Figure 2.1 shows that whether profits are low or high they will converge to the competitive norm. The convergence process is dynamic and smooth. Therefore, profits in a contestable market have a serially correlated data generating process (Chronopoulos *et al.*, 2013). The level of serial correlation may even extend far into the past. Therefore, the profit data generating process is a stationary autoregressive (*AR*) process. This means that firm performance dynamics approach measures profit persistence and, therefore, the level competition using correlation coefficient.

The data generating process has to be stationary to allow convergence and stop profits from persisting unduly (Crespo and Gschwandtner, 2006). The *AR*(1) process is commonly used to operationalize and estimate persistence of profits and competition in a market. Formally, the *AR*(1) profit generating process equation is given by:

$$\pi_{it} = \alpha_i + \lambda_i \pi_{it-1} + e_{it} \quad (2.2)$$

Where π_{it} are profits for firm *i* in period *t*

e_{it} is white noise error term

α_i is the permanent component of profits to the firm

λ_i is the coefficient of profitability in the previous period for the firm

The coefficient of profitability in the previous period (λ_i) shows the proportion of profits in the previous period ($t-1$) that are retained in the current (t) period. This effectively makes λ_i the measure of persistence of profits and competition (Cable

and Gschwandtner, 2008). For stationarity, $|\lambda_i| < 1$, since firms cannot fully retain all their previous period profits. Whatever is not retained is assumed to have been eroded by competition. If λ_i is close to one, profits persist and the level of competition is weak. When λ_i close to zero profits do not persist and competition is high.

The steady state equilibrium value of equation 2.2 to which the profit process asymptotically tends to is given by the unconditional expectation of π_{it} . This value is easily derived with the help of lag operators. Introducing lags in equation 2.2 yields:

$$\pi_{it} - L\lambda_i\pi_{it} = \alpha_i + e_{it} \quad (2.3)$$

Where L is the lag operator

Taking expectations on both sides and using the fact that $L(a) = a$ whenever a is constant. The steady state value of profits is given by:

$$E(\pi_{it}) = \frac{\alpha_i}{1 - \lambda_i} \quad (2.4)$$

Equation 2.4 is the long run projected profit rate (LPPR) and is a measure of that component of profits that is not eroded by competition and is consistent with the competitive norm. As stipulated by theory, if equation 2.4 is the correct value of the long run profit rate then it must be the same for all firms (Cable and Gschwandtner, 2008).

The performance dynamics approach is more relevant to the present study as it makes competition a robust dynamic process that allows entry and exit in the market. In

addition, performance dynamics approach considers time and allows the estimation of the level of competition for a given period of time. Importantly, performance dynamics approach is more appropriate since its estimation process provides for variations in the competitive landscape, which is a concern in the present study. Finally, performance dynamics approach connects competition and profitability. These are the twin concerns of this study.

Measurement of competition via performance dynamics provides a target profit rate as shown in equation 2.4. As a result, performance dynamics approach allows for the estimation of Speed of adjustment (SOA). The SOA measures the time that lapses between the move from an initial set of values of a variable to a target value of that variable (Arioglu and Tuan, 2014).

2.3 Empirical Literature

Yurtoglu (2004) studied the persistence of firm level profitability in Turkey using 172 of the largest manufacturing firms. The study was motivated by the ambitious trade liberalization programme that altered the competitive environment that manufacturing firms operated in. The study followed Mueller's (1977) performance dynamics approach to firm profitability and using information criteria, settled for the $AR(1)$ process. The study used data for 172 firms from the annual surveys conducted by Istanbul Chamber of Industry for firms that continually existed in the period 1985 to 1998. Due to serial correlation in the disturbance term, the study used generalized least squares to estimate the linear dynamic $AR(1)$ model. The study found that firm characteristics rather than industry characteristics explained the differences in firm level profitability in the Turkish

manufacturing industry. The present study borrows from Yurtoglu(2004) the use of firm level covariates as control variables in the estimation of the effect of changes in the competitive landscape on competition and profitability of commercial banks in Kenya. In addition, the present study also borrows from Yurtoglu(2004) the use of banks that continually existed in the period 2001-2014 from this study.

Gschwandtner (2005) studied profit persistence in the long run using 85 survivor and 72 non-survivor firms drawn from various industries in the US economy for the period 1950-1999. The study relied on data from Compustat database in the US. The study explored AR processes of up to four lags and selected the most appropriate using Akaike information criteria (AIC) and Schwarz Bayesian information criteria (SBIC). The study placed the firms in the competitive environment by including firm and industry characteristics such as market share, size of company assets, company growth rates and industry concentration.

Gschwandtner (2005) employed equation 2.2 in its raw form with only inclusion of firm and industry covariates. In its raw form, equation 2.2 implies that the level of persistence in profits is firm specific (λ_i). Therefore, the study did not adopt a panel design but rather a time series design in estimating the level of persistence of profits. The study found that the non-survivors were more competitive than the survivors even though there were still some level of persistence in their sample too. The fact that the non-survivors were more competitive may have been the explanation for exit other than bankruptcy. In addition, the study found that the industry in which the firms operated in provided an important explanation for persistence of profits. As such, the present study

places commercial banks in their competitive environment by incorporating firm and industry covariates in estimating the effect of changes in the competitive landscape on competition and profitability of commercial banks in Kenya. However, the present study deviates from Gschwandtner (2005) raw use of equation 2.2 as it assumed that the level of persistence in profits is common for all commercial banks. Thus, the present study assumes a panel rather than a time series design.

Flamini *et al.* (2009) studied the determinants of profitability of 389 commercial banks in 41 SSA countries. The purpose of the study was to unravel why banks in SSA were more profitable than the rest of world yet the region posted weak economic performance. The study further sought to establish whether the high bank returns were a negative feature of financial intermediation in SSA countries. The study used regression analysis to investigate the impact of firm, industry and macroeconomic variables on bank returns using annual bank and macro level data. The firm characteristics included bank size, activity and diversification, and ownership structure. Industry characteristics comprised regulations and technological changes whereas the macroeconomic variables included inflation and income. The study found that bank profitability in SSA was moderately explained by previous period profitability and that equity, credit risk, bank size, service mix, inflation and economic growth were important determinants of bank profitability in SSA. Based on the methodology, the current study used firm, industry and macroeconomic covariates as control variables in the estimation of the effect of changes in the competitive landscape on competition and profitability of commercial banks in Kenya. Flamini *et al.* (2009) used a cross-country approach. As such Flamini *et al.* (2009)

recommend country specific studies for precise conclusions, the present study sought to accomplish this task for Kenya.

Kamau (2009) investigated efficiency and productivity in the banking sector in the post liberalization period in Kenya. The study analyzed technical, scale and managerial efficiency of commercial banks in Kenya. Kamau (2009) was motivated by the fact that though the banking sector constitutes a large part of the financial system in Kenya, little was known about the efficiency status and factors that determine inefficiency. The study used Data Envelopment Analysis (DEA) and stochastic frontier approach to analyze measures of various aspects of efficiency in the banking sector. Further, Kamau (2009) used panel fixed effects and system GMM to estimate the factors determining X-inefficiency in the banking sector. The study used monthly secondary financial data from the commercial bank audited returns submitted to the Central Bank every month for a period of 6 ½ years. Kamau (2009) found that commercial banks were not fully efficient and had reason and scope to improve performance by improving their technology, skills and enlarging their scale of operations. The study further found a positive relationship between bank X-efficiency with variables such as profitability, capital adequacy and liquidity. The study recommended policies encouraging competition, products diversification, risks minimization and proper supervision for improvement in bank efficiency. In relation to Kamau (2009), the present study not only shares the same unit of study but also the period of the study, the post liberalization period. However, the present study deviates from Kamau (2009) in terms of focus. Kamau 2009 investigated efficiency and productivity in the banking sector but the present study investigates commercial banks competition and profitability.

Goddard, Liu, Molyneux and Wilson(2011) carried out a cross country study on persistence of bank profitability for a sample of 65 countries from developing and developed countriesfor the period 1997 to 2007 using bank level data. The study adopted equation 2.2 but assumed that the persistence parameter was country rather than firm specific. Therefore, the study used a time series design for each country. For its dynamic nature, the study estimated the variant of 2.2 using generalized method of moments (GMM). The study found that persistence in bank profits for developing countries appeared weaker than that of developed countries.This means that banking industries were more competitive in developing than in developed countries. This finding is contrary to conventional expectations on three accounts. First, developed economies are naturally considered to be more competitive than less developed ones (Gschwandtner, 2005). Thus, it is expected that persistence of profits would be stronger in developing than developed countries. Second, the study was a cross country one that used industry level data to draw conclusions. Flamini *et al.*, (2009) observes that strong conclusion or policy recommendations cannot be arrived at from a cross country study such as this one. Third, industry level data involves aggregation of data for non-homogeneous products, which is empirically incorrect as observed by Mueller (1977). The present study contributed to this debate between expectations and the findings by Goddard *et al.*(2011)by estimating the level of competition in the Kenyan banking sector.

Sanya and Gaertner (2012) assessed competition in four of the five East African Community (EAC) countries banking sectors. The study investigatedwhy small banks in the EAC countries namely Kenya, Uganda, Tanzania, and Rwandawere unable to take

advantage of the opportunity presented by the large unbanked segment of the population in each country. The study applied the two non-performance dynamic approaches to bank-level consolidated financial data for the years 2001–2008. The study found that the degree of competition in the countries is low due to a combination of structural and socio-economic factors. The study further ranked the Kenyan banking sector as the most competitive compared to those of Tanzania, Uganda and Rwanda. This study was cross country and, therefore, could not have country specific conclusions. Further the study took a regional rather than a country specific perspective. As a result, the uniqueness of Kenya as the second largest banking sector in Africa was confounded by the pooling of observations from Kenya, Uganda, Tanzania and Rwanda. The present study overcomes these challenges by presenting a particular Kenyan case while using a more robust methodology rather than the non-performance dynamics approach.

Gschwandtner (2012) analyzed and compared persistence of profits for firms in various industries in the US during the periods 1950-1966, 1967-1983 and 1984-1999. The splitting of the half a century into three periods allowed entry and exit in the economy, change of firm composition during the period of the analysis and introduction of structural breaks. The study applied performance dynamic approach on firm level data from 549 firms operating in the US. The study confirmed the hypothesis that today's profits are related to yesterday's and converge gradually to a competitive norm. The present study is informed by Gschwandtner (2012) since it splits the study period into sub-periods to test the impact of regulation, technological advancement and consolidation on bank profitability in Kenya.

Eklund and Desai (2012) carried out a cross country study on the effects of entry regulations on competitive markets and the speed of elimination of abnormal profits for 59 countries during the period 1998-2011. The study used performance dynamics approach to establish the level of persistence of profits and dummy variables to represent the body of entry regulations in each country. Lagged profits were interacted with dummies to establish the impact of regulation on profit persistence. Being a cross country study, it only made a generalized conclusion that regulation may speed or slow the competitive process in eliminating abnormal profits. The present study borrows the method of interacting dummy variables with the lag of profits to obtain the impact of regulations on bank profitability in Kenya. This is because regulation is a moderator rather than an exogenous variable in explaining persistence of profits.

Chronopoulos *et al.* (2013) studied the dynamics of bank profitability in the US arising from regulatory changes during the period 1984-2010. The study applied the performance dynamics approach to bank annual balance sheet and income statement data for all US banks to establish the influence of regulation on persistence of profits. The study augmented static determinants of bank profitability as control variables in the dynamic model. Importantly, the study provided for firm (bank) characteristic covariates. These included bank size, asset growth, bank risks exposures, diversification, liquidity and bank capital. The study provided for industry structure and economy wide covariates using Herfindahl-Hirschman Index (HHI) and national income. To capture the impact of regulatory change, the study introduced dummies and interacted them with the lagged value of profits. The simultaneous introduction of dummies and interaction terms transformed the base model given in equation 2.2 to:

$$\pi_{it} = \alpha_i + \alpha_1 \pi_{it-1} + \alpha_2' BR_t + \alpha_3' (BR_t \times \pi_{it-1}) + \alpha_4' IND_t + \alpha_5' X_{it} + \gamma_i + e_{it} \quad (2.6)$$

Where:

BR Vector of variables capturing regulatory change

IND Vector of variables capturing industry and economy wide covariates

X_{it} Vector of bank characteristics

γ_i Individual bank effects which could be random or fixed

The coefficient of lagged profits (α_1) gives the level of persistence before the bodies of regulations are effected. That is $\lambda = \alpha_1$ before enactment of the regulations. After the regulations are implemented the level of persistence is given by the sum of parameters (coefficients) of lagged profits and the interactions. That is:

$$\lambda = \alpha_1 + \alpha_3' BR_t \quad (2.7)$$

The sign of α_3 shows whether the regulation enhances or slows persistence of profits. The study found that the financial crisis of 2007-2010 and restrictive regulation enhanced persistence of profits. The present study borrows from Chronopoulos *et al.*(2013) specification of the model in establishing the effect of changes in the competitive landscape on competition and profitability of commercial banks in Kenya. However, the present study goes beyond the scope covered by Chronopoulos *et al.*(2013) in two ways. First the current study estimated the competitive norm for the

Kenyan banking sector. Secondly, the present study estimated the speed with which bank profitability in Kenya is approaching the competitive norm.

Gudmundsson *et al.*(2013) studied the role of capital requirements on bank competition and stability in Kenya for the period 2000-2011. The study was motivated by the gradual raising of core capital from KES250 million in 2008 to KES1 billion in 2012. The study applied non-performance dynamics approach on data from 36 commercial banks. The study used the LI to measure competition for the banking sector over the period 2000 to 2011. The study used the estimates of the LI to run a regression analysis to find the effect of gradual increase in core capital on competition. The study found that core capital has nonlinear effects on competition. By using the LI followed by a linear regression, the study ignored the autoregressive nature of profits as discussed in section 2.1.2. This anomaly limited the strength of the study findings. Unlike the study by Gudmundsson *et al.*(2013), the present study is motivated by a host of other changes in the regulatory environment including the change in core capital. Further, the present study not only estimates the level of competition using a different methodology but also estimates the speed of adjustment of bank profitability to the competitive norm.

Muchai *et al.*(2015) analysed the value effects of banking institutions' mergers and acquisitions in Kenya. The study was motivated by the fact that mergers and acquisitions, within the banking industry in Kenya had gained prominence between 1990s and 2000s but had mixed outcomes on bank performance with some recording commendable performance and others collapsing even after indulging in mergers and acquisitions. The study measured the value effects of mergers and acquisitions using

efficiency gains and shareholders' value effects. The study used DEA to estimate efficiency gains and events study methodology to assess stockholders gains. The study used secondary financial firm level data from the period 1989 to 2010. The study found that though mergers and acquisitions led to improved profit efficiency, large banks benefited more from improved performance after merger and acquisition activities than the small banks. The study found that the larger the merged banking institution, the higher the probability of its success as a merger. This study is similar to the present study to the extent that the two studies focus on the same population. However, the focus is different to the extent that the present study investigates competition and profitability of commercial banks in Kenya whereas Muchai *et al.* (2015) focused on value effects of mergers and acquisition. In spite of the difference, the findings in this study imply that bank size is an important determinant of bank performance in Kenya. Therefore the study by Muchai *et al.* (2015) forms the basis of inclusion of bank size as a determinant of bank profitability.

2.4 Overview of the Literature

The reviewed literature demonstrates that based on the neo classical theory of markets competition can be measured via performance dynamic approach. Theoretically and empirically, performance dynamic approach is preferred due to its robustness and multi-period applicability unlike the non-performance dynamic approach. As such, the present study will adopt performance dynamic approach. The performance dynamic approach is firm based and, therefore, requires firm level data on all firms under consideration over time. This yields a panel design which will be adopted by the present study.

As per the performance dynamics approach, the level of competition is entirely determined by the dynamic component only as given in equation 2.2. However, as per the risk bearing theory, innovation theory of profits and equation 2.6 as well as other empirical literatures such as Muchai *et al.* (2015), firm invariant determinants of profitability should be considered. These determinants include inflation and national income, and time invariant firm covariates such as bank size, asset growth, bank risks exposures, diversification, liquidity, bank capital, ownership structure and regulations. The current study will employ these covariates as appropriate. Due to the use of lagged profits as an explanatory variable most studies use system GMM estimator with Windmeijer correction to estimate the variants of dynamic panel models presented in equation 2.2 and 2.6 (Chronopoulos *et al.*, 2013). For consistency and comparability of estimates, the present study borrowed these estimation methods.

Much of the reviewed empirical literature is based on developed countries. The ones on developing countries are cross country and, therefore, cannot be relied upon for country specific conclusions. The present study is specific to Kenya for precise conclusions on bank competition and profitability. Domestically, previous studies on the banking sector in Kenya have investigated efficiency and productivity (Kamau, 2009); analyzed value effects of banking institutions' mergers and acquisitions in Kenya (Muchai *et al.*, 2015); and studied the role of capital requirements on bank competition and stability in Kenya for the period 2000-2011 (Gudmundsson *et al.*, 2013). The study by Gudmundsson *et al.* (2013) attempted to estimate bank competition but using non-performance dynamic approaches. None of these studies have investigated competition and profitability of commercial banks in Kenya. Therefore, the present study sought to fill

this literature gap by investigating competition and profitability of commercial banks in Kenya.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology employed by the study. The sections included are the research design, the theoretical framework, empirical model, definition and measurement of variables, data types and sources, data analysis and diagnostic tests and estimation method.

3.2 Research Design

The study sought to investigate competition and profitability of commercial banks in Kenya for the period 2001 to 2014 and adopts a non-experimental research design since it sought to examine competition and profitability of commercial banks in Kenya without any controls.

3.3 Theoretical Framework

This section presents the theoretical framework used by the study. Section 3.3.1 begins with the presentation of the measurement of persistence of profits and bank competition. Section 3.3.2 follows with the measurement of the speed of adjustment of bank profitability to the competitive norm while 3.3.3 concludes with the effect of changes in the competitive landscape on commercial banks profitability.

3.3.1 Measuring Persistence of Profits and Bank Competition

Based on the neo-classical theory of markets and following Mueller (1977), firm i 's profits at time t (π_{it}) can be decomposed into the competitive return (α), firm specific return (γ_i) and the transitory or short run rent (S_i). That is:

$$\pi_{it} = \alpha + \gamma_i + S_{it} \quad (3.1)$$

In the long run, competition in contestable markets is sufficient to eliminate the transitory component (S_{it}) (Mueller, 1977). Therefore, it is this component that decays autoregressively. That is:

$$S_{it} = \lambda_i S_{it-1} + u_{it} \quad (3.2)$$

Where λ_i is the proportion of period $t - 1$'s returns retained in period t . u_{it} is a white noise error term.

From equation 3.1 $S_{it} = \pi_{it} - (\alpha + \gamma_i)$. Therefore,

$$S_{it-1} = \pi_{it-1} - (\alpha + \gamma_i) \quad (3.3)$$

Substituting 3.3 in 3.2 and plugging the resulting solution in 3.1 yields

$$\pi_{it} = (1 - \lambda_i)(\alpha + \gamma_i) + \lambda_i \pi_{it-1} + u_{it} \quad (3.4)$$

Letting β_i and λ_i to be the parameter estimates of equation 3.4, the autoregressive equation 3.4 becomes

$$\pi_{it} = \beta_i + \lambda_i \pi_{it-1} + u_{it} \quad (3.5)$$

Equation 3.5 is firm specific. It can be transformed to suit an industry by assuming that β_i and λ_i are constant across firms and overtime. This yields equation 3.6:

$$\pi_{it} = \beta + \lambda \pi_{it-1} + u_{it} \quad (3.6)$$

Where λ is the industry level of persistence of profits in the short run. It is the proportion of the industry's period $t-1$ returns retained in period t . Following Gschwandtner (2005) if λ is high, short run rents persist and competition is weak (low). Also as argued by Yurtoglu (2004) if λ is low short run rents are eroded quickly and competition is strong (high).

The unconditional expectation of equation 3.6 is

$$\alpha = \frac{\beta}{1-\lambda} \quad (3.7)$$

Equation 3.7 gives the estimate of α in equation 3.1. That is equation 3.7 gives the long run projected profit rate (LPRR). This component is not eroded by competitive forces and gives the level of bank profitability consistent with the competitive norm.

3.3.2 Measuring Speed of Adjustment of Bank profitability to the Competitive Norm

The persistence of profit estimating equation 3.6 gives an estimate λ that measures the persistence of bank profitability in the short run. According to Gschwandtner (2005), Yurtoglu, (2004), Cable and Gschwandtner (2008) and Goddard *et al.*(2011) λ also helps in measuring the speed of adjustment of profitability to the long run projected profit rate. In particular, the speed of adjustment (SOA) is given by:

$$SOA = 1 - \lambda \quad (3.8)$$

If SOA in 3.8 is close to one, short run rents converge fast to the competitive norm. If close to zero, then short run rents converge slowly (Goddard *et al.*,2011).

3.3.3 Competitive Landscape and Bank profitability

According to Muller (1977) and Chronopoulos *et al.* (2015) firms try to defend or improve their profit positions by altering the competitive landscape in their favour. According to the innovations theory (Schumpeter, 1943) and the performance dynamics approach (Muller, 1977) the competitive landscape comprise firm concentration, innovations and regulations. Precisely, banks alter competition through consolidation, innovation and regulation. Regulation may block or enhance competition in the form of patents that block imitation and encourage dominance or through compliance to new rules that keep off new entrants (Muller, 1977). The underpinning, therefore, is that bank profitability is not only a function of its previous values but also a function of changes in

the competitive landscape in the form of innovation (technology change), consolidation and regulation. Assuming a general functional form, bank profitability can be expressed algebraically as:

$$\pi_{it} = f(\pi_{it-1}, TC, Con, BR) \quad (3.9)$$

Where π_{it-1} is period $t-1$ profitability of bank i

TC = Changes in technology, which is a proxy for innovation

Con = Consolidation

BR = Regulation

3.4 Empirical Model

This section presents the empirical models thematically based on the study objectives. Section 3.4.1 presents the empirical model for estimating the level of bank competition in Kenya. Section 3.4.2 presents the empirical model for estimating the speed of adjustment of bank profitability to the competitive norm. section 3.4.3 concludes by presenting the empirical model of estimating the effect of changes in the competitive landscape on bank profitability.

3.4.1 Level of Bank Competition in Kenya

The first objective of this study sought to ascertain the level of competition in the Kenyan banking sector. To ascertain the level of competition among commercial banks,

the level of persistence of profitability in the sector was estimated first. In the estimation of the level of persistence of profitability only the dynamic component is considered (Yurtoglu, 2004). According to Yurtoglu (2004), persistence profit is entirely a pattern of firm level profitability over time. This is consistent with literature such as Gschwandtner (2003);Yurtoglu, (2004);Gschwandtner (2005);Cable and Gschwandtner (2008) and Goddard *et al.* (2011). Therefore, the present study used the dynamic component only to estimate the level of profit persistence and therefore competition.

The persistence of profit estimating equation 3.6 was modelled and operationalized on a simple $AR(1)$. However, profits of all firms slowly converge with the profitability at one point being directly related to its past profit values even extending the time span far into the past (Pakes, 1987). Assuming the furthest past of p periods, equation 3.6 was expressed as an $AR(p)$ process as shown in equation 3.10.

$$\pi_{it} = \beta + \lambda_1\pi_{it-1} + \lambda_2\pi_{it-2} + \lambda_3\pi_{it-3} + \dots + \lambda_p\pi_{it-p} + u_{it} \quad (3.10)$$

The short run industry wide level of persistence of profits was given by the sum of coefficients of the lags of profits as shown in 3.11 and as put forward by (Gschwandtner, 2005)

$$\lambda = \sum_{i=1}^p \lambda_i \quad (3.11)$$

To obtain the level of bank competition among commercial banks in Kenya, the estimated value of λ in equation 3.11 was considered. Theoretically and empirically, λ

lies between zero and one (Yurtoglu, 2004). A value of λ close to zero implies high or strong level of competition while a value close to 1 implies low or weak competition. In literature, Gschwandtner (2003);Yurtoglu, (2004);Gschwandtner(2005); Cable and Gschwandtner (2008) and Goddard *et al.* (2011), values of λ greater than 0.5 (50 per cent) are interpreted as high while values greater than 0.5 (50 per cent) are interpreted as low competition (Yurtoglu, 2004; Gschwandtner, 2005). In this study, the level of competition was given by:

$$Level\ of\ competition = \begin{cases} Low, & \lambda > 50\% \\ Moderate, & \lambda = 50\% \\ High, & \lambda < 50\% \end{cases} \quad (3.12)$$

Further, given 3.10, the level of competition as depicted in 3.12 erodes short run rents to the long run projected profit rate given by the unconditional expectation of equation 3.10 as shown in equation 3.13.

$$LPPR = \frac{\beta}{1 - \sum_{i=1}^p \lambda_i} \quad (3.13)$$

The long run projected profit rate in equation 3.13 is that level of bank profitability that will never be eroded by bank competition and will persist indefinitely.

3.4.2 The Speed of Adjustment of Bank profitability to the Competitive Norm

The second objective of this study sought to determine the speed of adjustment of bank profitability to the competitive norm in the Kenyan banking sector. Given the

generalization of the persistence of profit estimating equation to an $AR(p)$ process, the speed of adjustment estimating equation 3.8 was generalized to fit the $AR(p)$ process. Specifically, the speed of adjustment was given by equation 3.14 as put forth by Gschwandtner (2005) as:

$$SOA = 1 - \sum_{i=1}^p \lambda_i \quad (3.14)$$

The summation of λ_i lies between zero and one (Goddard *et al.*, 2011). Therefore, the speed of adjustment also lies between zero and one. If the speed of adjustment is greater than 50 per cent, short run rents converge fast to the competitive norm (Gschwandtner, 2005). However, if speed of adjustment is less than 50 per cent, then short run rents converge slowly to the competitive norm (Gschwandtner, 2005). If the speed of adjustment is equal to 50 per cent it implies that short run rents converge moderately to the competitive norm.

The half-life of the estimated SOA was given by

$$HL = \frac{\gamma \ln(0.5)}{\ln(1 - SOA)} \quad (3.15)$$

where γ is the frequency of the time period in years (Arioglu and Tuan, 2014). The half-life measured the period in years that it takes to reduce the gap between the long run projected profit rate and realized profitability by half.

3.4.3 Effect of Changes in the Competitive Landscape on Bank Profitability in Kenya

The third objective of the study sought to determine the relationship between bank profitability and the competitive landscape in Kenya. Following the innovations theory (Schumpeter, 1943) and the performance dynamics approach (Muller, 1997), bank profitability is modelled as a function of previous levels of profitability, level of technology consolidation and regulation as shown in equation 3.9.

Profitability is not just a function of the dynamic component (previous levels of profitability) and the competitive landscape. According to Cantwell (2000), Mitra-Kahn (2005) and Gudmundsson *et al.* (2013) profitability is as well determined by risks faced by a firm, the market structure and firm characteristics.

In the context of the present study, the risks faced by commercial banks were either macro or micro in nature. According to Chronopoulos *et al.* (2013) and Flamini *et al.* (2009), the macro risks relevant to banks are movements in macro variables such as inflation and economic growth. In terms of micro risks, the most relevant to banks according to Chronopoulos *et al.* (2013) and Flamini *et al.* (2009) are credit, liquidity and capitalization risks.

With regard to firm characteristics, firm size, ownership structure and product offering can influence profitability of a firm (Varian, 2005). With respect to banking, ownership structure manifests in the form of domestic or foreign ownership and public or private

ownership. Product offering manifests in the form of diversification in types of products offered by a bank.

Therefore, other than the determinants of profitability developed in sections 3.3.1 through 3.3.3, the present study considered bank profitability as function of static macro and micro determinants. Mathematically, the equation relating profitability and the competitive environment was extended to incorporate the risks faced by a bank, the market structure and bank characteristics as shown in equation 3.16.

$$\pi_{it} = f(\pi_{it-1}, \pi_{it-2}, \pi_{it-3}, \dots, \pi_{it-p}, EG, TC, INF, Con, BRE, BS, D, BC, OS, L, BR) \quad (3.16)$$

Where π_{it-j} is period $t-j$ profitability of bank i $j=1,2,3,\dots,p$

EG = Economic growth

TC = Technological change

INF = Inflation

Con = Consolidation

BRE = Bank risk exposures

BS = Bank size

D = Diversification

BC = Bank capital

OS = Ownership structure

L = Liquidity

BR = Body of regulations

Equation 3.16 was parametrized and expressed in vector form as in equation 3.17.

$$\pi_{it} = \beta + \lambda_1 \pi_{it-1} + \lambda_2 \pi_{it-2} + \lambda_3 \pi_{it-3} + \dots + \lambda_p \pi_{it-p} + \beta'_1 IND_t + \beta'_2 X_{it} + \theta_i + u_{it} \quad (3.17)$$

Where:

IND is a vector of variables capturing industry characteristics and economy wide conditions as put forward in section 3.3.4. These characteristics consist of economic growth, technological change (proxied by the log of number of ATMs) inflation and consolidation as proxied by bank concentration using Herfindahl-Hirschman Index (HHI).

X_{it} is a vector of bank characteristics which as informed by section 3.3.4 include bank risk exposures, bank size, diversification, bank capital, ownership structure, liquidity and body of regulations

θ_i is individual bank specific effects which could be random or fixed

λ_i is the coefficient of period $t-i$ returns

The models as specified in 3.16 and 3.17 are short run models since they depict partial adjustment process in bank profitability. Models with partial adjustments (dynamic models) are short run models (Baltagi, 2005). Therefore, model 3.17 captures only the short run effect of changes in the competitive landscape on bank profitability. To capture the long run effect the models were transformed into long run models by dropping the dynamic component (Baltagi, 2005; Verbeek, 2004). As such the long run specification of equation 3.16 was

$$\pi_{it} = f(EG, TC, INF, Con, BRE, BS, D, BC, OS, L, BR) \quad (3.18)$$

Where profitability is considered to be a function of the static determinants only. The variables remain as defined in 3.16. When parametrized, equation 3.18 becomes

$$\pi_{it} = \beta_0 + \beta_1'IND_t + \beta_2'X_{it} + \theta_i + u_{it} \quad (3.19)$$

The variables remain as defined in 3.17.

To capture the short run effect of technological change on bank profitability in the Kenyan banking sector, the coefficient of log of the number of ATMs (growth in technology) in equation 3.17 was interpreted. To get the long run effect of technological change on bank profitability in the Kenyan banking sector, the coefficient of log of the number of ATMs (growth in technology) in equation 3.19 was interpreted.

To examine the short run effect of consolidation on profitability in the Kenyan banking sector, the coefficient of HHI index in equation 3.17 were interpreted since HHI measures the level of concentration and, therefore, the level of consolidation in an

industry. To examine the long run effect of consolidation on profitability in the Kenyan banking sector, the coefficient of HHI index in equation 3.19 was interpreted.

To establish the effect of regulatory changes on bank profitability in the Kenyan banking sector, a dummy variable representing body of regulations (BR) was introduced in model 3.17. The introduction is based on the fact that banks block or enhance competition in form of patents that block imitation and encourage dominance or through compliance to new rules that keep off new entrants (Muller, 1977). The variable BR takes a value of one when the regulations are in force and zero otherwise. The effect of regulation is assumed to be in the short run and acts together and through the dynamic component (lagged profits) (Chronopoulos *et al.*, 2013). Therefore, BR was interacted with previous period's profitability to examine its influence on persistence of previous period profits. Equation 3.20 shows introduction of BR in equation 3.17.

$$\pi_{it} = \beta + \sum_{j=1}^p \lambda_j \pi_{it-j} + \beta_4 BR_t + \sum_{j=1}^p \beta_j (BR_j \times \pi_{it-j}) + \beta'_5 IND_t + \beta'_6 X_{it} + \theta_i + u_{it} \quad (3.20)$$

Simplifying 3.20 yields:

$$\pi_{it} = \beta + \sum_{j=1}^p (\lambda_j + \beta_j BR_j) \pi_{it-j} + \beta_4 BR_t + \beta'_5 IND_t + \beta'_6 X_{it} + \theta_i + u_{it} \quad (3.21)$$

The coefficient of interest in equation 3.21 is $\sum_{j=1}^p (\lambda_j + \beta_j BR_j)$. When the regulation is in force BR is equal to one. Therefore, the coefficient of interest is

$$\sum_{j=1}^p \lambda_j + \sum_{j=1}^p \beta_j \quad (3.22)$$

The variables remain as defined in equation 3.17.

To get the effect of the body of regulations on bank profitability the signage of $\sum_{j=1}^p \beta_j$ in equation 3.22 was considered. If the overall effect was negative, the *BR* would have enhanced competition and reduced profitability. If the sign was positive the regulation would have reduced competition and enhanced bank profitability. During the period 2001 to 2014, the key regulatory change with a direct influence on bank profitability was the amendment of the banking Act (Cap 488). The amendment progressively increased the core capital requirement from KES250 million in 2008 to KES1 billion in 2012.

The amendment triggered four mergers and one acquisition. The mergers were between Prime Capital & Credit Ltd and Prime Bank Ltd; CFC Bank Ltd and Stanbic Bank Ltd; and Equatorial Commercial Bank and Southern Credit Banking Corporation and finally between Savings and Loans limited and Kenya Commercial Bank. The consolidation activities reduced the number of commercial banks from 45 in 2008 to 43 in 2012 (CBK, 2012). Therefore, *BR* took a value of zero before 2008 and a value of one from 2009 onwards. The coefficient of *BR* captured the effect of progressive increase of core capital requirement from KES250 million in 2008 to KES1 billion on bank profitability.

3.5 Definition and Measurement of Variables

Table 3.1 presents the definition and measurement of dependent and independent variables that were used in the study.

Table 3.1: Definition and Measurement of Variables

| Variable | Definition | Measurement |
|---------------------|---|--|
| Profits, π_{it} | Returns on Assets (ROA) of bank i in year t | Percentage normalized annual returns on assets |

| | | |
|--|---|--|
| | | $\pi_{it} = \frac{ROA_{it} - \overline{ROA_t}}{ROA_t}$ |
| Industry Characteristics (IND_t) | | |
| Economic Growth, (EG) | Is the percentage change in national income in a given year | Percentage change in national income |
| Concentration, (HHI) | A measure of the degree of concentration in the banking industry. | Sum of the squares of each bank's market shares of each year |
| Technological change, (TC) | Growth in the number of ATMs | Percentage change in the number of ATMs |
| Inflation (INF) | The continuous rise of the general price level of goods and services. | Percentage change in the general price level of goods and services |
| Firm Characteristics (X_{it}) | | |
| Bank size, (BS) | The total assets of bank i at time t | The total assets of bank i in period t in Kenya Shillings |
| Bank risk exposures, (BRE) | Banks' exposure to credit risk | The ratio of net charge offs to gross loans in percentage form |
| Diversification, (D) | A banks dependence on other sources of income rather than the core business of lending | The ratio of non-interest income to total operating income in percentage form |
| Bank capital, (BC) | Banks contribution to capital | The ratio of equity to total assets in percentage form |
| Ownership structure, (OS) | A dummy variable that shows ownership structure of a bank with reference category of domestic ownership. | Takes a value of 1 if more than 50% of a bank's shareholding is foreign and zero otherwise |
| Liquidity, (L) | The liquidity and lending specialization of a bank | The ratio of loans to assets in percentage form |
| Regulatory Covariates | | |
| Body of regulations, (BR) | A dummy variable showing the amendment of the Banking Act (Cap 488) that increased the core capital requirement for commercial banks from KES250 million in 2008 to KES1 billion in 2012. | Sets to one when the regulation is in force and zero otherwise |

3.6 Data Type and Sources

The study used published panel data for 36 commercial banks for the period 2001 to 2014. Data on bank size, asset growth, bank risks exposures, diversification, liquidity,

bank capital, ownership structure, technological change and regulations was obtained from bank supervision annual reports from the CBK as well as published financial statements from individual commercial banks. Data on inflation and economic growth was obtained from statistical abstracts published by the Kenya National Bureau of Statistics (KNBS).

3.7 Sample Selection

The study investigated competition and profitability of commercial banks in Kenya over the period 2001 to 2014, which was a total of 14 years. Over the study period there were 50 distinct banks in Kenya. Due to entry and exit, 12 banks did not have complete observations over the 14 years period. These banks were considered short lived and were excluded from the sample since short lived banks tend to exhibit different business behavior relative to other banks (Chronopoulos *et al.*, 2013). To diminish the influence of outliers on the findings, the study used banks with return on assets (ROA) greater than -10 per cent and less than 10 per cent (Chronopoulos *et al.*, 2013). Following this criterion, two more banks were excluded leaving a sample of 36 commercial banks. Therefore, the study used 72 per cent (36 out of 50) of the entire bank population in Kenya in the period 2001 to 2014. This proportion was representative enough to satisfy validity of the results.

3.8 Model Stability and Diagnostics Tests

Equations 3.10, 3.17 and 3.20 are linear dynamic panel data models since they include the lags of the dependent variable. This affected the estimation method as well as the diagnostic tests conducted.

The presence of the lagged profits on the right hand side of the equations 3.10, 3.17 and 3.20 causes endogeneity problems. As such, ordinary panel data estimation methods such as pooled ordinary least squares (POLS), random effects and fixed effects model yield inconsistent estimates (Blundell and Bond, 1998). To address the problem, the Generalized Method of Moments (GMM) was used (Roodman, 2006). The GMM estimator reduces potential bias and asymptotic imprecisions (Arioglu and Tuan, 2014). As such equations 3.10, 3.17 and 3.20 were estimated using GMM.

Equation 3.19 is a static panel model. This means that it can be estimated using Fixed Effects (FE) and Random Effects (RE) models depending on the assumption on the one way error component (Baltagi, 2005). If the individual heterogeneity in model 3.19 were fixed, fixed effects model would be used to estimate model 3.19. However, if the individual heterogeneity were random drawings from a distribution with a constant mean and variance the random effects were to be used to estimate model 3.19.

To test the precision of the GMM estimates, the results were compared with those of Pooled Ordinary Least Squares (POLS) and FE. The GMM estimate of the coefficient of lagged dependent variable lies between that POLS and FE (Roodman, 2006). The POLS estimate biases the estimate upwards whereas the fixed effect estimate biases the

estimate downwards (Roodman, 2006). Due to the GMM specification, relevant tests on the specification of the *AR* process were conducted. Over identification restrictions and validity of instruments tests were conducted using Hansen test(Roodman, 2006).

The dependent variable and the lagged dependent variable in equations 3.10, 3.17 and 3.20 are normalized. The normalization does away with macroeconomic cycles and, therefore, most studies on persistence of profits and competition report stationarity (Crespoet *al.*, 2006). This fact was further supported by the case of large individuals (N) than time period (T). However, there is limited literature defining ‘large’ and ‘small’ T . Samples with a T less than 10 years or waves are classified as micro while those with a T more than 20 years or waves are classified as macro (Blackburne and Frank, 2007). This leaves studies with $10 < T < 20$ in a tepid situation. The present study had 14 years and, therefore, in the inconclusive situation. To authoritatively use the dynamic panel approach, the study had to verify and confirm the level of stationarity of the ratio scaled variables used.

Panel unit root tests are either individual or common. Individual panel unit root tests usually test stationarity for each series for a given study unit such as a bank. Common panel unit root test generally tests stationarity for the pooled series. The study reported both individual and common unit roots tests for bank and time variant variables (ratio scaled firm characteristics) and individual tests for bank invariant but time variant variables (ratio scaled industry characteristics).

The estimation of models 3.10, 3.17 and 3.20 using GMM were to provide precise estimates lying within an acceptable range established by naïve OLS and dynamic fixed effects estimates of the model (Roodman, 2006). The dynamic fixed effects underestimates the coefficients of the lagged dependent variable while the naïve OLS over estimates the coefficients (Roodman, 2006). For precision of the estimates in the study, the coefficients of the lagged dependent variable were considered admissible if they lie between the dynamic fixed effects estimates and naïve OLS estimates.

The use of GMM in estimation of linear dynamic models such as 3.10, 3.17 and 3.20 is anchored on the assumption of first order serial correlation in the error term only (Roodman, 2006). The GMM permits instruments from the second lag of the dependent variable if the assumption of first order serial correlation holds (Roodman, 2006). Therefore, higher order serial correlation invalidates the use of instruments (Baltagi, 2005). As such, a test for first order serial correlation [$AR(1)$] and higher orders of serial correlation is both a test for autocorrelation and specification. For application of GMM, $AR(1)$ should be present and $AR(2)$ onwards absent in the error terms (Roodman, 2006).

To test for autocorrelation, and, therefore, specification, Arrellano and Bond (1991) test of first $AR(1)$ and second order $AR(2)$ serial correlation was used. To arrive at the correct specification, deeper lags of the dynamic component of models 3.10, 3.17 and 3.20 were explored with a starting point of an $AR(1)$ process. The optimal lag length of the $AR(p)$ process was obtained when the assumption of presences of $AR(1)$ and absence of $AR(2)$ and any other higher order serial correlation held. Further, all the lags

admissible under this assumption had to be statistically significant as put forth by (Roodman, 2006).

Model 3.19 was static and could have been estimated using fixed or random effects. To discriminate between the models and settle for the most parsimonious model Hausman (1978) test was used. If the null hypothesis of no systematic differences between the FE and RE estimates was not rejected RE model were to be preferred over the FE model. However, rejection or no rejection of the null of no systematic differences between the estimates of two models would permit the interpretation of the fixed effect model (Verbeek, 2004).

The use of GMM is based on moment conditions (Roodman, 2006). The moment conditions proliferate with the number of instruments used. This can sometimes cause imprecision in estimation (Roodman, 2006). As such, the study tested whether the moment conditions established by a particular number of instruments were over identified. Hansen test for over identifying restrictions was used (Roodman, 2006). The test has a null hypothesis of binding restrictions. The optimal lag length of the instruments is attained when the Hansen J statistic has a with a p-value that is not perfect (equal to one) and when the explanatory power of the predictor variables is enhanced (Roodman, 2006).

3.9 Data Analysis

The first objective of the study sought to ascertain the level of competition in the Kenyan banking sector. To achieve this objective, equation 3.10 was estimated and the

sum of coefficients of lagged values of profitability fitted in equation 3.11 to determine the level of persistence of bank profit (λ). A value of λ less than 50 per cent was interpreted as high competition, that equal to 50 per cent was taken to reflect moderate competition and λ greater than 50 per cent was interpreted as low competition as shown in equation 3.12.

The second objective of the study sought to measure the speed of adjustment of bank profitability to the competitive norm in the Kenyan banking sector. To achieve this objective, the value of λ from equation 3.11 was plugged into equation 3.14 to estimate the SOA. If the speed of adjustment was greater than 50 per cent, short run rents converged fast to the competitive norm. However, if speed of adjustment was less than 50 per cent then short run rents converged slowly to the competitive norm. If the speed of adjustment was equal to 50 per cent it implied that short run rents converged moderately to the competitive norm. The half-life of the speed of adjustment was estimated using equation 3.15.

The third objective of the study sought to investigate the effect of changes in the competitive landscape on commercial banks profitability in Kenya. The competitive landscape comprised three components: technological change, consolidation and regulatory changes. To capture the short and long run effects of technological change on bank profitability, the coefficients of log of the number of ATMs in equation 3.17 and 3.19, respectively were interpreted. To examine the short run and long run effects of consolidation on profitability in the Kenyan banking sector, the coefficients of HHI index in models 3.17 and 3.19 were interpreted. To get the effect of the body of

regulations on bank profitability, equation 3.20 was estimated and the signage of sum of coefficients of interactions of lagged profitability and *BR* as in 3.22 was interpreted. If the sum had an overall negative sign then the *BR* had enhanced competition and reduced profitability. If the sum was positive, then regulation would have reduced competition and enhanced bank profitability.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents the study findings. Section 4.2 presents the descriptive statistics, section 4.3 presents the results of the diagnostic tests while section 4.4 presents the empirical results. The empirical results are presented and discussed as per the study objectives.

4.2 Descriptive Statistics

This section presents the measures of central tendency, dispersion, trend and associations between the variables used in the study. With respect to summary statistics, the analysis was three pronged. First, summary statistics for the bank characteristics are presented. Secondly, summary statistics for industry wide characteristics are presented. Finally, tabulation of discrete variables is presented.

4.2.1 Summary Statistics of Bank Characteristics

This section discusses the adjacency and spread of bank characteristics used in the study. The measures of central tendency and dispersion of these variables are shown in Table 4.1.

Table 4.1: Overall Summary Statistics of Ratio Scaled Variables

| Variables | Unit of Measurement | $N = n \times T$ | Mean | SD | Min | Max |
|---------------------|----------------------------|------------------|-------------|-----------|------------|------------|
| Bank Size | KES mn | 504 | 32,594 | 53,779 | 502.3 | 383,038 |
| ROA | Percentage | 504 | 2.81 | 2.151 | -6.5 | 9.5 |
| Normalized ROA | Percentage | 504 | 0.318 | 1.219 | -4.64 | 6.82 |
| Bank Risk Exposures | Percentage | 504 | 10.21 | 12.15 | 0.1 | 77.1 |
| Diversification | Percentage | 504 | 16.03 | 10.11 | 0 | 58.81 |
| Bank Capital | Percentage | 504 | 16.87 | 9.521 | 5.6 | 76.51 |
| Liquidity | percentage | 504 | 59.51 | 22.154 | 19.77 | 185.73 |

Source of Data:CBK Bank Supervision Annual Reports (various issues)

Table 4.1 shows that the pooled observations for each bank specific variable were 504. This corresponds with the panel specification adopted by the study. The 36 cross sectional observations for 14 years yield a total of 504 observations per variable. The fact that all variables had 504 observations means that none of the ratio scaled variables had missing observations over the 14 years. This ensured the technical validity of the study findings.

The mean bank size for the pooled data is KES32.6 billion with the smallest and largest banks for the entire period having net assets worth KES502.3 million and KES383 billion, respectively. Therefore, in terms of size, as proxied by net assets the sample had markedly dissimilar commercial banks, a fact that is consistent with the population under study.

The ROA for the sample over the period 2001 to 2014 was on average 2.81 per cent. When the period was considered as a whole, ROA ranged from -6.5 per cent to 9.5 per

cent with the observations approximately 2.151 standard deviation units from each other. Thus the sample obeys the criterion for diminishing outliers in the data adopted by the study.

Table 4.1 also shows that the mean normalized return on assets was 0.318 per cent for the entire period. The minimum and the maximum normalized return on assets was -4.64 per cent and 6.82 per cent, respectively. Therefore, excess profitability relative to annual sample means has a spread of 11.46 units for entire period, a fact that is consistent with the disparate nature of commercial bank profitability in Kenya over the period 2001 to 2014.

The summary statistics presented in Table 4.1 further show that on average, pooled bank risk exposures series had a mean of credit risk up to 10.21 per cent. However, the risk exposure varied over the period from 0.1 per cent to 77.1 per cent with a standard deviation of 12.15. Therefore, irrespective of the bank and time, the levels of risk exposures have a vast spread for the sample over the period 2001 to 2014 with the observations approximately 12.15 standard deviation units from each other.

With regards to diversification, the data presentation in Table 4.1 shows that the pooled data for diversification had a mean of 16.03 per cent and a standard deviation of 10.11 with a range from zero to 58.81 per cent. Therefore, over the period, some banks concentrated on core business of lending money while others supplemented their interest income with non-interest income.

Further, the data summarized in Table 4.1 shows that pooled bank capital series had a mean of 16.87 per cent and a standard deviation of 9.521, with a range from 5.6 per cent to 76.51 per cent. This means that over the period 2001 to 2014, the assets that shareholders had a residual claim on were on average 16.87 percent and had a spread of 70.91 per cent.

Finally, Table 4.1 shows that the mean outstanding loan to net assets ratio was 59.51 per cent with a standard deviation of 22.15 and a spread from 19.77 per cent to 185.73 per cent. On average, therefore, over the period 2001 to 2014, commercial banks' lending did not exceed their net assets. Since the ratio of outstanding loans to net assets was a proxy of liquidity risk, the fact that commercial banks' lending did not exceed their net assets implies that over the period of analysis liquidity risk was moderate. As such, commercial banks could have met a sudden liquidity need through a fire up sale of assets.

4.2.2 Summary Statistics of Industry Wide Characteristics

This section presents the summary statistics for the industry wide variables adopted by the study. The variables include economic growth, concentration, number of ATMs and inflation rate. This was necessitated by the fact that summary statistics of pooled series understate the standard deviation of firm invariant variables. The summary statistics obtained for each variable are reported in Table 4.2 and are interpreted as the overall for the period 2001 to 2014.

Table 4.2: Summary statistics of firm Invariant variables

| Variable | Mean | Std Deviation | Min | Max |
|----------------------------|-------------|--------------------------|------------|------------|
| Economic Growth | 4.242 | 1.062 | 2.5 | 7.1 |
| Herfindahl-Hirschman Index | 0.071 | 0.01 | 0.059 | 0.092 |
| Number of ATMs | 1287.85 | 949.56 | 166 | 2613 |
| Inflation | 8.1 | 3.959 | 2 | 15.1 |

Source of Data:CBK Bank Supervision Annual Reports (various issues)

Table 4.2 shows that the average economic growth for the period 2001 to 2014 was 4.24 per cent, with a standard deviation of 1.062 per cent. The minimum growth rate over the period of analysis was 2.5 per cent while the maximum was 6.1 per cent. Therefore, the economic growth over the study period was moderate presenting the commercial banks with a moderate room for growth.

The summary statistics in Table 4.2 also show that on average the banking sector had a concentration of 0.071. This figure is slightly greater than zero and by far less than one. Therefore, the banking sector was characterized by a large number of commercial banks over the study period. The maximum value and the minimum value of commercial bank concentration were 0.09 and 0.06, respectively. Thus the spread of bank concentration over the period was 0.03, revealing that the number of banks in the banking sector in Kenya had no substantial changes over the period 2001 to 2014.

The data summarized in Table 4.2 shows that the number of ATMs averaged 1,288 over the period of the analysis. The minimum number of ATMs in the period of analysis was 166 and the maximum 2,613. Therefore, over the period the spread for the number of

ATMs was 2,447 ATMs underscoring the rapidness with which technology was adopted by the commercial banks over the period. This sample characteristic is consistent with the population of all the banks in Kenya over the period 2001 to 2014. Thus in terms of adoption of technology, the sample was representative of the population.

Finally, Table 4.2 shows that the mean level of inflation rate over the period was 8.1 per cent with a standard deviation of 3.959, a minimum of two (2) per cent and a maximum of 15.1 percent. Overall, therefore, commercial banks in Kenya experienced mild, rapid and galloping inflation rate at some points in the study period.

4.2.3 Tabulation of Discrete Variables

The study used two discrete variables namely ownership structure (foreign and domestic, private and public) and body of regulations. With respect to foreign and domestic ownership, a dummy variable for foreign domestic bank was created. The variable was set at zero if the bank was domestic and one if the bank was foreign. Therefore, in a regression analysis the reference category was domestic banks. The sample had a total of 36 commercial banks of which 23 were domestic and 13 foreign owned. Therefore, in the sample considered by the study, domestic banks were 63.89 per cent whereas foreign banks were 36.11 per cent. As such, domestic banks were the majority, a fact that is consistent with the banking sector in Kenya over the period 2001 to 2014. Therefore, the sample was representative of the study population in terms of foreign and domestic ownership of banks in Kenya.

With regard to private and public ownership, a dummy variable depicting a private or public bank was set to one if over 50 per cent of the bank's shareholding was private and zero otherwise (public). The reference category was public (government/state owned) commercial banks. The sample had 32 private banks and four (4) state owned banks. In percentage, the sample had 88.89 per cent of the banks as private and 11.11 per cent as state owned banks. Therefore, a majority of the banks in the sample were privately owned, a finding that is consistent with the study population that shows that a majority of commercial banks were privately owned over the study period.

With respect to the body of regulations, an indicator of the body of regulations was created. The variable was set to one if the amendment of the Banking Act (Cap 488) that increased the core capital requirement for commercial banks from KES250 million in 2008 to KES1 billion in 2012 was in force in a particular year and zero otherwise. The tabulation of the number of years in line with the regulation reveals that the study period had seven years before and after the enactment of the amendment of the Banking Act (Cap 488) of Kenya in 2008.

4.3 Diagnostic Tests

This section presents diagnostic tests dealing with stationarity and data smoothing. It also deals with choice of the optimal number of lags and instruments for the estimating equations.

4.3.1 Stationarity Tests

The study used a dynamic panel estimation approach that assumes that the variables are stationary. The study tested this assumption for both bank characteristics and industry characteristics. The tests were individual and common for bank characteristics and individual for industry wide characteristics. Im, Pesaran and shin, ADF Fisher chi-square and PP-Fisher chi square tests were used to test the null hypothesis to ensure that the conclusions arrived at were robust. Table 4.3 presents a summary of the findings.

Table 4.3: Stationarity Test Results

| Variable | Common Unit Root Test | Individual Tests | | |
|-----------------------------|-----------------------|---------------------------|----------------------------|---------------------------|
| | Levin, Lin &Chu | Im, Pesaran and Shin Test | ADF Fisher chi-Square Test | PP-Fisher Chi-square test |
| Normalized return on Assets | -8.520*** | -4.611*** | 137.877*** | 329.520*** |
| Economic Growth | | -3.040*** | 110.888*** | 259.586*** |
| Herfindahl-Hirschman Index | | -3.106*** | 111.485*** | 297.865*** |
| Growth in technology | | -3.526*** | 117.836*** | 284.402*** |
| Inflation | | -3.323*** | 117.737*** | 277.223*** |
| Bank Size | -4.731*** | -3.892*** | 123.346*** | 303.701*** |
| Bank risk Exposures | -8.366*** | -4.373*** | 135.634*** | 291.233*** |
| Diversification | -10.234*** | -5.513*** | 159.288*** | 358.680*** |
| Bank capital | -2.810*** | -3.644*** | 123.913*** | 305.096*** |
| Liquidity | -8.739*** | -7.748*** | 192.790*** | 318.678*** |

Key: ***P-value less than 0.01

Source of Data:CBK Bank Supervision Annual Reports (various issues)

Table 4.3 shows the summary of the findings on stationarity. All the tests have a null hypothesis of presence of a unit root. Therefore, a rejection of null hypothesis would

imply that the series in question was stationary. Table 4.3 shows that the test statistics for testing the null (presence of the unit root) against the alternative (stationarity) for bank covariates had p-value less than 0.01. The test statistics are greater than the critical values for all the covariates at one per cent level of significance, leading to the rejection of the null hypothesis. This finding is consistent for all the tests and, therefore, robust. Thus each bank covariate is stationary per bank and as a pooled sample series.

With respect to industry wide covariates, Table 4.3 shows that the test statistics have p-values less 0.01 for all tests and, therefore, greater than the critical values at one per cent level of significance. Thus all the unit root tests reject the null hypothesis of a unit root making this finding robust. Thus the industry wide covariates are stationary for the period 2001 to 2014.

The stationarity of bank and the industry wide characteristics satisfies the inherent assumption of stationarity assumed by micro-panels. Therefore, the study can safely apply the generalized method of moments (GMM) in the estimating models without the fear of spurious results.

4.3.2 Data Smoothing

Data smoothing was guided by the fact that the present study was interested in the trend rather than the cyclical movement of the data. As such, the study used Hodrick Prescott (1997) filter to smoothen the Data. The filter is primarily a time series data smoothening technique (Kowa and Pawel, 2005). Nevertheless, extensions by Baum (2005) made it

available for panel data (Kowa and Pawel, 2005). Thus, the present study used the extended Hodrick Prescott filter by Baum (2005) to smoothen the data.

4.3.3 Choice of Optimal Lags

To select the optimal number of lags of the dependent variable in the estimating equations, comparison of the various lag structures was employed. The present study was based on a methodology assuming an AR(P) autoregressive process. Therefore, a specific AR process was required. The initial point of comparison began with the first lag of the dependent variable. Thereafter, extra lags of the dependent variable were introduced. The optimal lag structure was up to the lag preceding an insignificant lag of the dependent variable as put forth by Roodman (2006). It also applied to one where the assumption of presence of $AR(1)$ and absence of $AR(2)$ and any other higher order serial correlation hold. The optimal lag structure for estimating models is the same whether the model incorporates the dynamic and static components or dynamic only (Gschwandtner, 2005). For brevity, therefore, model 3.10 is used. Table 4.4 presents the findings.

Table 4.4: Determination of Optimal Lags of Normalized Return on Assets

| VARIABLES | AR(1) | AR(2) | AR(3) | AR(4) |
|--|------------------------|-------------------------|-------------------------|-------------------------|
| 1 st lag of Normalized return on Assets | 0.817*** (0.0221) | 1.666*** (0.0314) | 2.245*** (0.0611) | 2.359*** (0.0770) |
| 2 nd lag of Normalized return on Assets | | -0.738*** (0.0273) | -1.793*** (0.106) | -1.995*** (0.147) |
| 3 rd lag of Normalized return on Assets | | | 0.502*** (0.0495) | 0.625*** (0.0983) |
| 4 th lag of Normalized return on Assets | | | | -0.0143 (0.0269) |
| Economic Growth | -0.311 (0.189) | -0.470*** (0.111) | 0.326*** (0.0567) | 0.161*** (0.0591) |
| Herfindahl-Hirschman Index | 27.34*** (8.061) | 2.512 (5.253) | -81.54*** (8.913) | 21.47 (18.15) |
| Growth in Technology | 0.518*** (0.180) | 0.473*** (0.121) | -0.922*** (0.105) | -0.0543 (0.152) |
| Inflation | -0.0196** (0.00820) | -0.0198*** (0.00581) | 0.0930*** (0.00978) | -0.0180 (0.0190) |
| Bank size | 0.313 (0.207) | -0.0322 (0.0742) | -0.00538 (0.0364) | 0.0235 (0.0485) |
| Bank Size squared | -0.0115 (0.0102) | 0.00238 (0.00349) | 0.00101 (0.00175) | -0.000605 (0.00234) |
| Bank risk Exposures | 0.00782** (0.00302) | -0.000450 (0.00113) | 0.000432 (0.000580) | 0.000265 (0.000647) |
| Diversification | -0.00275 (0.00289) | 0.000398 (0.000905) | -0.000495 (0.000614) | -0.000236 (0.000428) |
| Bank capital | 0.00329 (0.00299) | -0.000446 (0.00111) | 0.000109 (0.000541) | 0.000759* (0.000380) |
| Liquidity | -0.00189 (0.00203) | -0.000375 (0.000594) | -0.000422 (0.000280) | -0.000206 (0.000448) |
| i.Foreign Domestic Bank | -0.0726 (0.0742) | 0.0478 (0.0292) | 0.00548 (0.0163) | 0.00567 (0.0219) |
| i.Private Public Bank | 0.186** (0.0797) | 0.0353 (0.0420) | 0.0270 (0.0211) | 0.0238 (0.0180) |
| Constant | -6.009*** (1.616) | -1.142 (0.861) | 9.746*** (1.025) | -1.825 (2.085) |
| Observations | 468 | 432 | 396 | 360 |
| Number of id | 36 | 36 | 36 | 36 |
| AB test for AR(1) in first differences | 0.002 | 0.007 | 0.013 | 0.140 |
| AB test for AR(2) in first differences | 0.007 | 0.002 | 0.167 | 0.520 |
| Satisfaction of bounds | Yes | Yes | Yes | Yes |

Key: Robust standard errors in parentheses
*** p<0.01, ** p<0.05,

Source of Data:CBK Bank Supervision Annual Reports (various issues)

Table 4.4 shows the introduction of the first to the fourth lags of normalized return on assets in model 3.10. Further Table 4.4 shows the p-values of Arrellano and Bond test of autocorrelation in first and second differences and satisfaction of bounds established by the naïve OLS and fixed effects estimates for each model to establish the fitness of each model.

All the *AR* versions of the model satisfy the bounds restrictions. That is, the estimated coefficients of the lagged dependent variable lie between those of the fixed effects and naïve OLS for each model. However, not all the *AR* versions satisfy the Arrellano and Bond test of autocorrelation. For the *AR*(1) and *AR*(2) model, the null hypothesis that the error term has no first order and second order serial correlation is rejected. For the *AR*(3) the null hypothesis is rejected for the first differences but not rejected for the second differences. The *AR*(4) model fails to reject the null hypothesis for both the first and second order serial correlation. Estimation of dynamic panel data models using GMM is anchored on the assumption of first order serial correlation in the error term and no higher order serial correlation say of order two (Verbeek, 2004). Therefore, based on the Arellano and Bond test of autocorrelation, the *AR* version of the estimating models that best fit these assumptions is *AR*(3). In addition, Table 4.4 shows that the lag preceding an insignificant lag of normalized return on assets is the third lag since the coefficient of the fourth lag of normalized return on assets is insignificant.

The lag of normalized return on assets preceding an insignificant lag as put forth by Roodman (2006) is the third. Further, the lag where the assumption of presence of *AR*(1) and absence of *AR*(2) and any other higher order serial correlation hold is the

third lag of normalized return on assets. Therefore, the study adopted an $AR(3)$ framework.

The fact that the optimal autoregressive framework is the third ($AR(3)$), implies that ‘todays’ bank profitability in Kenya is related to profitability in the previous three years. The methodology of the present study was formulated on an $AR(P)$ process. Thus for application, the framework is upgraded to an $AR(3)$ framework as shown in appendix I.

4.3.4 Choice of the Number of Instruments

To select the number of instruments in the optimal AR structure a sensitivity analysis ranging from severe, moderate to no restrictions of instruments was carried out. The most severe restriction for the $AR(3)$ framework of the estimating models were the use of first lag only. The no restriction was the use of the first to the 13th lag since the study had 14 years (time periods). Table 4.5 shows the results of the sensitivity analysis.

Table 4.5: Determination of Optimal Number of Instruments

| VARIABLES | Lag(1 1) | Lag(1 2) | Lag(1 3) | Lag(1 7) | Lag(1 13) |
|---|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|
| 1 st lag of Normalized return on Assets | 2.125*** (0.106) | 2.161*** (0.0778) | 2.192*** (0.0695) | 2.236*** (0.0605) | 2.245*** (0.0611) |
| 2 nd lag of Normalized return on Assets | -1.637*** (0.168) | -1.687*** (0.128) | -1.723*** (0.116) | -1.781*** (0.105) | -1.793*** (0.106) |
| 3 rd lag of Normalized return on Assets | 0.444*** (0.0762) | 0.465*** (0.0589) | 0.477*** (0.0535) | 0.498*** (0.0488) | 0.502*** (0.0495) |
| Economic Growth | 0.272*** (0.0639) | 0.288*** (0.0567) | 0.301*** (0.0564) | 0.321*** (0.0562) | 0.326*** (0.0567) |
| Herfindahl-Hirschman Index | -74.52*** (9.364) | -76.57*** (8.830) | -78.45*** (8.699) | -81.02*** (8.904) | -81.54*** (8.913) |
| Growth In Technology | -0.823*** (0.116) | -0.852*** (0.106) | -0.877*** (0.104) | -0.913*** (0.105) | -0.922*** (0.105) |
| Inflation | 0.0851*** (0.0107) | 0.0875*** (0.00990) | 0.0895*** (0.00965) | 0.0924*** (0.00977) | 0.0930*** (0.00978) |
| Bank Size | 0.0980 (0.0814) | 0.0702 (0.0678) | 0.0461 (0.0554) | 0.00695 (0.0397) | -0.00538 (0.0364) |
| Bank size Squared | -0.00364 (0.00377) | -0.00233 (0.00318) | -0.00132 (0.00259) | 0.000441 (0.00190) | 0.00101 (0.00175) |
| Bank risk exposures | 0.00229 (0.00167) | 0.00206 (0.00140) | 0.00144 (0.00110) | 0.000725 (0.000653) | 0.000432 (0.000580) |
| Diversification | -0.000627 (0.00120) | -0.000728 (0.00104) | -0.000555 (0.000855) | -0.000510 (0.000634) | -0.000495 (0.000614) |
| Bank Capital | 0.000697 (0.00115) | 0.000466 (0.000998) | 0.000342 (0.000762) | 0.000130 (0.000567) | 0.000109 (0.000541) |
| Liquidity | -0.000956 (0.000777) | -0.00106* (0.000619) | -0.000755 (0.000498) | -0.000546* (0.000305) | -0.000422 (0.000280) |
| i.Foreign Domestic Bank | 0.00997 (0.0372) | -0.0103 (0.0276) | 0.00299 (0.0231) | 0.00172 (0.0164) | 0.00548 (0.0163) |
| i.Private Public Bank | 0.133 (0.0819) | 0.108* (0.0625) | 0.0824 (0.0502) | 0.0417 (0.0248) | 0.0270 (0.0211) |
| Constant | 8.243*** (1.319) | 8.681*** (1.147) | 9.046*** (1.080) | 9.605*** (1.045) | 9.746*** (1.025) |

Table 4.5 continued

| | | | | | |
|--|-------|-------|-------|-------|-------|
| Observations | 396 | 396 | 396 | 396 | 396 |
| AB test for AR(1) in first differences | 0.031 | 0.021 | 0.016 | 0.014 | 0.013 |
| AB test for AR(2) in first differences | 0.214 | 0.199 | 0.183 | 0.168 | 0.167 |
| Number of Instruments | 53 | 62 | 70 | 92 | 98 |
| Hansen J | 27.05 | 27.85 | 25.35 | 25.95 | 23.03 |
| Hansen P | 0.830 | 0.973 | 0.999 | 1.00 | 1.00 |
| Satisfaction of Bounds | Yes | Yes | Yes | Yes | Yes |
| Over identifying Restrictions | 35 | 52 | 74 | 80 | 36 |

Key: Robust standard errors in parentheses
*** p<0.01, ** p<0.05,

Source of Data:CBK Bank Supervision Annual Reports (various issues)

Table 4.5 shows that the lags of instruments used notwithstanding the satisfaction of bounds holds and first but not second order serial correlation is present in the error term. Therefore, the assumptions for the application of GMM hold for the AR(3) specification of the estimating models no matter the lags of instruments used. This further supports the fitness of the AR(3) framework on the data.

Table 4.5 shows that the severely restricted number of instruments was 53 while the unrestricted number of instruments was 98. When the instruments are allowed to proliferate from 53 to 98, the coefficients of the first to the third lag increase from 2.125, -1.637 and 0.444 to 2.245, -1.793 and 0.502, respectively. Therefore, the coefficients are marginally rather than excessively sensitive to the number of instruments used. This supports the parsimonious nature of the AR(3) specification. Further, when the instruments proliferate, the Hansen P-value increases from 0.830 to a perfect value of one. Thus, an increase in the number of instruments from 53 to 98 leads to a strong

failure of rejecting the null hypothesis of the Hansen test that the over-identifying restrictions hold.

Table 4.5 further shows that when the number of instruments multiplies from 53 to 98, the number of variables explaining variation in profitability other than the lagged dependent variables increases from four to six at the count of 62 instruments and finally to four at the count of 98 instruments. Thus proliferation of instruments has an inverted U effect on the explanatory powers of variables with the maximum being at 62.

Thus based on the facts that proliferation of instruments increases the coefficient of the three lags of normalized return on assets marginally and explanatory power of other independent variables reaches its peak at 62 instruments. The present study chose to use the first and second lags [Lag (1 2)] of the dependent variables as instruments as well as the other exogenous variables (firm and industry wide covariates).

4.3.5 Hausman Test

To determine whether the fixed or random effects estimates of the static model 3.19 should be interpreted, Hausman test was used and the chi statistic reported in Table 4.7. The results presented in Table 4.7 show that the Hausman chi-statistic is 18.22 with a corresponding p-value of 0.0327. Thus the chi statistic is greater than the tabulated value at five per cent level of significance. Therefore, the null hypothesis of no systematic difference between the estimates of the Random Effects model and Fixed Effects model is rejected at five per cent level of significance. Thus the Fixed Effects model should be interpreted as the long run (static) model.

4.4 Empirical Results

This section presents the study findings. It follows the thematic areas covered in the study objectives.

4.4.1 The Level of Commercial Banks Competition in Kenya

The first objective of the study was to ascertain the level of competition among commercial banks in Kenya. To achieve this objective, an $AR(3)$ variant of the persistence of profits model (model A3.10 in appendix I) was estimated and the results reported in Table 4.6.

Table 4.6: Persistence of Bank Profits in Kenya

| VARIABLES | Fixed Effects | System GMM | Naive OLS |
|--|------------------------|-----------------------|------------------------|
| 1 st lag of Normalized Return on Assets | 1.990*** (0.0426) | 2.373*** (0.0509) | 2.427*** (0.0326) |
| 2 nd lag of Normalized Return on Assets | -1.464*** (0.0697) | -2.019*** (0.0818) | -2.082*** (0.0569) |
| 3 rd Lag of Normalized return on Assets | 0.370*** (0.0332) | 0.607*** (0.0355) | 0.632*** (0.0267) |
| Constant | 0.00811** (0.00336) | -0.00129 (0.00725) | -0.120*** (0.00851) |
| Observations | 396 | 396 | 396 |

Key: Standard errors in parentheses
 *** p<0.01, ** p<0.05

Source of Data: CBK Bank Supervision Annual Reports (various issues)

Table 4.6 shows dynamic fixed effects, system GMM estimates and the naïve OLS estimates of $AR(3)$ variant of the persistence of profits model. The dynamic fixed effects model and the naïve OLS establish the bounds where the coefficients of the efficient system GMM model should lie. Table 4.6 shows that the coefficients of lagged

dependent variable in the system GMM model lie between those of the dynamic fixed effects estimates and the naïve OLS estimates. Therefore, the estimates fell within required range (bound).

The system GMM coefficients of first, second and third lag of normalized return on assets were 2.373, -2.019 and 0.607, respectively with the corresponding p-values less than 0.01. Therefore, the coefficients were significantly different from zero at one per cent level of significance. The sum of these coefficients is 0.961. Therefore, cumulatively the banks are able to maintain 96.1 per cent of their profitability from the past three years.

Substituting the sum of the coefficients of the lagged normalized return on assets in the competition estimating equation (3.11) yields the level of competition. The persistence of commercial banks profitability (λ) was 96.1 per cent. This level of persistence is greater than 50 percent. Therefore, the level of competition among commercial banks in Kenya over the period 2001 to 2014 was low. The low level of commercial bank competition in Kenya may be explained by the domination of the banking sector by few large sized banks that experience inadequate competition from the many small banks (Republic of Kenya, 2008)

The findings that the level of persistence in bank profitability in Kenya was high and the level of competition was low are in consonance with the dynamic approach of measuring commercial banks competition (Mueller, 1977). The dynamic approach posits an inverse relationship between persistence of profitability and competition (Mueller, 1977; Goddard *et al.*, 2011 and Chronopoulos *et al.*, 2013). Therefore, the findings support the

logical flow put forward by the performance dynamics approach of measuring commercial banks competition.

The findings, however, contradict as well as support empirical findings by previous studies. For instance, the findings that commercial banks in Kenya are able to retain 96.1 per cent of the three previous periods profits are in harmony with the findings by Flamini *et al.* (2009) who found out that commercial banks in SSA retain a moderate proportion of previous periods profits. However, the current study and that of Flamini *et al.* (2009) differ on the extent of explanation. The fact that commercial banks were able to retain 96.1 per cent of the three previous periods profitability shows that past values of profitability profoundly explain 'todays' commercial banks' profits in Kenya. Therefore, the present study found an immoderate level of influence of past bank profitability on 'todays' profitability unlike Flamini *et al.* (2009) who found a moderate influence. The difference on the extent of influence may be explained by the different approaches adopted by the studies. The present study adopted a country specific approach whereas Flamini *et al.* (2009) adopted a cross country approach. The second possible explanation for the difference in the extent of influence lies on the period of focus by the studies. The present study focused on the period between 2001 and 2014 whereas Flamini *et al.* (2009) focused on the period 1998 to 2006.

Further, the finding that competition among commercial banks in Kenya was low contradicts the finding by Goddard *et al.* (2011) who established that bank competition in developing countries is greater than that in the developed countries. The findings by Goddard *et al.* (2011) was contrary to expectations on three accounts. First, developed

economies are naturally considered to be more competitive than less developed ones (Gschwandtner, 2005). It is expected, therefore, that bank competition would be low in developing than developed countries. Second, Goddard *et al.* (2011)'s study was a cross country study that used industry level data to draw conclusions. Flamini *et al.* (2009) observed that strong conclusions or policy implications cannot be arrived at from a cross country study. Third, industry level data used by Goddard *et al.* (2011) involved aggregation of data for non-homogeneous products, which is empirically incorrect as observed by Mueller (1977). The present study corrects the finding that bank competition in developing countries is greater than that in the developed countries by presenting a developing country, Kenya, that has severely low level of competition among commercial banks.

When the findings were considered in light of the non-performance dynamics approach measures of commercial banks competition, they led to important conclusions and implications. The Lerner Index, for instance, posits that low competition is a sign of an imperfectly competitive industry that is able to mark up the price above the marginal costs (Elzinga and Mills, 2011). Therefore, the low level of commercial banks competition in Kenya implies that the commercial banking industry is not perfectly competitive and is able to markup (increase) lending rates above the base rates such as the central bank rate (CBR) and the Kenya bank reference rate (KBRR).

The implication that the commercial banking industry in Kenya is not perfectly competitive and is able to markup (increase) lending rates above the base was arrived at when the findings were also considered in light of the performance dynamics approach.

Unlike in a monopoly, in a perfectly competitive market, firms or an industry cannot retain their previous period profits (Mueller, 1977; Goddard *et al.*, 2011 and Chronopoulos *et al.*, 2013). Thus unlike in a monopolistic market where firms maintain almost all their previous period levels of profitability in a perfectly competitive market, the level of profit persistence is zero (Mueller, 1977). The present study found that the level of profit persistence is 96.1 per cent implying that the banking industry in Kenya is imperfect and has monopolistic tendencies of retaining high proportions of previous periods' profitability.

4.4.2 The Speed of Adjustment of Bank Profitability to the Competitive Norm

The second objective of the study sought to determine the speed of adjustment of commercial banks profitability to the competitive norm in Kenya. To achieve this objective, the study estimated the $AR(3)$ (equation A3.14 in appendix I) variant of the speed of adjustment estimating equation 3.14. The sum of the coefficients of the lags of normalized profits in section 4.4.1 was 96.1. Thus, the speed of adjustment of bank profitability to the competitive norm is $100 - 96.1 = 3.9$. Hence, the speed with which bank profitability closes the gap between the realized profitability and the competitive norm was 3.9 per cent per year. This means that, per year the difference between the competitive norm and realized profitability in the banking sector in Kenya is reduced by approximately four per cent per year. The speed of adjustment was less than 50 per cent. The implication is that, short run rents earned by commercial banks in Kenya converge slowly to the competitive norm. This may be explained by the low level of bank competition experienced in the Kenya.

Plugging the estimated speed of adjustment of 3.9 per cent in half-life estimating model gives the half-life of the speed of adjustment as 17.42 years. This means that, other things being equal, to reduce the gap between the competitive norm and realized bank profitability in Kenya by half would take about 17 years. The finding that the speed of adjustment of elimination of excess profitability in the banking sector is about four per cent with a half-life of 17.42 years implies that elimination of excess profitability in the banking sector in Kenya is not instantaneous but rather slow. This explains why commercial banks profitability in Kenya seems to persist (Republic of Kenya, 2008).

To establish the competitive norm that short run rents should converge to, the AR(3) version (equation A3.13 in appendix I) of the long run projected profit rate estimating equation 3.13 was used. The constant term in the system GMM estimate of persistence of profit estimating model in Table 4.6 is -0.00129 with a corresponding p-value greater than 0.05. Thus the constant term is not significantly different from zero at five per cent level of significance. Thus the β for the LPPR estimating equation is zero, making the long run projected profit rate for the banking sector in Kenya to be zero. This implies that commercial bank profitability should not persist unduly.

The finding that the long run projected profit rate for commercial banks in Kenya is zero is consistent with the neo classical theory of markets (Varian, 2005). The theory hypothesizes that in the long run a firm operating in a perfectly competitive market should make zero profits (Varian, 2005). A value of zero return on assets may appear far-fetched for the banking sector. However, the finding is reinforced by the nature of the banking industry. Commercial banks exist to intermediate between borrowers and

savers of funds. If the commercial banks are absolutely efficient, interest rate spread should be zero or near zero. Zero spreads imply zero profits for the commercial banks and, therefore, zero long run projected profit rate.

4.4.3 The Effect of the Competitive Landscape on Bank Profitability

The third objective of the study sought to investigate the effect of changes in the competitive landscape on commercial banks profitability in Kenya. The competitive landscape comprises three components: technological change, consolidation and regulatory changes. The estimation results for short run and long run effects of changes in technology and consolidation on commercial banks profitability are reported in Table 4.7.

Table 4.7: Effect of Technology and Consolidation on Bank Profitability

| Variables | Dynamic Model | Static Model |
|--|-------------------------|-------------------------|
| 1 st lag of Normalized return on assets | 2.161*** (0.0778) | |
| 2nd lag of Normalized return on assets | -1.687*** (0.128) | |
| 3 rd lag of Normalized return on assets | 0.465*** (0.0589) | |
| Economic Growth | 0.288*** (0.0567) | 0.389 (0.476) |
| Herfindahl-Hirschman Index | -76.57*** (8.830) | 31.46** (15.19) |
| Growth In Technology | -0.852*** (0.106) | -0.663 (0.420) |
| Inflation | 0.0875*** (0.00990) | -0.000575 (0.0251) |
| Bank Size | 0.0702 (0.0678) | 1.813*** (0.382) |
| Bank size Squared | -0.00233 (0.00318) | -0.0781*** (0.0185) |
| Bank risk exposures | 0.00206 (0.00140) | -0.0210*** (0.00504) |
| Diversification | -0.000728 (0.00104) | -0.00472 (0.00660) |
| Bank Capital | 0.000466 (0.000998) | 0.0817*** (0.00715) |
| Liquidity | -0.00106* (0.000619) | 0.000141 (0.00250) |
| i.Foreign or Domestic Bank | -0.0103 (0.0276) | |
| i.Private or Public Bank | 0.108* (0.0625) | |
| Constant | 8.681*** (1.147) | -10.16*** (2.587) |
| Observations | 396 | 504 |
| Hausman Chi | | 18.22 |
| Hausman p-value | | 0.0327 |
| Robust standard errors in parentheses | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | |

Source of Data:CBK Bank Supervision Annual Reports (various issues)

The results presented in Table 4.7 show that the coefficient of the log of number of ATMs is -0.852 with a corresponding p-value of less than 0.01 in the short run (dynamic specification). Therefore, the coefficient was significantly different from zero at one per cent. Since the number of ATMs enters the persistence of profits estimating equation in log form and normalized return on assets is in percentage form, the coefficient of the number of ATMs can be interpreted as elasticity. Thus, other things being equal, a one per cent increase in the level of technology in the banking sector in Kenya reduces bank profitability by 0.852 percent points in the short run. Accordingly, in the short run, growth in technology slows persistence of profits and increases competition holding other factors constant.

The finding that increase in level of technology increases competition and thereby reduces persistence of profits was consistent with theory and expectations. According to the neo-classical theory of markets, a perfectly competitive market sells a homogeneous product and, therefore, consumers will purchase the product from sellers who quote the least price (Varian, 2005). In Kenya, technology makes the products offered by commercial banks to be similar and easily imitable (CBK, 2013). Thus commercial banks in Kenya compete in terms of prices to attract customers. This leads to price reductions and subsequent reduction in profits and increased rivalry (competition) among them. Equity Bank, for example, is credited for the onset of mobile banking due to their innovative partnership with Safaricom in May 2010 (CBK, 2010). However, the product was quickly replicated by Family Bank in June 2010 as '*Pesa Pap*' and in 2014 copied by Kenya Commercial Bank and Commercial Bank of Africa through their partnerships with Safaricom (CBK, 2014).

Table 4.7 shows that the coefficient of log of the number of ATMs in the static model, long run model, was -0.663 with a corresponding p-value greater than 0.05. Thus the coefficient was not statistically different from zero at five per cent level of significance. Therefore, in the long run, changes in technology do not influence the level of profitability. This means that growth in technology neither slows persistence of profits nor increases competition in the long run. This finding is consistent with theory and a priori expectations. According to neo-classical theory of production, in the short run some factors of production are usually fixed (Varian, 2005). However, in the long run firms are able to vary the level of employment of all factors of production (Varian, 2005). In the short run, not all commercial banks are able to adopt new technologies. However, in the long run all commercial banks are able to catch up with the frontiers of commercial banking in the industry making such technologies a common way of service provision. The banking sector in Kenya saw first movers adopt ATMs in early 2000 (CBK, 2000). However, by 2014, the use of ATMs was a conventional service delivery channel for all the commercial Banks in Kenya (CBK, 2014). Due to conventional nature of technology in the long run, it cannot help an institution gain new customers or rival its competitors. Therefore, changes in technology have effect on bank profitability and competition in the short run rather than in the long run.

To examine the effect of consolidation on profitability in the banking sector in Kenya the coefficient of Herfindahl-Hirschman Index was interpreted. Table 4.7 shows that the coefficient of Bank concentration was -76.57 with a corresponding p-value less than 0.01 in the short run model. Thus the coefficient was significantly different from zero at one per cent level of significance. The coefficient was negative indicating that an

increase in concentration in the short run reduces bank profitability. Therefore, in the short run, market led movement from a huge number of very small banks to a single large bank slows persistence of bank profits and therefore, increases bank competition holding other factors constant.

Table 4.7 further shows that in the long run the coefficient of the Herfindahl-Hirschman index is 31.46 with a corresponding p-value less than 0.05. Thus the coefficient was significantly different from zero at five per cent level of significance. Thus an increase in concentration in the long run increases bank profitability and slows bank competition. Therefore, in the long run, prolonged consolidation would enhance persistence of bank profitability and slow bank competition holding other factors constant.

The finding that consolidation reduces persistence of profitability in the short run but not in the long run is consistent with theory and expectations. According to the neoclassical theory of markets, a move from very many small firms to few large firms increases competition and slows persistence of profitability but a movement from many small firms to one large firm increases persistence of profitability and slows competition (Varian, 2005).

The fact that consolidation reduces persistence of profitability and increases competition in the short run but does otherwise in the long run implies that consolidation has an inverted U effect. The finding points to an optimal level of consolidation beyond which profits persist and competition is reduced. This is consistent with the findings by Chronopoulos *et al.* (2013) who found that increased industry concentration leads to reduced profitability in the US banking sector.

To establish the effect of regulation on bank profitability and, therefore, on bank competition the study assumed that regulation acts through persistence of previous periods profits as a moderator. To test the moderating effect, the body of regulations was introduced as a moderator as shown in Table 4.8.

Table 4.8 Effect of Body of Regulations on Bank profitability in Kenya

| VARIABLES | Fixed effect | GMM | Naive OLS |
|--|--------------------------|-------------------------|---------------------------|
| 1 st lag of Normalized return on assets | 1.903*** (0.0502) | 2.079*** (0.0827) | 2.115*** (0.0480) |
| 2nd lag of Normalized return on assets | -1.318*** (0.0805) | -1.532*** (0.138) | -1.599*** (0.0787) |
| 3 rd lag of Normalized return on assets | 0.313*** (0.0371) | 0.401*** (0.0642) | 0.429*** (0.0356) |
| Body of regulations | 0.0298* (0.0159) | 0.00780 (0.0266) | 0.0224 (0.0168) |
| Interaction with the 1 st lag | 0.311*** (0.0712) | 0.356*** (0.0984) | 0.327*** (0.0678) |
| Interaction with the 2 nd lag | -0.478*** (0.126) | -0.600*** (0.174) | -0.508*** (0.118) |
| Interaction with the 3 rd lag | 0.165*** (0.0620) | 0.277*** (0.0904) | 0.215*** (0.0565) |
| Economic Growth | 0.254*** (0.0711) | 0.354*** (0.0542) | 0.373*** (0.0758) |
| Herfindahl-Hirschman Index | -72.55*** (7.603) | -80.05*** (11.14) | -84.45*** (8.204) |
| Growth In Technology | -0.803*** (0.118) | -0.937*** (0.132) | -1.000*** (0.128) |
| Inflation | 0.0782*** (0.00899) | 0.0892*** (0.0110) | 0.0935*** (0.00963) |
| Bank Size | -0.0329 (0.0513) | 0.0826 (0.0622) | 0.0257 (0.0363) |
| Bank size Squared | 0.00220 (0.00239) | -0.00342 (0.00289) | -0.000815 (0.00179) |
| Bank risk exposures | 0.00111 (0.000793) | 0.00217 (0.00146) | 0.000523 (0.000432) |
| Diversification | 0.000224 (0.000842) | -0.000192 (0.000849) | 2.79e-06 (0.000367) |
| Bank Capital | 0.000524 (0.00115) | -0.000362 (0.000778) | -0.000332 (0.000491) |
| Liquidity | -0.000770* (0.000409) | -0.00145* (0.000744) | -0.000540** (0.000209) |
| i.Foreign or Domestic Bank | | -0.0430 (0.0295) | -0.00172 (0.00570) |
| i.Private or Public Bank | | 0.0951 (0.0590) | 0.0211** (0.00858) |
| Constant | 8.909*** (1.041) | 9.227*** (1.468) | 10.15*** (1.102) |
| Observations | 396 | 396 | 396 |

Key Standard errors in parentheses
*** p<0.01, ** p<0.05,

Source of Data:CBK Bank Supervision Annual Reports (various issues)

Table 4.8 shows the estimates of the $AR(3)$ version of the moderating model. The measure of the body of regulation indicates the amendment of the Banking Act (Cap 488) that increased the core capital requirement for commercial banks from KES250 million in 2008 to KES1 billion in 2012. The signage of the coefficients of interaction terms between body of regulations and the lags of normalized return on assets indicate the effect of amendment of the Banking Act (Cap 488) that increased the core capital requirement for commercial banks.

Table 4.8 shows that the coefficients of the interactions of body of regulations and the 1st, 2nd and 3rd lags of normalized return on assets are 0.356, -0.600 and 0.277, respectively with corresponding p-values less than 0.01. Therefore, the coefficients are significantly different from zero at one per cent level of significance. The signage of the coefficients of interactions reinforces that of the first, second and third lag of profitability. Their sum is 0.033. The signage of the sum was positive reinforcing the level of profit persistence (0.961). Therefore, the progressive increase in core capital requirement from KES250 million in 2008 to KES1 billion enhanced persistence of bank profitability and therefore, reduced bank competition in Kenya. This finding is consistent with theory and empirical findings (Chronopoulos *et al.*, 2013).

The progressive increase in core capital requirement can be seen as an erection of barrier to entry. According to the neoclassical theory of markets, a market structure without free entry and exit experiences persistence of profits and less competition (Varian, 2005). In addition, the increase in the core capital requirements may have triggered forceful consolidations that were predatory rather than non-exploitative. This is so since the

coefficient of consolidation in the estimating equations is negative in the short run. This implies that market led consolidations are more beneficial than regulatory induced ones. Regulatory induced consolidation does not always occasion mergers and acquisition between small banks only. Large banks prey on small banks due to compliance deadlines leading to undesired outcomes. After the progressive increase in core capital requirement from KES250 million in 2008 to KES1 billion, for example, Savings and Loans limited, a small bank, merged with a large bank, Kenya Commercial Bank. This was an outcome that was not anticipated. Due to erection of barriers to entry and exit as well as predatory mergers and acquisitions, the progressive increase in core capital requirement increased persistence of profitability and slowed competition in the banking industry in Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusions, policy implications and areas for further research.

5.2 Summary

Exceptional bank profitability can be seen as a negative feature for financial intermediation if high profitability implies high interest rates on loans. In Kenya, the banking sector is characterized by exceptional interest driven bank profitability. This is a negative feature for financial intermediation. Competition among commercial banks should remedy this situation by driving bank profitability to the competitive norm. This study investigated how competition is correcting this inefficiency by investigating competition and profitability of commercial banks in Kenya over the period 2001 to 2014.

The specific objectives were to: ascertain the level of competition among commercial banks in Kenya; determine the speed of adjustment of commercial banks profitability to the competitive norm in Kenya; and investigate the effect of changes in the competitive landscape on commercial banks profitability in Kenya. The study used the performance dynamics approach to measure the level of competition and persistence of bank

profitability in the banking sector. The GMM was used to estimate the resulting dynamic panel models. The investigation led to a number of key findings.

With respect to the level of competition among commercial banks in Kenya the study found that the level of competition among commercial banks in Kenya was low and characterized by 96.1 per cent persistence in profitability. This finding was in consonance with the performance dynamic approach of measuring competition that posits an inverse relationship between persistence of profitability and competition.

With regard to the speed of adjustment of commercial banks profitability to the competitive norm in Kenya, the study found that the speed with which bank profitability closes the gap between the realized profitability and the competitive norm was 3.9 per cent per year with a half-life of 17.42 years. Therefore, short run rents (excess profitability) earned by commercial banks in Kenya converge slowly to the competitive norm. This may be explained by the low level of bank competition during the period.

The competitive landscape had three components: growth in technology, consolidation and regulation. With respect to technology, the study found that in the short run and other things being equal, a one per cent increase in the level of technology in the banking sector reduces bank profitability by 0.852 per cent. However, in the long run, the study found that the coefficient of growth in technology was statistically insignificant. This finding was consistent with theory and expectations.

With regard to consolidation the study found that the coefficient of consolidation was significant in the short run and in the long run. However, the signage of the coefficients was negative in the short run but positive in the long run. Therefore, consolidation had a negative effect on bank profitability in the short run and a positive effect in the long run. This finding is consistent with the neoclassical theory of markets that posits that firms in highly concentrated markets are more profitable than those in highly segmented markets.

In terms of changes in regulation, the study focused on the amendment of the Banking Act (Cap 488) that increased the core capital requirement for commercial banks in 2008. The study found that the coefficients of the interactions of body of regulations and the 1st, 2nd and 3rd lags of profitability were statistically significant. Further, the study established that the signage of the coefficients of interactions reinforced that of the 1st, 2nd and 3rd lags of profitability. This meant that interactions of body of regulations and the lags of profitability enhanced the influence of the lags of profitability on 'today's' profitability.

This study further compared the effect of voluntary consolidation and regulatory induced consolidation on commercial banks competition and profitability. In the short run voluntary consolidation had a negative effect on bank profitability and a positive effect on competition. However, regulatory induced consolidation had a positive effect on profitability and a negative effect on competition. This led to the finding that over the period of analysis, voluntary consolidation was more beneficial in enhancing competition and reducing profitability than regulatory induced consolidation.

5.3 Conclusions

The study findings led to five key conclusions. First, following the low level of bank competition in Kenya over the period 2001 to 2014, the study concludes that the banking industry in Kenya was imperfectly competitive with previous levels of profitability, immoderately (profoundly) explaining 'today's' bank profitability.

Second, due to the slow speed of convergence of excess bank profitability to the competitive norm, the study concludes that elimination of excess profitability in the banking sector is not instantaneous but severely slow and that excess profitability persists unduly.

Third, based on the finding that growth in technology reduces bank profitability in the short run and not in the long run, the study concludes that growth in technology slows persistence of profits and increases bank competition in short run. Moreover, the study concludes that in the long run growth in technology is impotent on persistence of profits and bank competition.

Fourth, premised on the finding of a negative effect on bank profitability in the short run and a positive effect in the long run, the study concludes that bank consolidation has an inverted Ueffect on persistence of bank profitability and bank competition. Consequently, a movement from very many small firms to a few large firms up to some point increases competition and slows persistence of profitability. Beyond this point, consolidation reduces competition and increases persistence of profitability.

Fifth, based on the finding that interactions of body of regulations and the lags of profitability enhances the influence of the lags of profitability on 'todays' profitability, the study concludes that contrary to expectation, the progressive increase in the core capital requirement for commercial banks increased persistence of bank profitability and slowed bank competition.

Finally, based on the finding that voluntary consolidation is more beneficial than regulatory induced consolidation, the study concludes that in the short run, voluntary consolidation is more effective in enhancing competition than regulatory induced consolidation. Regulatory induced consolidation does not always occasion mergers and acquisition between small banks. Due to the burden of compliance, large banks prey on small banks leading to undesired outcomes.

5.4 Policy Implications

The conclusions by the study have substantial implications:

First, the study found that the level of competition among commercial banks in Kenya was low and characterized by 96.1 per cent persistence in profitability. This implies that the market forces (competition) correcting the persistence of interest driven exceptional bank profitability in the banking sector are ineffective. When this market imperfection is viewed in light of the Lerner Index that posits that low competition is a sign of an imperfectly competitive industry that is able to mark up the price above the marginal costs, the low level of commercial banks competition in Kenya implies that the commercial banking industry is not perfectly competitive and is able to markup

(increase) lending rates above the base rates such as the central bank rate (CBR) and the Kenya bank reference rate (KBRR). In light of performance dynamics approach that posits that a perfectly competitive market, firm or industry cannot retain their previous period profits like in a monopoly, the low level of competition among commercial banks in Kenya implies that the banking industry in Kenya is imperfect and has monopolistic tendencies of retaining high proportions of previous periods' profitability.

The ineffectiveness of competition among commercial banks to rectify the inefficiency of interest driven exceptional bank profitability in Kenya is a justification for intervention. The intervention should be two pronged. First, the intervention should target commercial banks' ability to markup lending rates up and above the base rates. Second, the intervention should address the monopolistic tendency of commercial banks to retain a huge proportion of previous periods profits.

This can be done by the government or the commercial banks themselves. In the short term the government can easily achieve this through a price (lending and deposit) rate policy. The government can set a price ceiling on the lending rates and a price floor on the deposit rates based on any of the base rates. This would curtail commercial banks' ability to widen their profit margins by offering low deposit rates and charging high lending rates. In addition, a lending and deposit rate policy would effectively transform commercial banks' profitability from an interest rate margin game to a loan volumes game. Reduced interest rate spreads would force commercial banks to lend to many borrowers to protect their profit positions. This would increase competition among commercial banks for borrowers which in turn would lead to a further reduction in

lending rates and therefore, reduced exceptional commercial bank profitability. It is noteworthy that in the course of this study the government implemented the price policy both on the lending and deposit rates. The government restructured loan and deposit pricing by commercial banks through the Banking Amendment Act of 2016. The Act introduces a ceiling for interest charged on loans and a floor on interest paid on deposits. The Act prices loans at an interest rate of four per cent above the prevailing Central Bank of Kenya (CBK) base rate and prices deposits in interest bearing accounts at a minimum interest of 70 per cent of the prevailing CBK base rate (Republic of Kenya, 2016).

In the Medium term, the government could further intervene by acting as a direct competitor to commercial banks. First, the government can compete with commercial banks in terms of lending. In Kenya, the government has been overseeing the administration of the youths and women through the Youth enterprise development fund (YEDF) and women enterprise development fund through selected commercial banks. To compete directly with the commercial banks, the government can directly and efficiently lend to youths and women instead of administering the funds through commercial banks. This would deny commercial banks a critical mass of their customers. This would leave commercial banks competing for the few borrowers not catered for by the government leading to rivalry for borrowers. Increased rivalry for the borrowers would in turn reduce profit positions for commercial banks. Secondly, the government can directly compete with the commercial banks in the deposit markets. The government can provide savers with better and more lucrative saving opportunities unlike the commercial banks. This would force commercial banks to follow suit and

raise their deposit rates to attract savers. For instance, the government through the Central bank should expedite implementation of *M-akiba*. *M-akiba* is a product by the Central Bank allowing savers to save directly with the Central bank by purchasing treasury bills and bonds using mobile money services. Such a product would enable savers save directly with the government creating competition in the deposit markets and thereby raising the deposit rates in the financial markets. Increased deposit rate would reduce the margins enjoyed by commercial banks and therefore, exceptional profitability.

As a long term measure, the finding that the level of competition among commercial banks in Kenya is low and characterized by 96.1 per cent persistence in profitability is an incentive for small sized commercial banks to voluntarily merge with other small sized commercial banks in order to exert substantial competition to the large and medium sized banks. Small banks (Tier 3 banks) in Kenya have been blamed for being the majority that is too small to matter to the big banks (Republic of Kenya, 2008). In other words, the decisions by small banks hardly cause change of behaviour among the large banks. If the small banks merged and formed a few large commercial banks, the actions of the large entities would trigger strategic interactions from large sized and medium sized banks leading to more rivalry and therefore, reduced exceptional profitability.

Second, the study found that the speed with which bank profitability closes the gap between the realized profitability and the competitive norm was 3.9 per cent per year with a half-life of 17.42 years. This implies that the market forces would take about 17

years to clear the exceptional profitability by half. This is prescriptive as well as diagnostic. It is diagnostic in the sense that it informs the government and the banks regulator, CBK, that the inefficiency in the banking sector would be a long term issue if left to the market forces. It is prescriptive in the sense that it enables the government and the Central Bank to estimate the magnitude and nature of intervention required. Therefore, the implementation of the short term to medium interventions by the government in the form of lending and deposit rate policy, rollout of alternative lending and savings channels such as YEDF, women enterprise development fund and *Makiba* should be 'drastic enough' to increase the speed of adjustment of commercial bank profitability to the competitive norm and reduce the wait to attainment of intermediation efficiency among commercial.

To commercial banks, the finding that the speed with which bank profitability closes the gap between the realized profitability and the competitive norm was 3.9 per cent per year with a half-life of 17.42 years implies that commercial banks earning exceptional profits below the competitive norm will not find help from market dynamics to return to sustainable profitability level in the short term. Based on this study finding the competitive norm for commercial banks in Kenya is zero. That is in the long run and with perfect competition, commercial banks should just break even. Therefore, if a bank is not breaking even it should know that market forces will not help it break even in the short run. Therefore, it is prudent for commercial banks to seek approval from the Central Bank to seek other forms of recovery such as exiting the market, acquisitions and mergers.

Third, the study found that growth in technology slows persistence of exceptional profits and increases bank competition in short run but not in the long run. Therefore, as tool to promote competition, growth in technology is effective in the short run rather than in the long run. In Kenya, large sized banks control over 80per cent of the ATMs and mobile banking in the country(CBK, 2014). Therefore, small sized banks control a paltry 20 per cent of the ATMs network and some are yet to adopt mobile banking. Therefore, as a short term measure to promote competition and reduce exceptional bank profitability, small sized commercial banks should swiftly adopt technology in form of ATMs and mobile banking to rival market share from their large peers. In addition, the government through the central bank should facilitate adoption of technology by the small banks. This would promote the rivalry that small sized banks exert to the large banks in the short run.

Fourth, the study found that bank consolidation has an inverted U effect on persistence of exceptional bank profitability and bank competition. This implies that consolidation is effective in promoting competition and slowing persistence of exceptional bank profitability up to some point. Further, the finding implies that consolidation is a short medium term instrument for promoting bank competition and reduction of exceptional bank profitability. The government, therefore, should not over use consolidation beyond the optimal level. This optimal level as established by the study lies between one large bank and many small banks. This implies few large banks are good for competition and reduction of exceptional bank profitability. To the government, therefore, consolidation is a short to medium term tool of rectifying market inefficiency by reducing the number of commercial banks from many small sized banks to few large banks. Equally, to

promote a banking sector that has no interest driven exceptional profitability commercial banks should not engage in anti-competition mergers that would create one large bank. This intervention is opposite of what theory suggests. Economic theory suggests that a market should have many players such that none can influence price. However, the finding that consolidation has an inverted U effect on persistence of exceptional bank profitability and bank competition, shows that bank competition is not dependent on bank numbers but also the size of the banks. The larger a bank the better the competition but up to some point. In practice, consolidation for competition and stability has been implemented in Nigeria. In 2005, the Central bank of Nigeria reduced the number of commercial banks through consolidation from 89 to 24.

Fifth, the study found that contrary to expectation, the progressive increase in the core capital requirement for commercial banks increased persistence of bank profitability and slowed bank competition. This implies that though an increase in core capital requirements is a trigger for consolidation it can lead to undesired outcomes. In other words, an increase in core capital requirements can lead to the exact opposite of the desired outcomes based on how a regulation is structured. Whenever core capital requirements are increased, it's easily assumed that the regulation would trigger consolidation among the small sized banks. However, this is not always the case. Therefore, the government and the Central Bank should desist from blind increases in the core capital requirement for commercial banks. The regulations should be structured to incentivize consolidation and acquisitions among target tiers but not all the tiers. Therefore, as an alternative to core capital increment the government could carry out the following consolidation policies.

First, and in the short run, the government can incentivize the small sized banks to consolidate with other small and medium sized banks through rewards. The government can grant special tax concessions for expenditure incurred by small sized banks if they merge or undergo an acquisition process with small and medium sized banks. This would trigger mergers and acquisitions among the small and medium sized banks unlike in the case of blind increases in the core capital requirements. The resulting large entities would be efficient due to economies of scale and scope. This would enable the resulting large entities pose substantial competition to large and other medium sized commercial banks and therefore, reduce exceptional bank profitability.

Second, and in the short run, the government can offer to cover the consolidation expenditures for small banks that merge with medium and small sized banks. The government can achieve this by setting up a technical committee including international and national consultants to provide free consultancy to small and medium sized commercial banks interested in merging or involved in acquisitions. This would encourage small sized and medium sized banks interested in consolidation but derailed by consolidation costs to consolidate. The resulting large entities decisions would trigger strategic reactions from the large banks and therefore, increase rivalry and reduce exceptional profitability.

Third, and as a medium term measure, the government can spur consolidation among small sized and medium sized banks through a minimum market share policy. In Kenya the market share of commercial banks is measured using the composite market share index. A bank with a CMSI of over five per cent is considered large, that with a CMSI

between one per cent and five per cent is medium and those with a CMSI of less than one per cent are regarded as being small. The government can set a minimum CMSI index greater than one to trigger consolidation among small sized and medium sized banks. A legal requirement of CMSI greater than one would create a mutual interest among small sized and some medium sized commercial banks to merge. The market share policy would not trigger consolidation motives among large sized banks since they already satisfy the requirement. The resulting large commercial banks would be large enough to matter in all forms of competition and therefore, reduction of exceptional profitability.

Finally, and as an intervention to promote long run sustainable industry behaviour, the government can promote consolidation among small sized banks without using capital requirements by conducting government business through commercial banks that are large enough to matter. The government should only allow ‘these large banks’ to hold public sector deposits and participate in government auctions. This would incentivize small sized and medium sized banks to consolidate and acquire the required size to conduct business with the government. Since this rule would be implemented even far into the future, only commercial banks that are large enough to matter will exist far into the future. Therefore, only commercial banks that are large enough to pose competition to their peers and therefore, reduce exceptional profitability will be existing.

5.5 Contribution to Knowledge

The study contributes to the body of knowledge on three accounts. First, unlike previous studies, this study pin points estimates of the level of competition among

commercial banks in Kenya and the speed of adjustment of commercial bank profitability to the competitive norm. The precise estimates of the level of competition and the speed of adjustment are important to the government and the central bank since they provide the basis for intervention. Further, the pin pointed estimates of the level of competition and the speed provide the government with a bench mark against which the success of future interventions may be judged.

Second, this study corrects the notion that regulatory induced consolidations are always good. Thus, always occasion mergers and acquisition between small banks. The study establishes that regulatory induced consolidation may occur between large and small banks due to predation and opportunism created by the burden of compliance leading to undesired outcomes. This will be important to the government and the central bank in creating an intervention that minimizes predation of small commercial banks by large commercial banks.

Third, the study's finding that consolidation among commercial banks is good in promoting competition and slowing persistence of profitability up to some point since it has an inverted U effect on persistence of bank profitability and bank competition is a contribution to knowledge. This contribution will be important since it makes the government and the central bank aware that any interventions to consolidate commercial banks should trigger consolidation up to but not beyond the optimal level.

5.6 Areas for further Research

This study measured competition using the performance dynamic approach and investigated how competition varies with changes in the competitive environment. The findings elicited two areas of further analysis.

First, future research may be geared towards establishing the optimal level of consolidation in the banking sector since consolidation has an inverted U effect on persistence of bank profitability and bank competition. The level would serve as a target both to the commercial banks and the Central Bank.

Second, future research may test the robustness of this study's finding on the effect of technology on bank competition and persistence of profitability using data on developments such as mobile banking and *MPESA* partnerships. In measuring the effect of growth in technology on competition and bank profitability the study used the growth in the number of ATMs for its convenience of cutting across the study period from 2001 to 2014. Therefore, with availability of data on new technologies similar studies will be possible but with different measures of technology.

REFERENCES

- Arioglu, E., and Tuan, K. (2014). Speed of Adjustment: Evidence from Borsa Istanbul. *Borsa Istanbul Review*, 14(2), 126–131. <http://doi.org/10.1016/j.bir.2014.02.002> [viewed on 21/04/2015]
- Baltagi, B. H. (2005). *Econometric Analysis of Panel Data* (3rd ed). Chichester ; Hoboken, NJ: J. Wiley & Sons.
- Beck, T. (2004). *Structural Issues in The Kenyan Financial System: Improving Competition and Access* (Vol. 3363). World Bank Publications, http://books.google.com/books?hl=en&lr=&id=ewJkxDPJ4-YC&oi=fnd&pg=PA16&dq=%22A+complete+list+of+the+Kenyan+banks,+the+ir+market+share+and+ownership+structure%22+%22for+long-term+economic+growth+and+poverty+alleviation.+Countries+with+better%22+%22control+for+other+factors+that+can+explain+cross-country+variation+in+the+growth%22+&ots=Z4XBavWZvZ&sig=kRIYAUYg_w_u7qfi-VQ3hr09m1kM [viewed on 11/02/2015]
- Berger, A. N., Klapper, L. F., and Turk Ariss, R. (2008). Bank Competition and Financial Stability. *World Bank Policy Research Working Paper*, (4696), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1243102 [viewed on 20/10/2014]
- Bikker, J. A., and Haaf, K. (2002). Measures of Competition and Concentration In The Banking Industry: a Review of the Literature. *Economic & Financial Modelling*,

9(2), 53–98.

Blackburne, E. F., & Frank, M. W. (2007). Estimation of Nonstationary Heterogeneous Panels. *Stata Journal*, 7(2), 197-218.

Blundell, R., & Bond, S. (1998). Initial Conditions and Moment Restrictions In Dynamic Panel Data Models. *Journal of Econometrics*, 87(1), 115–143.

Boyd, J. H., & Champ, B. (2006). Inflation, Banking, and Economic Growth. *Federal Reserve Bank of Cleveland*, 1–4.

Cable, J. R., and Gschwandtner, A. (2008). On Modelling the Persistence of Profits in the Long Run: A Test of the Standard Model for 156 US Companies, 1950–99. *International Journal of the Economics of Business*, 15(2), 245–263.
<http://doi.org/10.1080/13571510802134411> [viewed on 01/07/2014]

Cable, J. R., and Jackson, R. H. G. (2008). The Persistence of Profits in the Long Run: A New Approach. *International Journal of the Economics of Business*, 15(2), 229–244. <http://doi.org/10.1080/13571510802134403>[viewed on 21/10/2014]

Cantwell, J. A. (2000). *Innovation, profits and growth: Schumpeter and Penrose*. University of Reading, Department of Economics.
<http://www.reading.ac.uk/web/FILES/management/427.pdf> [viewed on 21/10/2014}

Central Bank of Kenya (2000). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2001). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2002). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2003). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2004). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2005). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2006). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2007). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2008). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2009). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2010). *Annual Bank Supervision Report*. Nairobi: Central Bank

of Kenya.

Central Bank of Kenya (2011). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2012). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2013). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Central Bank of Kenya (2014). *Annual Bank Supervision Report*. Nairobi: Central Bank of Kenya.

Chronopoulos, D. K., Liu, H., McMillan, F. J., & Wilson, J. O. S. (2013). The Dynamics of US Bank Profitability. *The European Journal of Finance*, 21(5) 1–18. <http://doi.org/10.1080/1351847X.2013.838184> [viewed on 01/07/2014]

Crespo Cuaresma, J., and Gschwandtner, A. (2006). The Competitive Environment Hypothesis Revisited: Non-Linearity, Nonstationarity and Profit Persistence. *Applied Economics*, 38(4), 465–472. <http://doi.org/10.1080/00036840500390312> [viewed on 01/07/2014]

Eklund, J. E., and Desai, S. (2012). Entry Regulation and Persistence of Profits in Incumbent Firms, http://entreprenorskapsforum.se/wp-content/uploads/2013/06/WP_25.pdf [viewed on 01/07/2014]

Flamini, V., Schumacher, L., and McDonald, C. A. (2009). *The Determinants of Commercial Bank Profitability in Sub-Saharan Africa*. International Monetary Fund,
<http://books.google.com/books?hl=en&lr=&id=FAkcFrPE984C&oi=fnd&pg=PA3&dq=%22can+prevent+arbitrage,+and,+consequently+keep+returns+high.+While+in+most%22+%22bank+entry+barriers+if+they+exist,+as+well+as+other+obstacles+to+competition,%22+%22concept,+and,+as+such,+it+is+difficult+to+find+comprehensive+risk%22+&ots=S7wq8r8Q7a&sig=EJNk3Ruc3ze7YCnZEBxu4FZSfIE> [viewed on 01/07/2014]

Goddard, J., Liu, H., Molyneux, P., & Wilson, J. O. (2011). The Persistence of Bank Profit. *Journal of Banking & Finance*, 35(11), 2881–2890.

Gschwandtner, A. (2005). Profit Persistence in the “very” Long Run: Evidence from Survivors and Exiters. *Applied Economics*, 37(7), 793–806.

Gschwandtner, A. (2012). Evolution of Profit Persistence in The USA: Evidence from Three Periods. *The Manchester School*, 80(2), 172–209.

Gudmundsson, R., Ngoka-Kisinguh, K., and Odongo, M. T. (2013). The Role of Capital Requirements on Bank Competition and Stability: The Case of the Kenyan Banking Industry,
http://www.kba.co.ke/workingpaperseries/img/pdf/Working_Paper_WPS_05_12%5B2%5D.pdf [viewed on 01/07/2014]

Gugler, K., Mueller, D. C., Yurtoglu, B. B., and Zulehner, C. (2003). The Effects of

Mergers: An International Comparison. *International Journal of Industrial Organization*, 21(5), 625–653. [http://doi.org/10.1016/S0167-7187\(02\)00107-8](http://doi.org/10.1016/S0167-7187(02)00107-8) [viewed on 01/07/2014]

Hadush, G. (2015). *Determinants of Profitability of Insurance Companies in Ethiopia: An empirical Study*. <http://etd.aau.edu.et/handle/123456789/7838> [viewed on 01/07/2014]

Inanga, I. L. (1997). Institutional, Traditional and Asset Pricing Characteristics of the Nigerian Stock Exchange, <http://mobile.opendocs.ids.ac.uk/opendocs/handle/123456789/2194> [viewed on 01/07/2014]

Kamau, A. (2009). *Efficiency in the Banking Sector: An Empirical Investigation of Commercial Banks in Kenya*. PhD Thesis, University of Nairobi.

Mitra-Kahn, B. H. (2005). General Equilibrium Theory, its History and its Relation (if any) to the Market Economy. *City University, London. The New School for Social Research, New York*.

Mueller, D. C. (1977). The Persistence of Profits above the Norm. *Economica*, 369–380.

Muchai, J. M., Mburu, T. and Obere, A. (2015) *Value Effects of Banking Institutions Mergers and Acquisitions In Kenya*, Lambert Academic Publishing, Saarbrucken.

- Pakes, A. (1987). *Mueller's Profits in the Long Run*. JSTOR. Retrieved from <http://www.jstor.org/stable/2555556> [viewed on 01/07/2014]
- Resende, M. (2006). Profit Persistence in Brazil: a Panel Data Study. *Estudos Econômicos (São Paulo)*, 36(1), 115–126.
- Republic of Kenya (2008). First Medium Term Plan (2008-2012). Nairobi: Government Printer.
- Republic of Kenya (2007). *The Kenya Vision 2030*. Nairobi: Government Printer.
- Republic of Kenya (2013). Second Medium Term Plan (2013-2017). Nairobi: Government Printer.
- Roodman, D. (2006). How to do xtabond2: An Introduction to Difference and System GMM in Stata. *Center for Global Development Working Paper*, (103). Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=982943
- Samargandi, N., Fidrmuc, J., and Ghosh, S. (2013). Is the Relationship between Financial Development and Economic Growth Monotonic for Middle-income Countries. *Economics and Finance Working Paper*, (13-21), http://www.brunel.ac.uk/data/assets/pdf_file/0005/317714/1321.pdf [viewed on 01/07/2014].
- Sanya, S., and Gaertner, M. (2012). *Assessing Bank Competition within the East African Community*. International Monetary Fund. [viewed on 01/07/2014]

Schiersch, A., and Schmidt-Ehmcke, J. (2010). Empiricism meets Theory: Is the Boone-Indicator applicable?

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1641034

[viewed on 01/07/2014]

Verbeek, M. (2004). *A Guide to Modern Econometrics* (2nd ed). Southern Gate, Chichester, West Sussex, England Hoboken, NJ: John Wiley & Sons.

Yurtoglu, B. B. (2004). Persistence of Firm-level Profitability in Turkey. *Applied Economics*, 36(6), 615–625. <http://doi.org/10.1080/0003684042000217652>

[viewed on 01/07/2014]

Appendix I

The AR(3) Framework

Model 3.10

When all the three lags are introduced in the model 3.10 the resulting equation is:

$$\pi_{it} = \beta + \lambda_1 \pi_{it-1} + \lambda_2 \pi_{it-2} + \lambda_3 \pi_{it-3} + u_{it} \quad (\text{A3.10})$$

The λ_i 's are coefficients of the lagged profits

Model 3.14

The Speed of adjustment in AR(3) framework is

$$1 - (\lambda_1 + \lambda_2 + \lambda_3) = 1 - \sum_{i=1}^3 \lambda_i \quad (\text{A3.14})$$

Model 3.13

The unconditional expectation of A3.10 were to give the LPPR (competitive norm) as shown in equation A3.13

$$LPPR = \frac{\beta}{1 - \sum_{i=1}^3 \lambda_i} \quad (\text{A3.13})$$

Model 3.17

AR(3) specification of model A3.17


$$\pi_{it} = \beta + \lambda_1 \pi_{it-1} + \lambda_2 \pi_{it-2} + \lambda_3 \pi_{it-3} + \beta'_1 IND_t + \beta'_2 X_{it} + \theta_i + u_{it} \quad (\text{A3.17})$$

Model 3.20

AR(3) specification of model A3.20

$$\pi_{it} = \beta + \sum_{j=1}^3 \lambda_j \pi_{it-j} + \beta_4 BR_t + \sum_{j=1}^3 \beta_j (BR_t \times \pi_{it-j}) + \beta'_5 IND_t + \beta'_6 X_{it} + \theta_i + u_{it} \quad (\text{A3.20})$$



 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.