CAPITAL REQUIREMENTS AND BANK LENDING BEHAVIOUR OF COMMERCIAL BANKS IN KENYA: TESTING THE CAPITAL BUFFER THEORY

CHEPKILOT KEMBOI SAMMY
X50/88054/2016

A RESEARCH PROJECT SUBMITTED TO THE UNIVERSITY OF NAIROBI, SCHOOL OF ECONOMICS IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN ECONOMICS.

NOVEMBER 2019

DECLARATION

I declare that this is my personal work having not been presented to any other university for any degree award.

Signature …….. Date …….

Chepkilot Kemboi Sammy

X50/88054/2016

This project has been submitted for the purpose of examination with the university supervisor's approval.

Signature …… Date ……

Dr. Kennedy Osoro

School of Economics

University of Nairobi

DEDICATION

This project is hereby approval as to my dear wife Constance Jebet and my lovely daughter Jillian Kemboi for their encouragement, moral support and love that motivated me in the course of this study. I also dedicate this work to my mother Mary Cheptoo and my late father Thomas Cheptoo for the strong academic foundation they laid upon which I have walked this journey.

ACKNOWLEDGMENT

First, special appreciation to my supervisor Dr. Kennedy Osoro, School of Economics at the University of Nairobi, for his invaluable guidance, comments and even patience during this research project's development. Apart from his commitment, patience and professional leadership, this study journey would not have been a success.

Undoubtedly, I would not be where I am devoid of the unrelenting love and encouragement from my family at large. Appreciation goes to my loving daughter and dear wife who forfeited a lot of stuff owing to my tight schedule. Much appreciation as well goes to my mother and siblings, Josphat, Nicholas and Jeremiah.

Basically, all credit belongs to the Almighty God, the creator of the universe, who has blessed me with the vigour and courage for the completion this research project.

ABSTRACT

This study sought to examine how capital requirements affect bank lending behaviour among commercial banks in Kenya. The research tested whether heterogeneity across ownership structure exists between capital requirements and bank lending behaviour among Kenyan commercial banks. Bank-level annual data for the years between 2012 to 2018 was used. Using the panel regression model, the study finds that capital buffer which is a measure of capital requirements has a negative and significant effect on bank lending behaviour of commercial banks in Kenya. This is an indication that when banks' capital is closer to the minimum regulatory capital, they tend to reduce the loans advanced to the customers. Further, it was found that bank risk and ROE have an insignificant and positive impact on bank lending behaviour while monetary policy rates, inflation rate, real GDP, commercial bank leading rates and capping of interest rate were evidenced to have a significant effect on bank's behaviour of lending. Analysis of Variance (ANOVA) results shows that the relationship between capital requirements and bank lending behaviour for the private and foreign owned banks were statistically significant whereas for government owned banks was statistically insignificant and the results confirms the existence of heterogeneity across ownership structure as well as the applicability of capital buffer theory in Kenyan context. Therefore, the study recommends that though minimum capital requirements has a negative effect on loan lending rates, CBK should continue with the regulations in order to protect the depositors money. But to encourage loan lending, the regulator should lift interest rate cap so that banks can advance more loans to the customers especially to the small and medium enterprises.

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ACRONYMS AND ABBREVIATIONS

BAA: Banking Amendment Act

BIS: Bank for International Settlements

IS: International Settlements

CBK: Central Bank of Kenya

DEA: Data Envelopment Analysis

GDP: Gross Domestic Product

GFC: Global Financial Crisis

IPS: Im-Persaran-Shin

KNBS: Kenya National Bureau of Statistics

LM: Lagrange Multiplier

NBFIs: Non-Bank Financial Institutions

NPLs: Non-Performing Loans

RWA: Risk-Weighted Assets

SMEs: Small and Medium Enterprises

VIF: Variance Inflation Factors

CHAPTER ONE
INTRODUCTION

1.1 Background

The banking industry both in developed, emerging and frontier markets since the 2007/08 Post Global Financial crisis (GFC) is now the most regulated industry (Munywoki, 2017). Since then, the Bank for International Settlements (BIS) has put in place frameworks that seek to ensure financial institutions maintain a certain statutory minimum capital as conservation buffers under the Basel Accords. Over time, the Basel frameworks have mutated from Basel I and now in place are Basel III frameworks. With the coming into force of these regulations globally, bank regulators all over the world have sought to establish the most optimal capital requirements for banks under their jurisdiction, with the aim of achieving bank level and macroeconomic stability (Fonseca & González, 2010).

The related micro and macro-prudential regulations imposed on banks have quickly risen to the top of the agenda for central banks in managing the heterogeneity of risks that hit financial sectors. However, any impositions of capital regulations are always with effect on the behaviour of banks (Mwega, 2014). Nonetheless, financial regulation is imperative to ensure stability and hence avoiding a buildup of stress that may trigger a crisis whose impact may be detrimental as was evident in the 2007/08 GFC. This therefore calls for a delicate balance between fiscal regulation and economic growth especially in a country like Kenya where the economy is largely supported by the financial system (Mwega, 2014).

According to Spratt (2013), two ways exist through which regulation may affect stability and growth of the financial system. First, it influences the financial market's behavior on their day-to-day lending behavior especially to SMEs. Banks usually unable to extent loans unless they meet the minimum capital requirements. Through the indirect effects it influences the structural evolution of the financial and the diversity of the system and thus influencing the pattern of lending to the different sectors. It is envisaged that minimum capital requirements increment in the financial system may led to an increment in lending rates. In addition, it increases bank concentration and hence rendering the financial system to be oligopolistic in nature. Second, overregulation of banks comes with danger in that it retards the development of banks, hinders the effective use of the domestic savings that are available, hinder international capital access by countries and thus leading to slower growth.

This research was therefore anchored on the capital buffer hypothesis that asserts that excess capital of the least regulatory capital is maintained by banks as an insurance against exposure of assets to risk. As a result, the holdings are supposed to mitigate any possible future adversities. This theory therefore opines that as portfolio risk goes up, the bank capital should also rise commensurate to the risk levels. Based on the theory, modifications in Basel Frameworks have seen structural changes to the extent that there has been modification of Basel frameworks from Basel I II to Basel III. The focus is now been on minimum capital requirement.

1.1.1 Structure of Kenya's banking Industry

Kenyas' sector of banking is deeply integrated into the wide economic activities and a systemic crisis in the industry may bring down the economy. With 43 licensed commercial banks, Kenya's banking sector with a Kshs.4 trillion asset base is considered the largest banking system in the East African Region. Despite being the largest in the region it's been marked by turbulence arising from global and local factors. Despite the turbulent domestic and international environment, the banking industry has demonstrated some resilience with a 7.1 percent contribution to GDP in 2017 and its asset base remains elevated registering an 8.3 percent growth between 2016 and 2017 (CBK, 2017).

In terms of profitability, the sector has seen a dip in profitability of the sector which is largely associated to the Banking (Amendment) Act, 2016. As at December 2017, 43 commercial banks were in operation with the majority shareholding being private as shown in Table 1.1. The proportion of foreign ownership stood at 32.6%, local private ownership at 58.1% and public ownership (that is government ownership) stood at 9.3%. In addition, privately owned commercial banks command a high asset base of Kenya's banking industry to stand at 65.2%, followed by foreign banks and public commercial banks at 30.9% and 3.9% respectively.

Table 1.1: Structure of Kenya's banking Industry

Ownership	Aggregate	percentage	Net Assets (Total)	Percentage
Government Owned Banks (Domestic)	4	9.3	145,45.00	3.9
Domestic Private Commercial Banks	25	58.1	2,406,742.00	65.2
Foreign Banks	14	32.6	1,143,751.00	30.9
Total	**43**	**100**	**3,695,943.00**	**100**

Source: CBK (2016).

1.1.2 Evolution of Capital Requirements in Kenya's Banking Industry

Numerous developments have occurred over the last decade in Kenya's financial system. The financial system has experienced tremendous growth with the most significant transformations being non-bank financial institutions (NBFIs) transforming into banks. Similarly, the financial industry has seen a quantum leap in diversity of products being offered as well as the increment in the banking hours. Besides these developments, notably has been the rapid expansion into other African Countries by a few banks (CBK, 2016) driven by the need to tap into unexploited markets. Further, they have adopted borderless banking allowing banks in other jurisdictions to transact through subsidiary banks domiciled in their respective countries. This model has seen central banks in the different countries coordinate efforts to undertake supervision and, hence ensuring financial stability (Spratt, 2013).

Other policy developments in the banking sector include agency banking introduced in 2011 which has altered the way banks operate and their appetite towards risk. On the regulatory front, the banking industry has experienced numerous changes in their capital adequacy requirements which are statutory minimum standards stipulation and enforced by the Central Bank through its supervisory powers and are aimed at ensuring that the banking industry is stable, resilient and globally competitive (Mwega, 2014). In the wake of the 2008 Global Financial Crisis (GFC), multiple prudential guidelines among global financial institutions were put in place to protect depositors and creditors by ensuring enough capital was available to financial institutions commensurate to their risk exposure. As such capital requirements were borne under the different frameworks put forth by Bank for International Settlements (BIS) in the form of Basel I, II and III frameworks (Spratt, 2013).

In the Kenyan context, considering the global phenomenon, minimum capital requirements were therefore increased in 2008 but came into effect in 31 December 2012 which was meant to ensure that banks had a conservation buffer unlike in prior periods where banks were not

required to have buffers. In 2008, the Central Bank reviewed minimum capital requirements with a stringent requirement that banks have a core capital of KShs 1 billion by the closure of the year 2012. The revision came on the back of the Global Financial Crisis of 2007/08. To date, this is one of the most dramatic increases in capital requirements in the Kenyan Banking Sector. Specifically, the Kenyan Banking sector has had four increases in minimum capital requirements: There was the first which imposed a requirement of KShs 100 million by end of 2009, a second of KShs 150 million by end of 2010 and a third of KShs 200 million by December 2011 and the last in 2012 being 1 billion.

In 2013, the minimum capital quantitative relations for the core capital - total assets ratio stood at 8% while its ratio of total capital to total risk-weighted assets at 12%. A capital conservation of buffer of 2.5% should be held by banks thus bringing the ratio of core capital to total assets as well as that of total capital to total risk-weighted assets standing at 10.5% and 14.5% respectively (CBK, 2013). Table 1.2 shows the summary.

Table1.2: Kenyan Banks Capital Requirements

Capital Requirement	**Core Capital (Tier 1 to TWA)**	**Total Capital (Tier 2 to TWA)**
Minimum Ratio	8%	12%
Conservation Buffer	2.5%	2.5%
Minimum ratio plus Conservation Buffer	10.5%	14.5%

Source: CBK, 2015

The Finance Act (2015) required compliance with the minimum capital requirements for new and existing banks for them to be allowed to continue operating as commercial banks. Due to the pressure on minimum capital requirements, many commercial banks have undergone a lot of restructuring. For example merging or amalgamation of businesses became a necessity for several commercial banks in Kenya. The major aim of acquisition is the ability to meet the increased share capital levels. In June 2010 Southern Credit Banking Corporation amalgamated Equatorial Commercial Bank, bringing about a new brand of the Equatorial Commercial Bank which was enlarged. The aim of the union was to enable the banks to encounter with the commercial banks' CBK requirement to have at least KES 1 billion as core capital. Other bank merger examples during the capital increment period under review include; Stanbic Bank and CFC Bank Ltd to form CFC Stanbic Bank Ltd, Jamii Bora Kenya Ltd and City Finance Bank

Ltd to form Jamii Bora Bank. Examples of Banks acquisitions include Ecobank Kenya Ltd acquisition of East African Building Society (EABS) Bank Ltd (Mwai, 2018).

1.1.3 Minimum Capital Requirement and Bank Lending Behaviour

The evolution of the capital requirements along three dimensions is as shown in Table 1.3. Evidently, the ratios have been on a general decline but still commensurate to the risk exposure of banks which has also been on a steep decline (CBK, 2017). The implication of this development has a significant bearing on the lending behaviour of commercial banks. Table 1.3 also shows that whereas the capital requirement ratios have been steadily on a decline, the asset quality of the industry has been rising and hence likely putting a strain on the capital reserves held at the Central Bank. According to the central bank report of 2017, 4 institutions (K-Rep bank, Habib, Oriental and Equatorial commercial banks) had missed to achieve the minimum statutory capital requirement ratios, an indication that the amount of capital held was not adequately commensurate to the risk exposure of their assets.

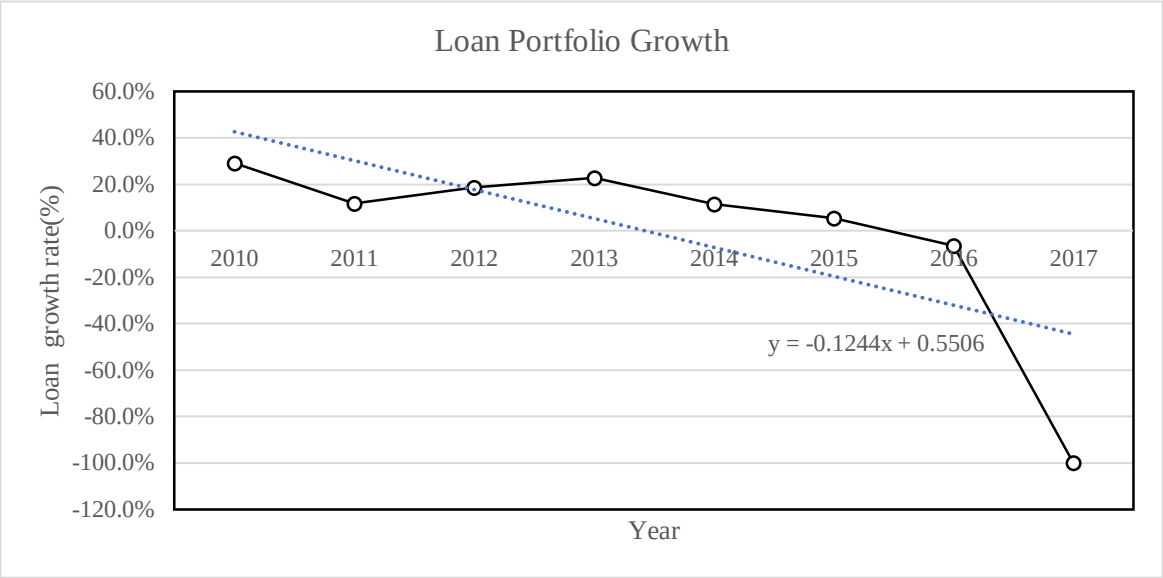
Table 1.3: Capital Requirements in Kenya's Banking Industry

Year	Total loans 'Kshs. Million'	Total Non-Performing Loans 'Kshs. Million'	Asset Quality	Core Capital/TRWA (Capital)	Total Capital/TWRA	Core capital/Total Deposits
2010	914910	47730	5.2%	20%	23%	17%
2011	1180956	42928	3.6%	18%	21%	19%
2012	1318570	50122	3.8%	16%	20%	19%
2013	1564635	67724	4.3%	16%	19%	19%
2014	1922857	90377	4.7%	16%	20%	19%
2015	2142150	124152	5.8%	16%	19%	18%
2016	2257489	178674	7.9%	16%	19%	19%
2017	2114804	220891	10.4%	11%	15%	8%

Source: Various issues of Central Bank of Kenya Annual Banking Sector Reports

The lending activity of the commercial banks measured using the loan portfolio growth rate is presented in Figure 1.1.

Figure 1.1: Lending Activity of the Banks Measured using Loan Growth rate



Source: Various issues of Central Bank of Kenya Annual Banking Sector Reports

Figure 1.1 shows that there has been a general decline in the trend of loan portfolio growth for the period between the year 2010 and 2017. It is evident that for the years 2016 and 2017, the loan portfolio growth recorded a negative growth of -6.3% and -100% respectively. This study, therefore, sought to establish if the capital minimum requirement is one of the factors that have contributed in the decline in the lending activity of the banks.

1.2 Statement of the Problem

Despite the adoption of stringent capital requirements triggered by the global financial meltdown, ratios of capital adequacy, a measure of capital buffers in an institution have been on a steady decline with loan portfolio growth continuing to deteriorate (Sporta, 2018). There has been a general decline in the trend of loan portfolio growth for the period between the year 2010 and 2017. It is evident that for the years 2016 and 2017, the loan portfolio growth recorded a growth of -6.3% and -100% respectively (CBK, 2017).

Due to the pressure on minimum capital requirements, many commercial banks have undergone a lot of restructuring. For example Fina Bank was acquired by Guaranty Trust bank, Fidelity commercial bank was acquired by SBM bank Kenya and EABS Bank Ltd acquired by Ecobank Kenya Ltd. Imperial bank and Chase bank have undergone receivership. While others like Charter House bank were put under statutory management. Dubai bank was liquidated in the year 2015. In 2019, commercial bank of Africa (CBA) is on course to merge with National Industrial Credit Bank (NIC Group) after majority of its shareholders approved the share capital

swap deal that was approved in January 2019. This study therefore considered the interaction between capital requirements and bank lending behaviour in Kenya and whether the effects vary across the different ownership structures.

1.3 Research Questions

i). What is the effect of capital requirements on the bank's lending behaviour among commercial banks in Kenya?

ii). Does heterogeneity exist across ownership structure in the relationship between capital requirements and bank lending behaviour among commercial banks in Kenya?

iii). What are some of the policy recommendations based on the finding?

1.4 Objective of the Study

This research sought to examine the impact of capital requirements on bank lending behaviour in Kenya by testing the capital buffer theory.

1.4.1 Specific Objectives

Specifically, the study sought to;

i). Investigate the effect of capital requirements on a bank's lending behaviour among commercial banks in Kenya.

ii). Investigate whether heterogeneity across ownership structure exists on the relationship between capital requirements and bank lending behaviour among commercial banks in Kenya.

iii). Draw policy implications based on the study findings.

1.5 Significance of the Study

The Kenyan banking industry is of interest for at least four reasons. First, it is the most advanced in East Africa and the source of cross-border banking within East and Central Africa (Mwega, 2014). After the 1990s economic reforms, bank controls have been eliminated thus allowing the market forces to influence the resource allocation in the industry. Second, although literature has mainly focused on advanced economies, the banking systems in Kenya are much more bank-oriented and deeply entrenched within the economy so that developments within this industry have severe macroeconomic effects relative to advanced economies. Third, well-defined rules for conservation buffers are followed not for its own sake but to achieve financial system stability. Fourth, focusing on a country case studies provides the advantage of being able to derive policy implications that are context-specific unlike in cross-country

analysis where a one size fits all approach is usually adopted while significant jurisdictional heterogeneity exists across countries.

This research will be of great importance at two fronts; policy implications and the conduct of future research. From a policy perspective, an understanding of the relationship between capital requirements and bank's lending behaviour is important especially in the wake of substantial structural changes in the policy frameworks Post-Global Financial Crisis. For instance, the adoption of Basel II which advocated for a range of capital measures to be adopted to cushion financial institutions from certain risks and therefore understanding the nexus between capital requirements and bank behaviour is therefore imperative as it will ensure that better and appropriate policies are put in place that would ensure bank's behaviour is optimal.

From an instructional perspective, the study can contribute to the literature in many necessary ways. This study is going to be one in every of its kind within the Kenyan context to look at the interaction between capital regulation and bank's disposition behaviour by testing whether or not the capital buffer theory holds. Secondly, in contrast to the existing studies on the Kenyan context that looks at financial distress and performance of operational issues, the focus was on bank lending behaviour and therefore adding to the paucity of empirical evidence in frontier markets. Similarly, the econometric strategy to be adopted is robust in the sense that it allows the data speak of itself and thus the choice of model is not determined apriori unlike in previous studies that pool the data. This appropriate will therefore allow for the utilisation of bank-specific characteristics as well as the bank-invariant characteristics capture at the macro level thus enriching the reliability of the estimates obtained.

1.6 Organization of the Study

This chapter contained the background. The theoretic and literature reviews are both presented in Chapter two and concludes with the literature overview. Research methodology adopted is contained in chapter three. In particular, the theoretical and empirical models are both presented in this chapter, measurement of variables, sources of data and conclude with the battery of diagnostic tests to be undertaken. Chapter four presented empirical findings and discussions whereas chapter five presented summary of the findings, conclusions and recommendations.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This part is comprised of four sub-sections with section 2.2 presenting the two theories upon which the study is based on. In section 2.3, a review of empirical literature both in developed and emerging markets is presented with a section of it only focusing on empirical evidence from Kenya. Lastly, a synopsis of the research gap and literature is provided in section 2.4.

2.2 Theoretical Literature

This segment presents the capital buffer hypothesis, moral hazard theory, economic theory of regulation upon which the study is based on.

2.2.1 Capital Buffer Theory

According to this theory by Marcus (1984), banks ensure insurance against exposure of assets to risk by upholding wealth in surplus of the least governing wealth. As a result, the holdings are superposed to mitigate any possible future adversities. In view of the capital buffer theory, banks whose capital buffers is low will therefore aim at building up adequate buffers by raising capital to the extent that it can absorb shocks in case they arise and therefore reducing the likelihood of their collapse (Jokipii & Milne, 2011). This theory therefore opines that as portfolio risk goes up, the bank capital should also rise commensurate to the risk levels.

2.2.2 Theory of Moral Hazard

This theory by Mirrlees (1999) opines that consequent to the behaviour of central bank's, governments and supervisory agencies, economic agents get the impression that their wealth is protected and in the face of failure they stand shielded. According to the theory, capital necessities impose on tiers the requirement to have enough capital to be able to react to any risk that emanates to avoid the moral hazard phenomenon from arising. Thus, banks that are well capitalized have less incentive for moral hazards and are more prone to adopt strategies that reduces costs. Similarly, regulatory authorities in trying to curb the moral hazard problem will force financial institutions to hold capital commensurate to their exposure to risk and thus in case of the risk materialising it reduces costs to financial institution of having to raised equity at short notice.

2.2.3 The Economic Theory of Regulation

It was postulated by Arrow (1985). The theory argues that the mechanism of cabbing the shortcomings of unbalanced market, imperfect competition, and undesirable market results is government regulation (Arrow, 1985). The governments through the central bank regulate banks as per the public interest view to facilitate the effective banks' functioning through the eradication of failures in the market, for the greater civil society benefits. The significance of the model is that the central bank that is the regulator of commercial banks should always keep in check the liquidity position of the banks to avoid market failures.

2.3 Empirical Literature

This segment surveys the works from two fronts. First, the survey of the literature is on studies focusing on developed and emerging markets. This is followed by a survey of the literature on frontier markets and finally the literature in the Kenya context and the studies that consider capital requirements in their analysis though they explicitly do not investigate the nexus between capital necessities and bank loaning conduct.

Utilizing cross-country data at the bank-level in seventy nations, Fonseca and Gonzalez (2010) after controlling for endogeneity of the independent variables as well as adjustment costs as measured by including the lagged capital buffers found that capital buffers were positively associated with not only the market power measured by total assets but also by the cost of deposits. Despite the finding they further establish that the effect varied across countries and attributed the observed heterogeneity to the diversity in regulations, supervisions and the nature of institutions in those jurisdictions.

Using a three stage least squares technique, Shim (2010) examined the capital regulation's impact on hazard and capital modifications among insurance companies in the US responsibility. The findings indicate that firm characteristics, firm size, determine the industry's capital structure with the firms relying on retained earnings to meet the capital shortfall. In addition, regulatory pressure was established to exert a positive effect on the portfolio risk among the insurance firms. Further, it establishes the interdependence between capital adjustments and risk.

On the determinants and behaviour of capital ratios that are risk-based for UK banks, Francis and Osborne (2010) using panel data evaluated the role of regulatory capital requirements and found that the conduct of investment ratios crossways the tiers are assorted with the heterogeneity arising due to the different bank size, its nearness to the minimum regulatory

capital, and its reliance on equity. In addition, they establish that the capital ratios also varied with the phase in the economic cycle and therefore suggested the need for ongoing review of capital standards to keep abreast with both bank-level and macroeconomic dynamics. In a similar study in German, Stolz and Wedow (2011) analysed the role of excess capital and whether they exhibit any cyclicality where it established that the movement in bank capital was in the opposite direction with economic cycles and therefore suggested that banks in their risk management patterns must take into accounts the economic phase when determining their capital base.

Alam (2013) looked at the nexus between bank regulatory capital on banks' efficiency and risk and documents that regulator's regulatory and monitoring powers increases technical efficiency of Islamic banking while reducing efficiency of conventional banks. In a closely related study, Bridges, Gregory, Nielsen, Radia, Pezzini and Spaltro (2014) investigated how micro-prudential guidelines interacted with both capital ratios and lending behaviour among banks in UK and established that regulatory capital requirements significantly triggered a change in bank's capital ratios towards the regulatory thresholds. Similarly, they show that controlling investment necessities affected lending though the effect was heterogeneous across the different sectors in the economy.

In China, Huang and Xiong (2015) investigates the capital buffers interactions under macroeconomic fluctuations. Their findings showed that capital buffers depict a counter-cyclical nature. In addition, they established a relationship that was negative between capital buffer and deposit premium. Irrespective of the business cycles, during economic downturns this effect is stronger while loan premiums are less affecting by buffers. Noreen, Alamdar and Tariq (2016) using a 24 commercial banks panel in Pakistan assessed the linkages amongst investment buffers and bank peril. Bank capital buffers were integral in safeguarding the Pakistani's financial system's stability. By applying the moments' generalized systems, it established that capital buffers and risk are affected by business cycles. It established that buffers were procyclical whereas bank risk was counter-cyclically to the business cycles.

Osborne, Fuertes, and Milne, (2017) using data for 13 banks in the U.S during the 1998 to 2012 period investigated how bank capital ratios relate to lending rates where they found substantial heterogeneity in the core capital coefficient for lending rates of secured households with the coefficient moving from positive in the course of the pre-crisis period to a coefficient that is

negative during the crisis period. Similar, findings are also established on how unsecured lending rates relate to bank capital ratios.

In an investigation of the credit risk interaction with commercial bank's profitability for all Kenya's 43 commercial banks, Aduda and Gitonga (2011) establishes using ordinary least squares technique that minimum core capital is highly related to performance with the relationship being established to be significant. moreover, the study concluded that the more total capital a bank had the less its performance was, that is, they established an association that is negatively significant between capital held and fiscal performance as proxy by ROA as well as ROE while to be insignificance in the structure of ownership was established.

Sentero (2013) investigated the bank's capital needs on technical efficiency under a two-stage framework. Firstly, using data envelopment analysis (DEA) established the efficiency levels of banks and linked the efficiency scores in the other stage to capital requirements where it found a significant effect on a bank's efficiency emanating from a higher adequacy of capital. Ongore and Kusa (2013) studied determinants of economic performance of Kenya's industrial banks for the period between 2003 and 2013, a relationship that's vital was found between capital risk and capital adequacy whereas no proof of an association was established for liquidity, credit, rate of interest risk, return on equity and assets on capital adequacy.

In their study on how minimum capital requirements relates to Kenya's bank competition, Ngoka-Kisinguh, Gudmundsson, and Odongo (2013) established the existence of a nonlinear effect between capital and competition. They also note that the advantages of investment requirements increment on competitiveness are obtained when accumulation begins to take place (derived from the square core capital). A significant and important effect was realized between Bank structure and banking performance. Kombo (2014) concluded that the adoption of the framework helps achieve and sustain financial stability by improving a bank's techniques of managing credit. Furthermore, the study found out that adoption of Basel III framework had an effect that is significant on the balance sheet of the bank with smaller banks in need of more additional capital having to merge.

Murkomen *et al.,* (2016) analyzed the capital requirements' effect on 43 Kenya's commercial banks' efficiency of operation using a multivariate fixed effects regression framework where they established that operating efficiency is positive to core capital ratio. Nyawira (2017) examined how capital requirements relates to financial performance and guided by the liquidity and agency theory, a descriptive design of research was used by the investigation sampling all

the Kenya's 43 commercial banks. a significant and positive effect on return on assets by capital adequacy was evidenced by the study, a proxy used in banks fiscal performance measurement and concluded that banks should also strives to hold sufficient capital and thus boosting the bank's confidence to the public.

Kamande (2017) examined the role of factors which are specific to banks for the period between 2011 and 2015 using a multivariate regression model. He specifically found that capital competence, management effectiveness, asset value, earnings ability and liquidity all related positively and significantly to return on assets, a measure adapted to proxy for financial performance.

A closely similar study Munywoki (2017) investigated how prudential regulations influence the fiscal performance of the Nairobi Securities Exchange. Findings depicted that, liquidity management regulation had a relationship that was positively insignificant with the performance of the Kenya's listed commercial banks while credit risk management regulation had an insignificant negative relationship. Capital adequacy regulations had relationship that was negative and significant with banks performance for studied period. Mukhanyi (2016) conducted a study on lending behaviour determinants for 35 Commercial banks using secondary panel data. Findings showed that interest rate, bank capitalization and volume of deposits to be positive and significant while real GDP were positive but insignificant to loan advances.

2.4 Overview of Literature

as evidenced in the literature review, most recent papers globally investigate how bank regulatory capital risk and capital adjustments interact (Shim, 2010), ; Bank efficiency (Alam, 2013); Bank risk (Noreen et al., 2016; Jokipii, & Milne, 2011); economic cycles (Tabak et al., 2011); cost of deposit & market power (Fonseca & Gonzalez, 2010). Locally, the role of bank regulatory capital on operating efficiency (Sentero, 2013; Murkomen *et al*., 2016; Musyoki 2017; Lotto, 2018). Others, skewed on capital adequacy and bank performance (Nyawira, 2017; Aduda & Gitonga, 2011; Kamande, 2017); bank competition and financial stability (Gudmundsson, et al., 2013; Kombo, 2014).

Many researchers have attempted to investigate the nexus between banks' behaviour as a result of capital requirements though most studies focus on banks in first world economies but empirical evidence remains scarce from developing countries. Despite the growing evidence, empirical evidence for Kenya is scarce. Similarly, economic shocks are not incorporated in

these studies since they are based on economic environments that are comparatively stable. Furthermore, the effectiveness of capital regulation in controlling banks' lending behaviour has not been examined by many studies, even though capital requirements impact on banks risk-taking has become a topical issue bearing in mind the recent banking and economic crises,. This study therefore considered the interaction between capital requirements and bank lending behaviour in Kenya and whether the effects vary across the different ownership structures.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

This section is organised into four subsections. In segment 3.1, a presentation of the theoretical model is made and Section 3.2 outlines the econometric model to be adopted as well as measurement of variables. Section 3.3 outlines the sources of data while section 3.4 finally presents the diagnostic and robustness checks that were undertaken to boost the validity as well as the reliability of the estimation strategy.

3.1 Theoretical Model

The theoretical model presented in this section is based on the capital buffer theory. According to it, banks use capital to reduce their risk of default due to high asset exposure to risk. As a result, they always seek to ensure that the requirements of minimum capital are met since the probability of default arising is determined by how close to the minimum capital regulatory requirements the capital buffer is. In principle, the changes in a bank's capital buffer can be viewed as being a function of two components; a component that is under the direct control of the bank and the other being an exogenous random component (Jokipii & Milne, 2011).

$$\Delta BUF_{i,t} = \Delta BUF_{i,t}{}^{bank} + \varepsilon_{i,t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where $\Delta BUF_{i,t}$ is the observed changes in the capital buffer while $\Delta BUF_{i,t}{}^{bank}$ is the bank's internally managed the capital buffer changes. $\varepsilon_{i,t}$ Is the exogenous random component at time t for bank i. The framework expressed in equation 1 above makes an assumption that banks will always have a target capital buffer that they desire to maintain and will gradually adjust to obtain the optimal target. The target capital long run level is given by:

$$\Delta BUF_{it}{}^{*} = \xi z_{it} + \eta_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

z_{it} Captures all the variables that determines the bank's target capital buffer level, $\Delta BUF_{it}{}^{*}$ is the target level of capital buffer and ξ is the vector coefficient. ΔBUF_{it} Is presumed to influence the target capital level because any short term alteration in the bank capital will by default affect the probability of banks. Overtime, the definite heights will be motivated away by the exogenous shocks towards or from the target levels. There is therefore need for banks to adjust capital buffer to revert towards internally optimal level. The adjustment is showed by$\Delta BUF_{i,t}{}^{bank}$.

$$\Delta BUF_{i,t}{}^{bank} = \lambda(BUF_{it}{}^{*} - BUF_{it-1}) + \eta_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where i indexes banks, and t indexes the time period (year). λ is the adjustment speed of the capital buffer, $BUF_{it}{}^{*}$ is the capital buffer target level and BUF_{it-1} captures the level of the previous period's capital buffer. The equation 3, therefore, shows that during a given time period, banks adjust a portion of their capital requirements by λ of the target capital requirements differences ($BUF_{it}{}^{*}$) and the substantial capital requirements realized during the previous period (BUF_{it-1}). As such, the study adopts based on previous studies an incomplete framework adjustment of capital requirements and behaviour of a bank thus allowing the examination of how banks respond to the central bank's requirements on capital. Under the partial adjustment framework, the study assume that banks *apriori* set their target capital requirements and adjust partially towards the target on an annual basis depending on the realized capital requirements in the previous period.

3.2 Empirical Model and Study Variables Measurement

The study derives the empirical model from the capital buffer theory. The study presents the methodology that sought to explain how capital buffers affects a bank's lending behaviour. The study estimated the following panel regression model as shown in equation 4.

$$\Delta LOAN_{it} = \alpha_0 + \alpha_1 \Delta BUF_{it-1} + \alpha_2 RISK_{i,t-1} + \alpha_3 ROE_{i,t-1} + \alpha_4 SIZE_{i,t-1} + \alpha_5 CBR_{t-1} + \alpha_6 Inflation_{t-1} + \alpha_7 realGDPGrowth_{t-1} + \alpha_8 INTR + \alpha_9 CAP + \varepsilon_{it} \ldots\ldots (4)$$

Where$\Delta LOAN_{it}$, represents growth rate for commercial bank loans i at time. ΔBUF_{it} represents the capital buffer changes at time t for bank i. $\Delta BUF_{i,t}$ is therefore described as the transformation amongst regulatory capital as well as capital held by banks (that is also referred to as excess capital) divided by the regulatory capital[1]. On the other hand, $RISK_{it-1}$ which is a measure of bank behaviour is gotten by$\frac{RWA}{TA}$, the ratio of risk-weighted assets (RWA) to total assets (TA). The coefficient of BUF_{it-1}which is α_1 capture the parameter estimate of interest in the study.

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[1]Suppose $K_{it}$and K_{it}^{r} denotes minimum regulatory capital as well as capital held by banks then $\Delta buf_{i,t}$ is defined as $\frac{K_{it} - K_{it}^{r}}{K_{it}^{r}}$

In addition, we also included,$ROE_{i,t}$ the return on equity that is a measure of excess capital remuneration direct cost. Among other bank-level factors, the study considered bank size ($SIZE_{it}$) computed using the log total assets which is meant to show the net effect of a bank's extent of variations capital buffers. Besides the bank-level factors driving capital buffer adjustments, the empirical literature also suggests that macroeconomic shocks have a significant influence. To account for these shocks which are bank invariant, we included a set of control variables in the study and these includes central bank monetary policy rate (CBR), $inflation\ rate$, $real\ GDP\ growthrate$, commercial bank lending rates ($INTR$) and interest rate capping (CAP) that also influence the lending behaviour of a commercial bank and are derived from a review of empirical literature. The explanatory variables were lagged to avoid possible endogeneity problem especially of the bank-level variables following the approach by Tabak, Noronha, and Cajueiro (2011).

Table 3.1: Summary of the Variable Description and Hypothesis

Notation	Variable Name	Measurement	Expected sign	Source of data
$\Delta LOAN_{it}$	Lending growth rate (Dependent Variable)	A measure of the lending behaviour of a bank and is measured as the rate of growth in the lending between two periods.		Bank supervision reports hosted by CBK
BUF_{it-1}	Lagged Capital Buffer	It is measured as the suplus capital divided the minimum requisite capital divided by the regulatory capital but lagged by one period and captures the adjustment cost.	-	Bank supervision reports hosted by CBK
$RISK_{i,t-1}$	ex-post risk and total assets that are risk-weighted	risk-weighted assets (RWA) to total assets (TA) ratio	+	Bank supervision reports hosted by CBK
$SIZE_{i,t-1}$	Lagged Bank Size	Is calculated as the bank's total assets' natural log and is included to capture the size effects.	+	Bank supervision reports hosted by CBK
$ROE_{i,t-1}$	Lagged return on equity	Net profit over average net equity which measures the cost of holding capital	+	Bank supervision reports hosted by CBK
cbr_{t-1}	Lagged policy rate	Central Bank set policy rate	+	CBK
$Inflation_t$	Inflation rate	Inflation rate (%)	+	CBK
$realGDP_{t-}$	Real GDP	Real GDP growth rate (%)	+	CBK
$INTRT_{t-1}$	Interest rate	Interest rate (%)	+	CBK
CAP	Interest rate capping	Dummy (1=After capping, 0=Before capping)	-	CBK

To test for heterogeneity, basically, the investigation sought to ascertain whether the relationship capital requirements and lending behaviour of bank varies across banks as a result of bank ownership structure (domestic public owned, domestic private owned or foreign owned). This was, therefore, achieved by using ANOVA to test if there exist a difference that is statistically significant among the 3 types of bank ownership structure. Further, the study estimated separate models for the different samples and looked at how big or small the coefficients they were in determining the existence of heterogeneity.

Testing the Capital Buffer Theory

The study tested the theory of buffer capital using the model presented in equation 5 by splitting the banks by degree of capital buffers (banks with little capital buffer as well as banks with great capital buffer). Basically, the test of the theory of capital buffer is the inclusion of the change in buffer capital variable since the theory holds that banks fine-tune their capital buffer to a certain optimal level.

$$\Delta BUF_{i,t}{}^{bank} = \lambda(BUF_{it}{}^{*} - BUF_{it-1}) + \alpha\Delta RISK + \eta_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5).$$

Where i indexes banks, and t indexes the time period (year). λ is the speed of fine-tuning the capital buffer, $BUF_{it}{}^{*}$ is the capital buffer's target level and BUF_{it-1} captures the level of the buffer capital of previous period. Based on the theory, banks which are well capitalized positively fine-tune their buffer capital while undercapitalized banks adjust their buffer capital negatively. Therefore, if λ is positive for well capitalized banks and negative for undercapitalized banks, then the capital buffer theory holds and vice-versa.

3.3 Data Analysis

The study used panel data regression model. Multiple phenomena observations are contained in the Panel data obtained over multiple periods of time for the same individuals or firms. The data was preferred based on how it revealed changes at the bank's individual level (cross sections) over a period of 2012 to 2018 (time series). Panel regression model uses either random effect or effects that are fixed and therefore hausman test was performed to establish whether random effect or effects which are fixed was the appropriate. The random effects being the preferred model are the null hypothesis. A small(less than 0.05) p-value calls for the null hypothesis rejection. The study first estimates the model of fixed effects, save the coefficients comparing them with the random affects model results.

3.4 Diagnostic Tests

In order to ensure the estimates from the estimation of equation (4) in Section 3.2, were in line with panel data estimation technique, the study carried out a battery of tests to ensure robustness and reliability of the estimates. In particular, the study tested for multicollinearity, heteroscedasticity and autocorrelation. A motivation of the need to undertake these tests are presented in the following:

3.4.1 Testing for Multicollinearity

Multicollinearity often refers to a problem encountered in regression analysis especially when a variable is either a linear arrangement of some other variables inside the model in a way that they are extremely interlinked. So as to ascertain the existence of multicollinearity in the independent variables, the recent research used VIF. A VIF that is higher than 10 shows extreme multicollinearity and therefore need to be removed from the final regression model.

3.4.2 Testing for heteroskedasticity

There is need to ascertain assumption of homoscedastic error terms. Modified Wald test tested if residuals accomplish the sphericity hypothesis. If the residuals are heteroscedastic determined with robust standard errors method. This is because heteroscedastic swells the standard faults and thus influencing hypothesis testing and not the approximations of the regression constants gotten.

3.4.3 Testing for autocorrelation

In panel data, if the covariance between successive period's residuals is non-zero then autocorrelation exists. To establish whether residuals are autocorrelated the Wooldridge's test for serial correlation will be adopted under no first-order autocorrelation null hypothesis. In the event that the residuals are autocorrelated, the robust standard errors should be adopted alongside using lagged independent variables and hence mitigating the possible problem of endogeneity especially of the bank-level variables following the approach by Tabak, Noronha, and Cajueiro (2011).

3.5 Data Type and Source

Annual bank-level data was used by the study for the 2012 to 2018 timeline drawn from yearly financial reports of 43 commercial banks currently approved to function in Kenya. In addition, to bank level data, macroeconomic records were gotten from the Kenya's Central Bank (CBK). Among the data that were collected from KNBS and CBK are inflation rates, policy rate, real

GDP growth and interest rate. To control heterogeneity among the cross-sections arising from their inherent varying nature of their characteristics, panel data is used. Additionally, it rebates for time effects, which may possibly occur due to changes in policy and macroeconomic environment. Similarly, panel data overcomes endogeneity of the regressors (Baltagi, 2013). Moreover, panel data circumvents errors in model specification.

CHAPTER FOUR
EMPIRICAL FINDINGS AND DISCUSSION

4.1 Introduction

The study used data that was panel in nature for Kenyan commercial banks for the season amongst year 2012 and 2018. Out of the 43 commercial banks, 39 were found to have sufficient data. Others which had undergone receivership like Imperial bank and Chase bank were excluded. In addition, those which were under statutory management like Charter House bank were also excluded. Others excluded from the list also included banks that were acquired like Fina Bank that was acquired by Guaranty Trust bank, SBM bank Kenya that acquired Fidelity commercial bank and Ecobank Kenya Ltd that acquired EABS Bank Ltd. Dubai bank which was liquidated in the year 2015 was also excluded.

The empirical findings of the study are presented in this chapter. section 4.1 examines the summary of the variables descriptive statistics under study, this include loan growth rate ($\Delta LOANS$) which is the dependent variable and capital buffer (BUF) which is the main independent variable. Other independent variables of interest included bank risk, ROE, SIZE, CBR, Inflation, real GDP growth rate and interest rate. Section 4.2 is the trend analysis for loan growth rate and capital buffer showing the evolution trajectory for the period for which the analysis is carried out. a correlation analysis is presented in Section 4.4 while in section 4.5 we perform some diagnostic tests for robustness while section 4.6 presents the panel regression analysis on how capital requirements relates to bank's lending behaviour. Section 4.7 delves in testing for heterogeneity across ownership structure and lastly section 4.8 tests the capital buffer theory.

4.2 Descriptive Statistics

The descriptive statistics presented were minimum and maximum for each variable for the years between 2012 and 2018 mean and standard deviation. The variables are loan growth rate ($\Delta LOANS$) which is the dependent variable and capital buffer (BUF) which is the main independent variable. Other independent variables of interest included bank risk, ROE, SIZE, CBR, Inflation, interest rate and real GDP growth rate.

Table 4.1: Descriptive Statistics Summary

Variable	Mean	Std. Dev.	Min	Max
Δ*LOANS* (%)	12.050	24.140	-64.395	255.414
BUF (%)	10.766	11.793	-34.444	84.003
RISK (TRWA/TA)%	79.800	82.800	3.100	1121.400
ROE (%)	12.510	23.607	-139.600	58.400
SIZE(Log TA)	4.594	0.562	3.466	5.792
CBR (%)	10.588	2.547	8.500	16.500
Inflation (%)	7.140	1.137	5.718	9.378
Real GDP growth (%)	5.525	0.555	4.600	6.300
INTR (%)	7.604	2.217	4.630	11.550

Notes: Δ*LOANS* is the growth rate in loans, BUF is the capital buffer, RISK is the bank risk portfolio, SIZE is the bank size measured using log total asset, TA is total asset, INTR is commercial bank lending interest rate

Results in Table 4.1 shows that loan growth rate (Δ*LOANS)* which is a measure of bank lending behaviour (dependent term) has a mean of 12.050% and a standard deviation of 24.14 (M=12.050, SD=24.14) indicating a large variability among the banks in the loan advances to the customers. Its minimum and maximum were -64.395% and 255.414% respectively. This has an implication that some banks have witnessed a decrease in loan portfolio while others have recorded an increase between the study periods.

Capital buffer (BUF) which is arrived as the excess capital over the minimum regulatory capital divided by the regulatory has a 10.766% mean and 11.793 standard difference (M=10.766, SD=11.793). The positive mean score imply that most banks do meet the required minimum capital set through the regulator, CBK. -34.444% and 84.003% were its minimum and maximum respectively. The recorded negative minimum capital buffer imply that although majority of the banks have hit the required minimum capital requirement, some of the banks are also still struggling.

Bank risk (RISK) was measured using (TRWA/TA) since it is careful to be a superior ex-ante gauge of general risk and is a more comprehensive measure. The mean for the banks risk portfolio for years under study is 79.8% and its standard deviation is 82.8% (M=0.798, SD=0.828). 3.1% and 1121.4% were its minimum and maximum respectively. The positive mean score imply that majority of the commercial banks have relatively high risk portfolio. This means that the banks need to closely monitor their capital buffers to be always above the minimum regulatory capital so that they do not fall under the lowest capital ratio, amassing the likelihood of insolvency and probability of facing charges related with catastrophe.

Return on Equity (ROE) which is derived from dividing net income by shareholders' equity has a 23.607 standard deviation and a 12.51% mean score (M=12.510, SD=23.607). Its minimum and maximum were -139.6 and 58.4 respectively. Bank size which is dignified via log of total asset has a mean of 4.594 and std.dev of 0.562(M=4.594, SD=0.562). Its minimum and maximum for the period were 3.466 and 5.792 respectively. CBR has a 2.547% standard deviation and a 10.588% mean score (M=10.588, SD=2.547). Its minimum and maximum for the period were 8.5% and 16.5% respectively. Inflation rate has a mean score of 7.14% and standard deviation of 1.137% (M=7.14, SD=1.137). Its minimum and maximum for the period were 5.718% and 9.378% respectively. Real GDP rate has a mean score of 5.525% and standard deviation of 0.555% (M=5.525, SD=0.555). Its minimum and maximum for the period were 4.6% and 6.3% respectively. Lastly, the results indicated the mean score for the interest rate (INTR) is 7.604% and the standard deviation of 2.217 %(M=7.604, SD=2.217). Its minimum and maximum for the period were 4.63% and 11.55% respectively.

4.3 Trend Analysis for Loan Growth and Capital Buffer

Figure 4.1 documents the trend analysis for loan growth and capital buffer for the period between 2012 and 2018. The loan growth rate is marked by a continuous decline from the year 2012 to 2018 though with upwards and downwards with the most prevalent fluctuations between the years 2013/2014 and 2016/2017. The general decline in the loan growth rate might be associated to the implementation of the conservative capital buffer of 2.5% on top of 12% for total capital and 8% for initial capital bringing the totals to 14.5% and 10.5% for total capital as well as initial capital respectively. The current research sought to establish if the capital minimum requirement is one of the factors that have contributed in the decline in the banks activity of lending.

The capital buffer presents a decline from the year 2012 to 2015 but it then rose after the year 2015. The decline might also be associated with the introduction of the conservative capital buffer of 2.5% in the year 2012 where majority of the banks were trying to cope up with the new regulatory. But after the year 2015, they had coped up and thus way a slight upward trend is witnessed between the years 2015 and 2017. Trend line of growth in loans and capital buffer is showed in figure 4.1.

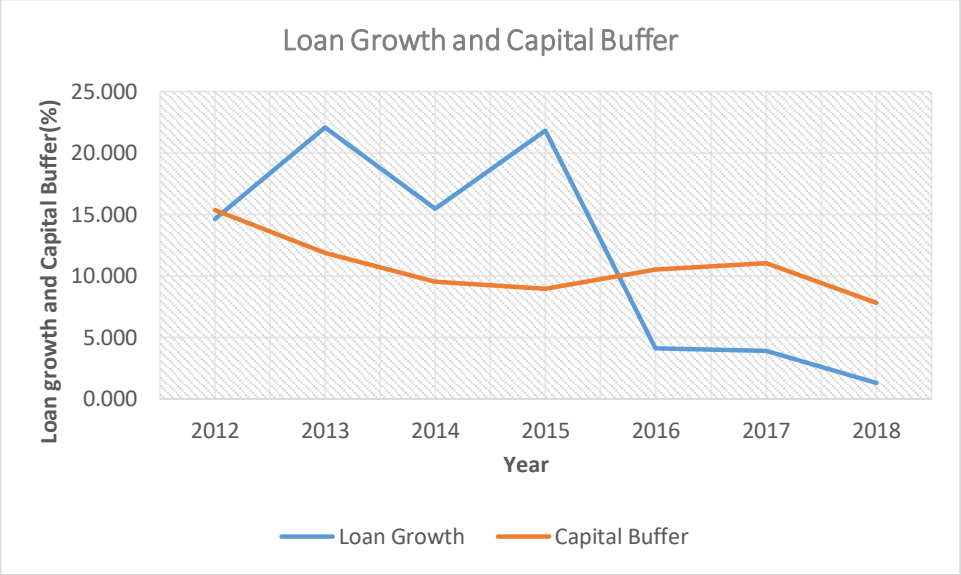

Figure 4.1: Trend Analysis for Loan Growth and Capital Buffer (2012-2018)

4.4 Correlation Analysis

Correlation examination was done between loan growth rate (Δ*LOANS*) and capital buffer (BUF) including all the other independent variables of interest (RISK, ROE, SIZE, CBR, Inflation, real GDP and interest rate). Table 4.2 presents the results of association matrix.

Table 4.2: Correlation Matrix

	ΔLOAN	BUF	RISK	ROE	SZE	CBR	Inflation	Real GDP	RINTR	CAP
ΔLOAN	1.000									
BUF	-0.312*	1.000								
RISK	0.007	0.058	1.000							
ROE	0.095	0.139*	-0.005	1.000						
SZE	-0.070	0.125	0.065	0.456*	1.000					
CBR	0.097	-0.089	-0.070	0.006	-0.087	1.000				
Inflation	0.086	-0.135*	-0.115	-0.043	-0.047	0.5210*	1.000			
Real GDP	-0.096	0.159*	0.122	0.043	0.038	-0.684*	-0.573	1.000		
INTR	0.2399*	-0.069	0.045	0.160*	-0.109	0.159*	-0.176*	0.196*	1.000	
CAP(Dy)	-0.3130*	0.116	0.067	-0.169*	0.132*	-0.180*	-0.151*	0.210*	-0.584*	1.00

Note: * The association is significant at 5%; CAP is the interest rate capping (Dummy (Dy): 1=after capping, 0=before capping.)

Table 4.2 shows that Δ*LOANS* and capital buffer (BUF) are related both positively and significantly ($r = -0.3132$, $P < 0.05$). This insinuates that increase in bank capitalization is associated with decreased loans while a low bank capitalization is associated with an increased loans. That is, we openly validate the part played by loaning action in the negative association of the additional bank capital. The results also revealed that Δ*LOANS* is positively associated

with RISK (r=0.007, P>0.05). This indicated a high risk portfolio attracts higher loans being advanced to the customers. This might also imply that banks have a higher appetite in giving out loans which are attached to high risk since they can get high returns due to high interests.

Other variables that were found to be positively associated with Δ*LOANS* includes ROE(r = 0.095, P > 0.05), CBR(r = 0.097, P > 0.05), Inflation(r = 0.086, P > 0.05) and commercial bank lending interest rate(r = 0.2399, P < 0.05). Commercial bank lending interest rate (INTR) is associated both positively and significantly with loan growth and this implies that an increase in lending interest rate by banks will lead to an increased loans advanced to the customers by the commercial banks. While other variables that were found to have a negative effect on Δ*LOANS* are SIZE(r = -0.007, P > 0.05), real GDP (r = -0.097, P > 0.05) and interest rate capping(r = -0.3130, P < 0.05). Interest rate capping has an adverse effect on the loans as illustrated by the existence of negative association.

4.5 Robustness checks and Diagnostic Tests

Robustness point checks are performed so as to avoid getting spurious results. The diagnostic tests undertaken in this study include multicollinearity test, Heteroscedasticity test, Autocorrelation test and test of Hausman.

4.5.1 Testing For Multicollinearity

Multicollinearity test is performed to ascertain if the independent variables under investigation are linear combination of each other that is highly correlated. The independent variables investigated include BUF, RISK, ROE, SIZE, CBR, Inflation rate, Real GDP growth, commercial bank interest rate (INTR) and Interest Rate Capping (CAP). The results are shown in Table 4.3.

Table 4.3: Multicollinearity Results Using VIF

Variable	VIF
BUF	1.12
RISK	1.04
ROE	1.56
SIZE	1.44
CBR	1.49
Inflation	5.92
Real GDP	2.45
INTR	3.46
CAP	2.25
Mean VIF	**2.30**

Table 4.3 designated that the variables are not highly collinear to each other since all the VIF values are less than 10. Therefore, the variables were fit to enter into the panel regression model.

4.5.2 Testing for Heteroscedasticity

Heteroscedasticity was performed to assess whether the error term is autocorrelated with the variables across the banks. Group wise heteroskedasticity through the modified Wald test for was used. The error term having constance variance (Homoscedastic) is the null hypothesis. Rejection of the null hypothesis is done where the p-value is less than 0.05. Outcomes are displayed in Table 4.4.

Table 4.4: Group Wise Heteroskedasticity Findings from Modified Wald test

group wise heteroskedasticity by Modified Wald test
H0: sigma (i) ^2 = sigma^2 for all i
Chi 2 (39) = 9177.45
Prob > chi 2 = 0.0000

Table 4.4 designated that chi square value was 9177.45 with 0.000 p-value and thus leading to the null hypothesis rejection. Hence, the data was suffering from Heteroscedasticity. To correct this, the study estimated the panel regression model using robust standards.

4.5.3 Testing for Autocorrelation

Autocorrelation was performed to assess if the error term is autocorrelated with the variables over time. In panel data, if the covariance between successive periods residuals is non-zero then autocorrelation exists. To establish whether residuals are autocorrelated the Wooldridge's test for serial correlation was adopted under the null hypothesis of autocorrelation of no first-order. The null hypothesis is rejected if the p-value < 0.05. Table 4.5 presents the Outcomes.

Table 4.5: Autocorrelation Wooldridge test in panel data

Autocorrelation Wooldridge test in panel data
H0: no first-order autocorrelation
F (1, 38) = 0.065
Prob > F = 0.8004

Outcomes in Table 4.5 displays that F statistic value was 0.065 with a p -value of 0.8004 and thus the null hypothesis is not rejected. Hence, the data was not autocorrelated.

4.5.4 Hausman Test

This study uses panel data model, therefore, Hausman test is performed so as establish whether model of random effects or model of fixed effect is applicable. Hausman test uses hypothesis

where the null hypothesis is that the model of random effects is preferred to the model of fixed effect. The null hypothesis is rejected if the p-value < 0.05. Table 4.6 shows the results.

Table 4.6: Hausman Test Results

Variable	(b) fixed	(B) random	(b-B) Difference
BUF	-0.752	-0.853	0.102
RISK	0.166	0.014	0.152
ROE	0.105	0.142	-0.037
SIZE	-12.371	-3.558	-8.813
CBR	-10.369	-11.143	0.774
Inflation	62.471	68.314	-5.844
Real GDP growth	104.323	115.169	-10.846
INTR	4.447	4.777	-0.331
CAP	-8.711	-8.855	0.144
chi2(9)	4.990		
Prob>chi2	0.836		

Results in Table 4.6 shows that the chi square value is 4.99 with a p of 0.836. Therefore, the null hypothesis is not rejected and this means that random effects model is preferred to the fixed effect model. Hence, this study using panel regression model with random effects.

4.6 Effect of Capital Requirements on Bank's Lending Behaviour: Panel Regression Analysis

The first study objective is to establish the capital requirements effect on bank's lending behaviour. Based on the Hausman results, random effects was the preferred model. Therefore, panel regression model with random effects was used and also robust error standards was used to correct the presence of Heteroscedasticity. Bank lending behaviour is the dependent variable measured using loan growth rate ($\Delta LOAN$) while capital buffer (BUF_{t-1}) is the main independent variable. The other independent variables of interest as dictated by the empirical literature include $RISK_{t-1}$, ROE_{t-1}, $SIZE_{t-1}$, CBR_{t-1}, $Inflation_{t-1}$, $Real\ GDP_{t-1}$, $INTR_{t-1}$ and CAP (Dummy where 1=After interest rate capping and 0= Before interest rate capping). To avoid possible endogeneity problem the explanatory variables are lagged especially of the bank-level variables following the approach by Tabak, Noronha, and Cajueiro (2011). In Table 4.7, the results from the panel regression are presented.

Table 4.7: Panel Regression Results

ΔLOAN	Coef.	Std. Err.	z	P>|z|
BUF_{t-1}	-0.8533	0.1740	-4.9000	0.0000**
$RISK_{t-1}$	0.0143	1.7269	0.0100	0.9930
ROE_{t-1}	0.1422	0.0818	1.7400	0.0820
$SIZE_{t-1}$	-3.5580	3.2321	-1.1000	0.2710
CBR_{t-1}	11.1433	4.1561	2.6800	0.0070**
$Inflation_{t-1}$	68.3143	26.2724	2.6000	0.0090**
Real GDP $growth_{t-1}$	115.1689	46.9398	2.4500	0.0140*
$INTR_{t-1}$	4.7775	1.4692	3.2500	0.0010**
CAP (Dy)	-8.8548	3.7904	-2.3400	0.0190*
Constant	-999.4054	407.1118	-2.4500	0.0140*
R squared	0.2481			
F statistic	59.3900			
P-value	0.0000**			

Note: * shows that the relationship is significant at 5%; ** is significant at 1%. Dummy (Dy): 1=after capping, 0=before capping.)

$$\Delta LOAN_{it} = -999.4054 - 0.853BUF_{it-1} + 0.0143RISK_{i,t-1} + 0.1422ROE_{i,t-1} - 3.558SIZE_{i,t-1} + 11.1433CBR_{t-1} + 68.3143Inflation_{t-1} + 115.1689realGDPGrowth_{t-1} + 4.7775INTR - 8.8548CAP$$

Table 4.7 indicated that BUF_{t-1} has a significant and negative effect with ΔLOAN (β=-0.8533, p=0.000). This shows clearly that a one element surge in capital buffer results to a decrease in a loan growth by 0.8533 units. This might mean that when banks' capital buffers are closer to the regulatory minimum capital, they seem to reduce the loans advanced to the customers. This outcome is dependable with that of Tabak *et al.,* (2011) who found out that capital buffers have a negatively significant effect on loans. This result is also consistent with that of Angelkort & Stuwe (2011); Humblot (2014); Brun et al. (2013); Osei-Assibey and Asenso (2015) who found that increased regulatory capital will impact the lending of SME bank negatively.

$RISK_{t-1}$ was established to have a positive but insignificant effect on ΔLOAN (β=0.0143, p=0.9930). This positive relationship implies that higher a bank's exposure to risk, the higher the impact on its lending behaviour. This finding is consistent with that of Tanda (2015) whose findings back the gamble for resurrection proposition, that is, banks close by the minimum ethics incline to upsurge their jeopardy disclosure in command of the assistance from likely proceeds that in the finale could be used to reinforce their capital base. The results further indicated that ROE_{t-1} has a positively insignificant effect on ΔLOAN (β=0.1422, p=0.082). ROE measures the cost of holding capital and the positive relationship with the loan growth

might mean that an increased capital might attract higher lending in the long run. $SIZE_{t-1}$ and ΔLOAN were found to be negatively and insignificantly related and this is inconsistent to the findings of Theodossiou (2011) who found that bank capitalization is positively associated with banks behaviour of lending.

In addition, there is a positively significant effect of inflation on ΔLOAN (β=68.314, p=0.007). This infers that a unitary surge in inflation tips to a rise in ΔLOAN by 68.314 units. This might mean that inflation greatly influences the volumes of loans advanced by banks. Inflation reduces the purchasing power of money and leads to increase in prices of commodities leading to more borrowing. Consequently, expectation of an increase in inflation increases the willingness for customers to borrow to finance things that will increase in value as inflation rises. Real GDP $t_{-1}$was found to have an effect that was positively significant on ΔLOAN (β=115.1689, p=0.014). This implies that an increase in real GDP that is unitary leads to increment in ΔLOAN by 115.1689 units. This means that GDP growth increase should culminate to a higher loans demand due to increased investment opportunities and improved conditions for loans approval, resulting to a positive relationship.

The regression results further show that $INTR_{t-1}$ has a positively significant effect on ΔLOAN (β=4.7775, p = 0.019). This involves that a unitary surge in the lending rates of bank, results in the increase in ΔLOAN by 4.7775. This means that banks are motivated by an interest rate increment is expected to attract more returns when more loans are advanced to customers. The findings agrees with that of Mukhanyi (2016) found that interest rate, bank capitalization and volume of deposits to be positive and significant while real GDP was positive but insignificant to loan advances.

the study finally establishes that CAP has a negative and an effect that is significant on ΔLOAN (β=-8.8548, p=0.014). This implies that increment in the capping of interest rate by one unit leads to a decrease in loan growth by 8.8548 units. This depicts that capping of Interest rate has an adverse effect on the loan volumes as illustrated by the existence of negative relationship. The finding is in keeping with that of Meja (2017) who assessed the interest rates capping result on the degree of non-public loans granted by Kenya's industrial Banks and located a negative relationship between the variables. The study results presented an R squared of 0.2481 implying that 24.81% of the changes are explained by the predictor variables in the ΔLOAN. The model was entirely significant as shown by the F statistic value of 59.39 with a p value of 0.000 lower than 0.05.

4.7 Heterogeneity across Ownership Structure

The second goal of the study was to explore whether heterogeneity across ownership structure exists on the association amongst capital requirements and bank lending behaviour on Kenya's commercial banks. To test for heterogeneity, basically, the study sought to assess whether capital requirements and bank lending behaviour association varies across banks as a result of bank ownership structure (government owned, private owned or foreign owned). ANOVA was used to test if there exist a difference that is statistically significant among the 3 types of bank ownership structure. In addition, the study verified the results by estimating separate models for the different samples and looking at the levels of significance. Results are presented in Table 4.8.

Table 4.8: Analysis of Variance (ANOVA) results

Ownership Structure		Sum of Squares	Df	Mean Square	F	Sig.
Government Owned Banks	Regression	86.012	1	86.012	0.494	.488
	Residual	4875.194	28	174.114		
	Total	4961.206	29			
Private Owned Banks	Regression	4254.12	1	4254.12	14.051	.000
	Residual	31184.203	103	302.759		
	Total	35438.323	104			
Foreign Owned Banks	Regression	15376.172	1	15376.172	16.194	.000
	Residual	87353.35	92	949.493		
	Total	102729.521	93			

Analysis of Variance (ANOVA) results in Table 4.8 shows that the association amongst requirements of capital and behaviour of bank lending for the banks that are privately owned and those that are foreign owned is statistically significant with F statistic =14.051, p value=0.000 and F statistic =16.194, p value=0.000 respectively. Whereas for the government owned banks is statistically insignificant (F statistic =0.494, p value=0.488). This implies that there exists heterogeneity across ownership structure on the association amongst capital requirements and bank lending behaviour among Kenya's commercial banks. The findings agree with Francis and Osborne (2010) who found that the capital ratios behaviour is heterogeneous across the banks with the heterogeneity arising due to the different bank size

and ownership structure. In addition, the results correspond to Osborne et al., (2017) who found substantial heterogeneity in the core capital coefficient for lending rates of secured households.

Further, separate regression of coefficient for each bank ownership was also determined to confirm on the existence of heterogeneity across ownership structure.

Table 4.9: Regression of Coefficient for Each Ownership Bank Structure

Ownership Structure		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Government Owned Banks	(Constant)	7.246	2.580		2.809	0.009
	BUF_{t-1}	-0.417	0.594	-0.132	-0.703	0.488
Private Owned Banks	(Constant)	12.563	1.713		7.334	0.000
	BUF_{t-1}	-0.559	0.149	-0.346	-3.748	0.000
Foreign Owned Banks	(Constant)	9.523	3.198		2.978	0.004
	BUF_{t-1}	-1.848	0.459	-0.387	-4.024	0.000

a Dependent Variable: Loan Growth
b Predictors: (Constant), Capital $Buffer_{t-1}$

Model 1: Government Owned Banks: $\Delta LOAN_{it} = 7.246 - 0.417BUF_{it-1}$

Model 2: Private Owned Banks: $\Delta LOAN_{it} = 12.563 - 0.559BUF_{it-1}$

Model 3: Foreign Owned Banks: $\Delta LOAN_{it} = 9.523 - 1.848BUF_{it-1}$

Results in Table 4.9 shows that foreign owned banks have a greater beta coefficient for BUF_{t-1} (β= -1.848, p=0.000), followed by private owned banks (β= -0.559, p=0.000) and lastly government owned banks (β= -0.417, p=0.488). This therefore implies that foreign owned banks exhibit a greater effect of capital requirements on their lending behaviour, then followed by banks that are privately owned and lastly government owned banks which did not show any statistical significant effect on how capital requirements relate to their behaviour of lending. Therefore, the results confirm that heterogeneity across ownership structure exists on the capital requirements connection with bank lending behaviour amongst commercial banks in Kenya. These derivations are the same with the study of Tabak *et al.,* (2011) who found from their study that capital buffer varies from bank to bank when it comes to the lending behaviour due to different structures of ownership.

4.8 Testing the Capital Buffer Theory

The study proceeded to test on the capital buffer theory. To test for the capital buffer, the study split the banks by degree of capital buffers. The banks were classified into two; well capitalized

banks (high buffers) and undercapitalized banks (low buffers). Basically, the test of the theory of capital buffer is the inclusion of the change in capital buffer variable since the theory holds that banks fine-tune their capital buffer to a certain optimal level. Results are presented in Table 4.10.

Table 4.10: Capital Buffer Theory Results

Regression Results for Well Capitalized Banks

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-2.243	0.676		-3.316	0.001
$(BUF_{it}{}^{*} - BUF_{it-1})$	0.100	0.052	0.129	1.946	0.005
$\Delta RISK$	0.771	0.129	0.397	5.999	0.000

a Bank Capitalization = High buffers

b Dependent Variable: $\Delta BUF_{i,t}{}^{bank}$

Regression Results for Undercapitalized Banks

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Variable	B	Std. Error	Beta		
(Constant)	-2.055	0.536		-3.83	0.000
$(BUF_{it}{}^{*} - BUF_{it-1})$	-0.206	0.073	-0.305	-2.818	0.006
$\Delta RISK$	-0.309	0.12	-0.279	-2.572	0.012

a Bank Capitalization = Low buffers

b Dependent Variable: $\Delta BUF_{i,t}{}^{bank}$

Model 1: Well capitalized banks: $\Delta BUF_{i,t}{}^{bank} = -2.055 + 0.100(BUF_{it}{}^{*} - BUF_{it-1}) + 0.771\Delta RISK$

Model 2: Undercapitalized banks: $\Delta BUF_{i,t}{}^{bank} = -2.055 - 0.206(BUF_{it}{}^{*} - BUF_{it-1}) - 309\Delta RISK$

Results in Table4.10 discovered that well capitalized banks had a positive and significant coefficients for both BUF_{t-1} (β=0.100, p=0.005) and ΔRISK (β = 0.771, p=0.000). While the results for undercapitalized banks exhibited a negative and significant coefficients for both BUF_{t-1} (β=-0.206, p=0.006) and ΔRISK (β = -309, p=0.012).

These discoveries are similar with the theory of capital buffer, envisaging that banks that are better capitalized fine-tune their risk and buffer capital positively (Jokipii, & Milne, 2011). For low buffer banks, the relationship is negative. According to the theory, banks that are better capitalized fine-tune their buffer capital positively while undercapitalized banks fine-tune their buffer capital negatively. Therefore, from the results, the coefficients are positive for banks that are better capitalized and negative for banks that are undercapitalized and thus the capital buffer theory holds for commercial banks in Kenya. In addition, small capital buffers Banks

raise capital to rebuild a proper capital buffer while lowering risk simultaneously (Jokipii & Milne, 2011). Contrarily, banks that are well capitalized increase risk when capital increases so as to maintain their capital buffers. Further, estimations from this study indicate that banks' speed of fine-tuning towards the level that is desired is also dependent on the buffer size. It is further depicted that banks with small buffer alter capital buffers considerably quicker compared to their complements that are better capitalized.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The study's main objective was to investigate the nexus between capital requirements and the behaviour of bank's lending for Kenya's commercial banks. The study also investigated on the existence of heterogeneity across ownership structure on the association between capital requirements and lending behaviour of banks amongst commercial banks in Kenya. Lastly, it tested on the capital buffer theory. This chapter first begins with a summary of the findings in section 5.1, conclusions in section 5.2 and moves to section 5.3 where the policy implications are put forth and section 5.4 highlights the areas of further research.

5.1 Summary of Findings

The first study objective was to establish the effect of capital requirements and bank lending behaviour in Kenya's commercial banks. Using the model of panel regression, the study finds that capital buffer which is a measure of capital requirements affects bank lending behaviour of commercial banks in Kenya negatively and significantly. This is an indication that when banks' capital is closer to the minimum regulatory capital, they tend to reduce the loans advanced to the customers. Moreover it was evidenced by the study that bank risk affects bank lending behaviour positively but insignificantly. This positive relationship implies that higher a bank's exposure to risk, the higher the impact on its lending behaviour. ROE had an insignificant effect bank lending behaviour. ROE measures the cost of holding capital and the positive relationship with the loan growth might mean that an increased capital might attract higher lending in the long run. Bank size and bank lending behaviour were found to be negatively and insignificantly related.

The macroeconomic aspects had an effect that was significant on the behaviour of bank's lending include inflation, real GDP, commercial bank leading rates and interest rate capping. Inflation reduces the purchasing power of money and leads to increase in prices of commodities leading to more borrowing. Consequently, expectation of an increase in inflation increases the willingness for customers to borrow to finance things that will increase in value A booming economy, that is with a positive GDP growth attract investors/borrowers and thus they approach banks for loans and thus leading to an increase in loans advanced to customers. Banks are motivated by interest rates' increase since it is expected to attract more returns when more loans are advanced to customers. Interest rate capping has a hostile outcome on the loans volume

The second objective of the study was to investigate whether heterogeneity across the structure of ownership exists on the association amongst capital requirements and the behaviour of bank's lending amongst commercial banks in Kenya. Analysis of Variance (ANOVA) results shows how capital requirements relates to the behaviour bank lending for the private and foreign owned banks were statistically significant whereas for government owned banks was statistically insignificant. Foreign owned banks has a greater beta coefficient for capital buffers followed by private owned banks lastly government owned banks. This therefore implies that foreign owned banks exhibit a greater effect of capital requirements on their lending behaviour, then followed by banks that are privately owned and lastly government owned banks which did not show any statistical significant effect on how capital requirements impact their behaviour of lending. Therefore, the results confirm that heterogeneity across ownership structure exists on the association amongst capital requirements and behaviour of bank lending among Kenya's commercial banks.

Lastly, the study tested for the theory of capital buffer and found that banks that were well capitalized had a positively significant coefficient for both capital buffers and bank risk. While the results for undercapitalized banks exhibited a negatively significant coefficients for both for both capital buffers and bank risk. Our discoveries are approximately in link with the model of capital buffer, forecasting that glowing banks that are capitalized alter their safeguard capital and risk definitely while harmfully for the banks that are undercapitalized.

5.2 Conclusions

The findings further support the conclusion that minimum capital requirements deteriorate the capacity of banks' lending. That is, when minimum capital is increased by the regulator (CBK) banks would try ensure that the minimum capital requirements are met since the probability of default arising is determined by how the capital buffer seems close to the minimum regulatory capital requirements. In this way, banks would reduce the loans advances to customers and focus more on building the capital so as to avoid being penalized for not achieving the target capital. It was also concluded that bank risk and ROE have a positive but insignificant effect on bank lending behaviour while monetary policy, inflation rate, real GDP, commercial bank leading rates were found to have a positive and significant effect on bank lending behaviour. Interest rate capping was found to have a negative and significant effect on bank lending behaviour.

In addition, the study concludes that there exists heterogeneity across ownership structure on how the minimum capital requirement relates to the lending behaviour of Kenya's commercial banks. That is, based on the ANOVA results and coefficient size, minimum capital requirement showcased a greater effect on lending behaviour of private owned banks, then followed by foreign banks. The foresaid relationship was found to be insignificant for the government owned banks.

Commercial banks in Kenya broadly follows the capital buffer theory in that it was found out that well capitalized banks had a positively significant coefficients for both capital buffers and bank risk while negatively and significantly for undercapitalized banks. This corresponds to the theory of capital buffer, presuming that banks that are well capitalized fine-tune their risk and buffer capital positively while negatively for the undercapitalized banks.

5.3 Policy Implications

The study outcome is insightful and has several policy implications. The research established that capital buffers have an effect that is negative on the lending behaviour of commercial banks to individual customers and firms. Services of banking possibly becoming more costly in the near future due to increased regulations which includes imposing high minimum capital requirements in the sector. Complete banking segment with tougher balance sheets is a key positive, but overregulation might lead to better negative influence on moneylenders' revenues, expenses and capital sites. Extra compliance necessities and responsibilities would eventually affect customers. Capping of interest rate and harsher credit recording could end in certain clienteles and parts being omitted from proper monetary services. Therefore, the study recommends that though minimum capital requirements has a negative effect on loan lending rates, CBK should continue with the regulations in order to protect the depositors money. But to encourage loan lending, the regulator should lift interest rate capping so that banks can advance more loans to the customers especially to the small and medium enterprises.

Further, based on the result, that is the positive and statistical significance of interest rate on lending behaviour; commercial banks are required to relook into more innovative ways of improving their loan books so as to raise their income. For example, a commercial bank may reconsider its pricing strategy, offer more attractive products and uphold enhanced banking relationships with clients.

Finally, on the significant association established between Real GDP growth rate and lending behaviour the study recommends re-examination of good or bad project that are funded by Commercial banks during periods of economic booms or recessions. This is because, bad projects may not in the long run yield expected outcomes and in times of financial depression many loans may become non-performing and thus constraining the private sector's available credit.

Interest rate capping was evidenced to depict a negative and significant effect on the bank lending behaviour. This should also be concern to policy makers and more examination may be needed to evaluate the section of the market which may have been affected by such actions. It is also worth noting that the government had projected higher growth of credit after the interest rate capping, such growth may not have been achieved so far and the revelation that nearly half of the banks reduced the value of their loan book is a point of policy makers' concern.

Based on the findings of existence of heterogeneity on ownership structure on the impact of minimum capital requirement on behavior of lending, with a greater effect on private owned and foreign owned and the least being government owned banks, the study recommends for the CBK to discriminately regulate each category of banks separately in state of generalizing. This is because it was found out that each ownership structure reacts differently in their lending behavior owing to variations in the minimum capital requirements.

5.4 Areas for Further Research

The focus of this study was Kenya's commercial banks. The same study on the influence of minimum capital requirement on lending behaviour can be done in Micro finance institution. This is because Kenyan micro finance organizations have a greater role in economic growth by extending loans to small and medium organizations. So it could be of great interest to understand how minimum requirement of capital affects their lending behaviour so that proper measures can be applied.

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Appendix 1: Data Collection Template

Bank	Year	ΔLOAN	BUF	TRWA /TA	RISK	SIZE	ROE	CBR	INFL	real GDP	INTR	CAP
1	2012											
1	2013											
1	2014											
1	2015											
1	2016											
1	2017											
1	2018											