Interest Rate Ceilings and Agriculture Financing in Kenya

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by

Kellen Murungi

MRNKEL003

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Supervisor: Associate Professor Abdul Latif Alhassan

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ABSTRACT

The agriculture sector in Kenya contributes about 34% of the GDP and is a major employer both formally and informally. The sector has historically experienced challenges in accessing commercial financing, with banks committing less than 5% of their portfolio to agriculture, which has limited the sector's growth. In August 2016, the Kenyan government introduced interest rate ceilings in a bid to reduce the cost of borrowing, thereby releasing more capital to all enterprises, including those in the agricultural sector. This study sought to examine the effect of these interest rate ceilings on the growth in lending to the agricultural sector in Kenya. The study estimated a panel multiple regression model for 26 commercial banks, spanning a 5-year period between 2014 and 2018. The analysis revealed that the amount of credit supply to the agricultural sector increased following the imposition of interest rate ceilings. The findings from the panel regression analysis confirmed that variations in the amount of loans to the agricultural sector were affected by the imposition of interest ceilings. The finding held after controlling for bank-specific characteristics, such as firm size, equity, asset quality, liquidity and interest spread, suggesting that interest rate ceilings, if prudently applied, could lead to increased access to credit for the agricultural sector. However, the subsequent reversal of the interest rate capping law demonstrated that this is a blunt tool for enabling access to credit not only because of its ineffectiveness but due to the fact that it is prone to politicisation. This study, therefore, recommends that the government creates a favourable policy environment that enhances competition and information sharing in the banking sector which will lead to lower costs of credit. If they are deemed necessary, interest rate caps should be selectively used to enhance lending only to sectors where there is sufficient empirical evidence of their effectiveness.

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LIST OF ACRONYMS

CBK	Central Bank of Kenya
CGAP	Consultative Group to Assist the Poor
DFI	Development Finance Institutions
EAP	East Asia and the Pacific
ECA	Europe and Central Asia
EMH	Efficient Market Hypothesis
GDP	Gross Domestic Product
LAC	Latin America and the Caribbean
MENA	Middle East and North Africa
MFI	Microfinance Institutions
SA	South Asia
SSA	Sub-Saharan Africa
UNICEF	United Nations Children's Fund

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Kenya's agricultural sector contributes up to 34% of GDP and is responsible for about 10% of formal jobs in the economy (KNBS, 2019). However, the government's investment in the sector has been lagging at 3.2% of government expenditure (PBO, 2019). This is much lower than the 10% envisioned in the Malabo Declaration (African Union Commission, 2014), whose goal is to accelerate agricultural development, towards the achievement of the Sustainable Development Goals. The underinvestment in agriculture has resulted in the sector growing at a slower rate than the population growth. This underinvestment can be seen in Kenya's nutritional indicators. According to UNICEF, over 10 million people in Kenya suffer from food insecurity and poor nutrition (Kamenwa, n.d.).

In a more developed economy with higher productivity levels, the gap in public financing for agriculture would be adequately bridged by private financing. This has, however, not been the case in Kenya. In 2018, agriculture made up only 3.6% of commercial banks' commercial lending portfolio (KNBS, 2019). According to the Central Bank of Kenya, of the KES 2.48 trillion private sector loans availed by banks in 2018, only KES 95.78 billion went into agriculture (CBK, 2019a). Individuals received most loans (26%), followed by trade (19.14%) and real estate (15.15%). Taking into consideration agriculture's contribution to the economy as enumerated above, there reveals a significant mismatch in the quantum of commercial funding available to agricultural business in Kenya.

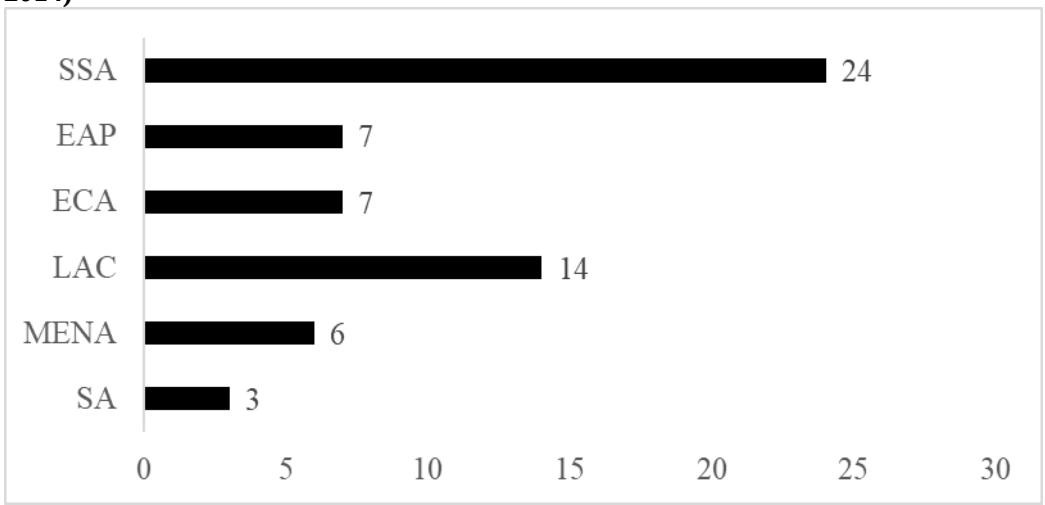
Limited access to financing has been cited as one of the barriers crippling Africa's agricultural sector. In a bid to stimulate lending to agriculture, the government and development finance institutions have supported the banks by providing guarantees and low-cost loans. However, this approach has not resulted in a significant increase in the share of commercial funding available to agriculture.

In August 2016, Kenya's parliament enacted the Banking (Amendment) Act 2015. This law set the maximum interest rate chargeable for a credit facility at "*no more than four percent, the base rate set and published by the CBK*" (CBK, 2016). The law was in response to the

indications that the interest rates that were then being charged by the banks were punitive and were a key factor in the slowing down of Kenya's economic growth. The legislators responded to public opinion that the banks were making unreasonably high returns by employing interest rate spreads of up to 10% (KNBS, 2019). By regulating and lowering the rate, it was hoped that there would be increased access to financing, especially for low-margin business sectors such as agriculture and manufacturing.

Though unpopular, interest rate ceilings are still a widely used tool to control the price of funds in markets. According to a 2010 CGAP survey, 17 countries in Sub-Saharan Africa had introduced or were using some sort of rate capping mechanism. Since then, additional countries have followed suit. In 2013, Zambia introduced ceilings on annual effective rates charged by non-banking institutions. In the same year, the West Africa Economic and Monetary Union, which includes eight Francophone African countries, lowered the interest rate ceiling - initially established in 1997 – by three percent. A 2014 study by the World Bank showed that at least 76 countries around the world had some form of interest rate cap in place (Maimbo & Gallegos, 2014). Figure 1 below shows the spread by region.

Figure 1: Number of countries with interest rate ceilings by region[1] (Maimbo & Gallegos, 2014)



Governments use different methods to institute interest rate ceilings. They may choose to put an upper limit on all loans issued by financial institutions. In other instances, governments may set ceilings based on the type of loan issued, as is the case in Chile, where there are nine

[1] SA – South Asia; MENA – Middle East and North Africa; LAC – Latin America and the Caribbean; ECA – Europe and Central Asia; EAP – East Asia and the Pacific; SSA – Sub-Saharan Africa

different types of ceilings based on size, currency, and terms (Andrade, 2006); and Uruguay where the cap depends on the amount of loans (Maimbo & Gallegos, 2014). Interest rate ceilings are usually linked to a central bank rate that is used in setting the monetary policy, as was done in Kenya, making the rates responsive to market conditions. Governments may also try to limit the fees charged on loans, to prevent banks increasing these as a way to bypass the interest rate ceiling.

1.2 Research Problem Statement and Question

In a perfectly competitive market, the price of credit, that is, the interest rate should be set by the forces of supply and demand (Rothbard, 1988). Holding all other factors constant, an increase in the demand for credit should see a corresponding increase in the interest rate, and vice versa. However, due to market imperfections, interest rates are determined by a multitude of factors.

Governments may choose to tamper with interest rates by instituting ceilings for three reasons. First to reign in banks in instances, where the central bank feels that banks may be colluding to distort the market and make super profits. This was the hypothesis behind Kenya's interest rate ceiling. The second reason for interest rate ceilings is to protect a vulnerable group of borrowers. An example of this was in Ghana, where an interest rate ceiling was put in place to protect non-bank borrowers, who were vulnerable to high interest rates from microfinance institutions (Alshebami & Khandare, 2015). Finally, interest rates are a monetary policy tool through which government achieves its monetary policy goals whenever inflation and the balance of payments become priority concerns (Cottarelli et al., 1986). Interest rate ceilings are adopted for this purpose based on the belief that they are a quicker and more precise way of controlling inflation and the balance of payments, compared to other conventional methods of monetary policy.

In the Kenyan case, the reason cited for interest rate controls was a combination of the first and second reasons as stated above. Banks were said to be charging usurious rates that were not reflective of the risk levels in the economy, and that these high rates were locking out a significant portion of borrowers from accessing credit. The argument made by the legislators was that the interest rate ceiling would provide a margin that allowed for risk-based pricing by banks. It was also argued that by controlling the pricing of loans, more credit would be available for low key economic sectors, such as agriculture and manufacturing.

Since then, there has been a number of studies on the effect of interest rate ceilings in Kenya, on both the banks and the economy. Kiseu (2017) and Meja (2017) studied the effect of the interest rate cap on the amount of credit issued by banks and access to personal loans respectively, while Ng'ang'a (2017) investigated the effect of the rate ceilings on the performance of commercial banks in Kenya. These studies are further considered in the Literature Review section of this document.

The agriculture sector is key to Kenya's economic growth, and access to financing is critical to the sector's development. As such, it is critical to evaluate whether major policy changes such as introducing interest rate caps have an effect on credit available to agricultural enterprises either positively or negatively. This leads to the research question of this study, which is:

> *Since the enactment of the 2016 interest rate cap law in Kenya, has there been an increase in the lending to the agricultural sector?*

1.3 Research Objectives

The objective of this research is:

> To examine the effect of interest rate ceilings on the growth in lending to the agricultural sector in Kenya.

The research hypotheses are:

> H0: An interest rate ceiling has no effect on agriculture business loans advanced by commercial banks in Kenya;
>
> H1: An interest rate ceiling has an effect on agriculture business loans advanced by commercial banks.

1.4 Justification of the Study

Since the enactment of the Banking (Amendment) Act 2015 that put in place interest rate ceilings on commercial banks, there has been a number of surveys and opinion pieces on the effect of the ceilings on the economy in general (Business Daily, 2018; Cytonn, 2016; Kenya Central Bank, 2018). However, there is insufficient empirical data on the effect of the interest rate ceilings on agricultural lending, despite the fact that agriculture is an important sector of the Kenyan economy in terms of its contribution to GDP, employment creation and food security. This study seeks to fill this gap.

The results of the research are of significance to a number of stakeholders. Firstly, policy makers and government may use the findings as a basis to shape policies that have a positive impact on agriculture lending. Secondly, DFIs that support commercial banks' lending to agriculture will be able to use the findings to assess the effect of interest rate ceilings on their lending and development objectives. Thirdly, scholars will find this study beneficial as a basis for further research on interest rate ceilings and lending to agriculture.

1.5 Scope of the Study

This study was limited to an analysis of the agriculture loan book of licensed commercial banks in Kenya that actively lend to agriculture. The study was limited to the 5-year period between 2014 and 2018. This period covered two years before the interest rate ceilings were introduced (2014/2015), and two years during which interest rates were constrained by the CBK (2017/2018). The year 2016 was excluded from the study as this is the year the interest rate ceilings were repealed and therefore contained data from both periods under study.

1.6 Organisation of the Study

This study is organised into five chapters. The first chapter is an introduction to the research topic. The second chapter contains the theoretical and empirical literature review on interest rate determination and the effect of interest rate ceilings in different sectors of the economy. The third chapter explains the methodology of the research, the data used and the data analysis techniques used. The fourth chapter contains a discussion of the results of the data analysis. Finally, the conclusion gives an overview of the study, conclusions drawn, policy recommendations, and areas of further research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section begins by interpreting key terms used in this study, followed by an overview of Kenya's banking sector and the history of interest rate ceilings in the country. This is followed by a theoretical overview of the key theories that define the research area while the next section provides a review of studies on interest rate ceilings and the findings that necessitated this research. The conclusion provides a summary of the key findings and how they relate to the study.

2.2 Definition of Terms and Concepts

Agriculture: The word 'agriculture' originates from the Latin word *ager* (field) and *colo* (cult) which when combined mean land tillage. However, its usage encompasses cultivation, domestication, horticulture, arboriculture, vegeculture, as well as forms of livestock management, such as mixed crop livestock farming, pastoralism and transhumance (Harris & Fuller, 2014).

Agribusiness: This refers to organised firms of different sizes involved in input supply, production, processing and retail. In the African context, this definition includes smallholder farmers and microenterprises as they make up the bulk of agribusiness activity on the continent (Byerlee et al., 2013).

Agriculture finance: This is financing available for agriculture and agribusinesses from commercial banks. This includes pre-harvest finance, inventory finance and trade finance (Varangis et al., 2012).

Agriculture lending: This is the process of availing credit to finance agricultural transactions (Ayegba & Ikani, 2013). The market may avail this credit in form of loans, notes, bills of exchange and bankers acceptances depending on the farmer's needs and the enterprise's business cycle. According to Adegeye and Ditto (1985), "agricultural credit is the process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at a future date.

Interest rates: According to Faure (2014), interest rates are the reward paid by a borrower (debtor) to a lender (creditor) for the use of money for a period. Interest rates are expressed in percentage terms and on an annual basis for ease of comparison. They are also referred to as the price of money.

Interest rate ceilings or interest rate caps: Interest rate ceilings take one of three forms based on the source of authority, namely interest rate controls, usury limits and *de facto* ceilings (Helms & Reille, 2004). Interest rate controls are banking laws that authorize banking or financial sector regulators to set maximum lending rates for regulated financial institutions. In most countries, the regulator responsible for interest rate controls is the central bank. Usury limits, on the other hand, are laws that set limits on rates for specified financial institutions. The body responsible for usury limits can be the central bank or in some cases, such as in Germany and the United Kingdom, the courts and ministry of finance respectively. *De facto* ceiling regimes apply where the interest rate caps are not legislated, but in practice are kept below specific levels through political pressure or activism. This is the case in countries like China where state-owned banks offer credit at subsidized rates or the Philippines where there is a gentlemen's agreement between lenders to cap interest rates on loans (Maimbo & Gallegos, 2014).

Interest rate floors: Are similar to interest rate caps or ceilings in that they are limits set by banking or financial sector regulators to set minimum lending rates for regulated financial institutions. Interest rate floors may also set a minimum interest rate that banks can pay on savings, as was the case in Kenya (CBK, 2016).

2.3 Overview of Kenya's Financial Sector

Kenya's lending sector is bank-led, and currently comprises of 42 commercial banks, one mortgage finance company, nine representative offices of foreign banks, 13 microfinance banks and three credit finance bureaus, all regulated by the Central Bank of Kenya (CBK). Alongside the banking sector, the country has a thriving cooperative movement which as at 2018 had a total of 176 deposit-taking savings and credit societies (SACCOS). In 2019, 83% of Kenyans were considered to be financially included (FSD Kenya, 2019), a high financial inclusion rate compared to the Sub-Saharan financial inclusion rate of 23% (Triki & Faye, 2013). This status that has been buoyed by the development of the mobile money transfer service M-Pesa, and the associated lending product M-Shwari, both of which have been immensely successful in the country (Cook, 2015). In 2018, 1.74 billion financial transactions were conducted via mobile money valued at KES 6.077 billion (KNBS, 2019).

The banking sector has historically provided the bulk of the lending to the private sector in the country. In 2018, credit advanced by commercial banks to private enterprises was KES

1.96 trillion, compared to KES 374.28 billion and KES 49.36 billion lent by SACCOS and microfinance banks respectively (SASRA, 2019).

Agricultural lending in Kenya

In post-independence Kenya, the government was the main source of agriculture finance in Kenya, through the Agricultural Finance Corporation (AFC). The AFC was established in 1963 and its chief function was to assist in the development of the agriculture sector (Amimo, 2004). The AFC's prominence as a source of agricultural financing declined due to reduced repayment rates and low levels of funding by the government. With its recession and the subsequent growth of commercial banks, the commercial agriculture lending space has been taken over by commercial banks, whose agriculture portfolio remains small in comparison to the sector's overall contribution to GDP.

In 2015 and 2016, lending to the agriculture sector grew by 15% and 5% respectively, but in 2017 and 2018, lending contracted by 6% and 2% respectively (KNBS, 2019). As of 2018, only about 4.24% of the overall commercial bank loan portfolio to private enterprises was dedicated to agriculture.

Table 2.1: Lending by Commercial Banks to Private Enterprises from 2014-2018 (KES billion)

Sector	**2014**	**2015**	**2016**	**2017**	**2018**
Agriculture	75,001	85,925	90,081	84,697	83,005
Mining and quarrying	23,421	20,776	16,802	16,470	14,700
Manufacturing	237,422	290,069	275,018	314,176	334,618
Building and construction	80,406	106,307	104,826	111,985	114,015
Transport, storage and communication	130,304	171,643	201,270	190,531	172,695
Wholesale and retail trade, hotels and restaurants	306,927	378,043	380,683	417,376	429,314
Real estate	262,691	282,586	337,352	370,732	368,710
Financial institutions	50,384	61,042	85,212	82,082	96,482
Other businesses	306,165	402,179	356,304	315,720	346,249

Source: Central Bank of Kenya (2019a)

The main barriers to commercial lending to agriculture include the real or perceived riskiness of the sector, high service costs due to smaller deal sizes, the lack of credit data, and limited market attractiveness relative to perceived higher returns outside of the agricultural sector (Maloba 2018).

The riskiness of agricultural lending in Kenya compared to other forms of lending is demonstrated by the fact that a majority of Kenyan farmers are smallholders (KNBS, 2018), whose enterprises are vulnerable to shocks, such as adverse weather and pests and diseases. Their low-uptake of insurance and other risk mitigation products further increase their risk profile to potential lenders. A study by the Kenya Bankers Association (Ngare et al., 2015) shows that while index insurance had the potential to address weather-related agricultural risks, while reducing lending transaction costs and moral hazard involved in traditional crop insurance, there was little evidence of commercial sustainability and scalability among small scale farmers in the country. The reasons for low uptake of commercial agricultural insurance include basis risk – where there is a discrepancy between measured risk at the meteorological station level and at the farm level, the quality of contract design, the high cost of the insurance, the flexibility of premium payment terms for small scale farmers and the limited trust of insurance providers (Carter et al., 2014).

The high transaction costs associated with lending to the sector are brought about by the high cost of reaching agricultural customers, who are based in rural areas and typically borrow low amounts of money, the higher perception of non-repayment due to sector specific risks (such as production, price and market), and the lack of interest or knowledge by financial sector players on how to manage transaction risks and structure products suited to the sector (Oruko et al., 2018). While small loans can be profitable, their modelled returns are significantly lower at about 5–9% against an average revenue yield of 22% for commercial banks in Kenya (Dalberg, 2018).

2.4 Interest Rate Ceiling Regime in Kenya

Kenya has a history of a mix of government-control and liberal interest rate policies. In the 1960s and 1970s, the post-independence government administered a fixed interest rate regime, where it mandated minimum lending rates for commercial banks, non-banking financial institutions and building societies. This policy was aimed at encouraging investment. However, from the 1980s onwards, financial reforms undertaken on the advice of multilateral institutions, such as the World Bank and the IMF, saw the government undertake a gradual interest rate liberalisation strategy. This was educated by the view that interest rate ceilings and other government interventions limited the economic growth of the country. By 1991, the country had fully liberalised its interest rates (Odhiambo, 2009).

The liberalisation of interest rates saw a significant increase in the cost of lending and banks were perceived by the public to be engaging in predatory lending. Between 2001 and 2015, interest rate spreads by commercial banks averaged 10.5% (Allen & Safavian, 2016). In 2012, the Committee on the Cost of Private Sector Credit and Mortgage Finance constituted by the National Treasury made key recommendations towards financial sector reforms. These included strengthening the system for movable collateral, increasing the scope of credit reporting, and promoting consumer protection measures (Safavian & Zia, 2018). This was an attempt at self-regulation and market-based solutions to the high cost of credit. The CBK also embarked on initiatives to increase the degree of transparency on lending information and development in credit information sharing through the licensing of credit reference bureaus (Safavian & Zia, 2018).

These measures were, however, unsuccessful and ultimately the Banking (Amendment) Bill of 2015 was signed into law in 2016 as the Banking (Amendment) Act (Kenya, 2016), which effectively capped the interest charged by licensed commercial banks at no more than 4% of the base rate set by the Central Bank of Kenya. The cap also set the floor on interest paid on deposits to at least 70% of the base rate.

The effects of the rate caps were mixed. A majority of banks grew their loan books significantly during this period (Kiseu, 2017), and there was an increase in personal loans issued to households by commercial banks (Meja, 2017). On the other hand, there was a decline in credit issued to small and medium enterprises (SMEs), a reduction in the profitability of small banks and reduced intermediation as commercial banks shifted away from private lending to public lending (Alper et al., 2019). The unpopularity of the interest rate caps, in both the financial sector and the international finance community, coupled by the downturn of the economy eventually led to the abolishment of the rate caps in November, 2019 (Kiruga, 2019).

2.5 Theoretical Framework

A study on the effectiveness of interest rate ceilings hinges on two main theoretical frameworks; interest rates determination and pricing. The former attempts to explain how interest rates are determined in an economy, while the latter explains the dynamics of efficient markets and the effect of price ceilings on the demand and supply of goods.

This section provides a summary of the key theories put forth by economic theorists on these two areas.

a) Classical theory of interest

Also known as the demand and supply theory, the classical theory of interest was initially put forth by economists Marshall (1920) and Fisher (1930), and later modified by Pigou, Cassel, Knight and Taussig (Hennings & Samuels 2012). According to their theory, interest rate is determined by the intersection of savings and investment. Classical economists state that interest is the price paid for the supply of savings. In addition, interest rates can be determined by analysing the demand for funds and their supply.

The demand for savings arises from investors and businesses that need to invest in business activities. This demand is driven by the level of productivity in the economy. According to classical economists, demand for capital can be raised up to a point where the capital's marginal productivity is equal to the interest paid on it. Therefore, if the marginal productivity is higher than the interest paid, then the demand keeps rising because it is beneficial to borrow money, and vice versa.

On the other hand, savings provide the supply for capital. Generally speaking, savings are the excess of income and consumption of both firms and households. There are two factors that affect the level of savings; the willingness and the capacity to save. The capacity to save depends on national income levels, personal income levels, purchasing power and price levels, among other factors. On the other hand, the willingness to save is determined to a large extent by the rate of interest – at higher rates of interest, people are said to save more.

At equilibrium, the demand for savings and the supply for savings are equal. This theory was criticized by Keynes and Dillard (Carvalho, 2019), as it assumed a state of full employment in the economy, which is unrealistic. Keynes (Milgate 1977) also took issue with the fact that the classical theory neglected changes of income and investment. In addition to this, it neglected monetary influences on the interest rate. Finally, D. H. Robertson (Ohlin et.al 1937) took issue with the fact that the classical theory only considers savings out of current income as the only source of funds.

b) Loanable funds theory

According to this theory, the rate of interest is determined by the demand and supply of loanable funds. Brought forth by Knut Wicksel, as an improvement to the classical theory, it states that the quantities of loanable funds demanded and the interest rate have an inverse relationship. It improves on the classical theory by recognizing hoarding as a factor that affects interest rates.

The demand for loanable funds arises from the government, consumers and businesses who need the funds for investment, hoarding, consumption and the provision of public goods. These borrowings are considered to be 'interest elastic' and depend on the expected profit from these activities, and whether this profit is higher than the rate of interest.

The supply of loanable funds comes from savings, dishoarding, and bank credit provided by individuals, governments and businesses. Dishoarding represents purchase of old assets or securities from others out of idle cash balances of one's own funds for net investment or for consumption in purchases in excess of the net disposable income. The higher the interest rates, the larger the funds that will be coming out of hoarding and vice versa. Similarly, the higher the rate of interest, the greater will be the inducement to save and vice versa. Bank credit is also elastic to some extent in that more funds are lent at a higher rate of interest.
The intersection of the total demand curve for loanable funds and the total supply curve of loanable funds gives the prevailing rate of interest (Ngugi, 2011).

c) Efficient Market Hypothesis (EMH)

EMH was introduced by Markowitz in 1952 and further advanced by Fama. The theory states that asset prices are a reflection of all available market information (Delcey 2019). This theory expresses three forms of the hypothesis; weak, semi-strong, and strong. The classification varies depending on the level of information in the market. The weak form states that public information is already reflected in the prices. The semi-strong form assumes that public and company-specific information, such as trading reports, are reflected in the asset prices. The strong form holds that prices incorporate public and non-public information.

This theory has been critiqued by economists as going against the thinking of Adam Smith and Keynes, who both posited that irrational behaviour had a real impact on the markets (Hurt, 2010). In his seminal paper, 'The Market for Lemons: Quality Uncertainty and the

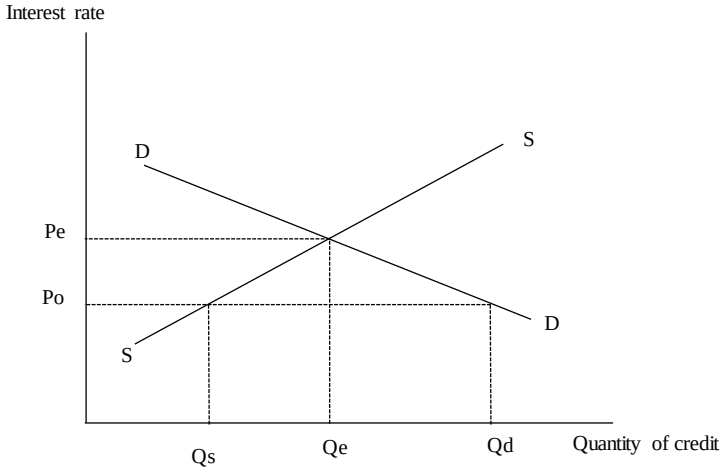
Market Mechanism', George A. Akerlof uses the automobile market to demonstrate the information asymmetry common in markets that affects pricing (Lofgren et al., 2003). In the context of interest rates determination in a developing country, one might contend that the markets are closer to 'the Market for Lemons' than the efficient markets put forth by the Efficient Market Hypothesis, which brings forth the question of whether governments should step in to correct market inefficiencies.

d) Price theory

A credit market can be viewed like any other market where there are buyers (borrowers) and sellers (lenders) of money as the commodity at a price which is the interest rate (Vandenbrink, 1980). This relationship is demonstrated in the simple demand and supply diagram in Figure 2 below. The demand curve (D) indicates the amount of credit borrowers are willing to take up at different interest rates. The supply curve (S) indicates the amount of credit lenders are willing to supply at different interest rates. In a perfectly competitive market, the equilibrium interest rate (Pe) and quantity (Qe) are at the point where the two curves intersect.

Introducing a price ceiling (Po) that is below the equilibrium interest rate creates a difference between the quantity credit lenders can supply (Qs) and the quantity demanded by borrowers (Qd).

Figure 2: Effect of price ceilings on equilibrium interest rate. Adapted from Becker (2017).



Putting price ceilings, therefore, may result to non-price credit rationing.

e) Non-price rationing theory

Claudio Gonzalez-Vega (1984) posits that an imposition of an interest rate ceiling has three effects. Firstly, a reduction in the total portfolio of assets due to a reduction in rate paid on deposits which also reduces the ability to attract additional equity capital. Secondly, ceilings reduce the overall profitability of lending which reduces the banks' overall allocation of funds to lending. Thirdly, since the effect of ceilings varies across asset classes, the degree of rationing will differ. Given the risks, transaction costs and information costs of lending to borrowers of different asset classes, most financial institutions optimize the adjustments of these three aspects of a loan to a particular borrower. Given a price ceiling that limits use of interest rates as a rationing measure, the lender then only has the choice of limiting the accessibility or size of the loan, or by increasing the non-interest cost of the loan. The final tool serves to lock out borrowers who are deemed unattractive.

2.6 Empirical Literature

Several empirical studies have demonstrated the importance of commercial credit supply towards growing agricultural productivity, food security and the economy. Examining the impact of agricultural financing on economic growth in Nigeria, Nwankwo (2013) found a strong link between agricultural financing and economic growth. In a study to examine the impact of commercial banks' credit on agricultural productivity, Ekokotu (2015) conducted a time series analysis of banking data between 1980–2013 using Ordinary Least Squares (OLS) techniques. This analysis indicated a positive relationship between commercial banks' credit and agricultural productivity. In a bid to determine factors affecting commercial lending to agriculture in Texas, Betubiza and Leatham (1995) conducted a Tobit econometric analysis on 1053 banks in the United States. This study was motivated by the observed fluctuating commitment of commercial banks to lending to agriculture. In particular, the study observed that in the wake of the 1980 bank deregulation, the resultant increased access to loanable funds to banks had not increased lending to agriculture. Among the factors analysed were the banks' deposit structures, competition, profitability, risk, the value of land in each county, the ratio of farm income to total income in each county, the population, oil production, and the risk levels of each county, among others. The results showed that as commercial bank deposits become more sensitive to market rates, less funding was availed to agriculture.

In an empirical examination of the perceived riskiness of the agricultural sector as a barrier to accessing agricultural credit, Onguka (2014) conducted a regression analysis on 5-year data of

43 commercial banks in Kenya, examining the relationship between non-performing loans (NPLs), interest rates, and the real GDP on loans advanced to the agricultural sector. This study found that over the study period (2009–2013), gross loans to agriculture grew but at a decreasing rate of growth. This growth was attributed by a government guarantee program and product innovation by commercial banks. However, NPLs fluctuated over the same period. The increase in interest rates did not temper the demand for loans as is theoretically predicted, which suggested that borrowers considered other factors when applying for bank credit. Changes in real GDP did not have a direct effect on gross loans advanced to agriculture. This study concluded that there was no relationship between growth rates in agricultural loans advanced and growth in non-performing loans. Hartarska and Nadolnyak (2015), however, came to an opposing conclusion. In an analysis of USDA state-level lending data between 1991 and 2010, they found a positive link between credit and economic development in rural areas. Similarly, in a study that utilised an econometric model to analyse the relationship between lending to agriculture and selected macroeconomic, variables, which included inflation rate, interest rate, exchange rate, and GDP growth rate, Wainaina (2013) found that both the GDP growth rate and interest rates had an effect on the quantum of credit availed by commercial banks to the agricultural sector. This study revealed that an increase in GDP resulted in a corresponding increase in the amount of credit provided by commercial banks to the agricultural sector.

Maloba and Alhassan (2019) carried out a study to investigate the determinants of agri-lending among financial institutions in Kenya over the period 2011 to 2016. Drawing from a sample of 15 licensed financial institutions and using a panel multiple linear regression model, the scholars found that the institutions' equity and credit risk had a negative and statistically significant effect on the proportion of gross loans advanced to the agricultural sector. The type of financial institution, lending rate and firm size were observed to have a positive and significant effect on agricultural lending.

In a review of credit risk assessment methods used by banks when assessing agricultural borrowers in Uganda, Lukwiya (2016) found conventional risk-assessment models were ill-suited for agriculture, because of the seasonal nature of the business and the level of informality in the sector, and instead, customer-specific metrics were used. In a study of 270 farmers of all sizes in Nigeria, Oluwasola (2008) found that the supply of credit to agriculture

was dependent on the interest rate charged on loans, the amount of savings made by loan beneficiaries, the size of the loan demanded, and the farmer's repayment track record.

It would be remiss to look at the determinants of lending to agriculture without evaluating whether the level of national debt has an impact on the availability of credit to the private sector. Using a robust VAR model that utilised over four decades' worth of data from Egypt, Shetta et al. (2014) found that banks tended to shift from private credit to government debt-instruments as government's demand for debt increased. As at December 2019, Kenya's domestic debt stood at KES 2.9 trillion, which was 49% of the country's total debt (CBK, 2019b). This amount comprised of treasury bills, treasury bonds and Central Bank overdrafts. In a 8-year study between 2008 and 2016, Mbogho (2017) found that high levels of domestic debt had a negative impact on the availability of commercial credit to businesses in Kenya. This was associated with the crowding out of private borrowing by government borrowing.

Focusing on the demand side of agriculture finance, Katchova (2005) used regression analysis on 3,123 farm records representing 1.26 million farms in the US with a total of 19 variables, one of which was interest rates. This research study found that the key determinants of demand were the farm's gross income, the age of the operator, and their attitude towards risk. Farms that had higher gross income also had higher levels of debt, while older operators tended to carry less debt. The operator's risk aversion negatively affected their demand for credit. Farm profitability and interest rate on existing debt had little impact on credit use.

The major argument against interest rate ceilings is that they have a distortive effect on the market. It is argued that they prevent the natural price-setting mechanisms from acting, thereby locking out high-risk customers. This runs counter to the financial outreach agenda behind these ceilings. A 1982 US study showed that interest rate ceilings on motor vehicle loans curtailed the availability of credit, without appreciably changing the underlying conditional distribution of equilibrium rates (Villegas, 1982). In developed markets, there has been evidence that the imposition of ceilings could increase the level of interest rates. A study of payday loans in Colorado resulted in a steady increase of interest rates (DeYoung & Phillips, 2009). This was attributed to implicit collusion among lenders.

According to CGAP's study on the effect of interest rate ceilings on microfinance institutions (MFIs), interest rate ceilings have a negative effect on the economy (Wright & Alamgir,

2001). This study found that when MFIs' loan pricing is regulated, they tend to withdraw from the market, become less transparent about total loan costs and/or reduce their work in rural and other costly markets. This report was based on a survey of Nicaragua, West Africa and South Africa, where interest rate ceilings had been imposed on MFIs. In some instances, financial institutions find creative ways to evade the interest rate caps. In South Africa, some financial institutions charged for credit life insurance and other services which concealed the total cost of credit (Maimbo & Gallegos, 2014). In Japan, interest rate caps led to the contracting of credit, a reduction of loan applications and the rise of illegal lending (Ellison & Forster, 2006; Porteus et al., 2010). In Armenia, financial institutions imposed additional fees and commissions as a way to avoid the rate caps (Helms & Reille, 2004).

Since the imposition of the interest rate cap in Kenya, there has been a number of studies on the effect of the cap on different aspects of the banking sector. Using correlational analysis of stock prices and interest rates, and stock volumes and interest rates on 11 listed banks, Mbua (2017) found that the interest rate cap had a negative effect on the returns of the banks, and, by extension, their attractiveness to investors on the Nairobi Stock Market. In a four-period study of 37 banks using inferential statistics, Kiseu (2017) found that the interest rate capping did not significantly influence the overall loan book of Kenyan commercial banks. The study discovered that the top tier banks grew their loan book across the board despite the rate caps, while the smaller banks had reduced growth. This led to the conclusion that the rate ceilings had a negative effect only on smaller banks' loan books, while larger banks were able to grow their loan books. In a sectoral study on the overall effect of the interest rate cap on the economy, the Central Bank of Kenya (2018) found that in the nine months following the introduction of the rate cap, there was a decline in the share of loans offered to micro, small, and medium enterprises (MSMEs) from 23.4% to 17%. This was validated by a study of 100 small and medium enterprises in Nairobi which found that while interest rate capping made credit more affordable, small businesses were crowded out by large corporations and the government which had lower default risk (Mokaya, 2018).

2.7 Summary of the Literature Review

Most studies seem to agree with the general theory that price ceilings have a negative effect on access to credit. The exceptions to this are where price ceilings are set at a rate that is higher than the equilibrium price, in which case there might be an increase in the average interest rate, but no reduction in credit issued to borrowers.

Interest rate ceilings have been criticized as a blunt instrument for protecting borrowers, since not all high-interest loans are unfair, and not all consumers under-estimate the risks of high-cost credit. As seen above, financial institutions could circumvent ceilings through charging high processing fees and other fees not disclosed to borrowers. Given the evidence that interest rate ceilings do not eliminate the information asymmetry and market failure that leads to limited access to credit, it is worthwhile for policy makers to consider other tools, such as competition policies that help expand access to credit, consumer protection, financial literacy, and the use of credit bureaus to alleviate the lack of credit information. Where interest rate caps must be used, they should be in conjunction with the other suggested measures, such as credit bureaus that assess borrower credit worthiness (Maimbo & Gallegos, 2014). There should also be a clear definition of the nature of the ceiling, the financial products it affects, and a definition of the total cost of credit to avoid concealed pricing tactics by financial institutions.

In less developed economies, studies have shown that interest rate ceilings have had no effect on the banks' earnings but have had a negative effect on borrowers. Given that the equilibrium interest rate is unknown in Kenya, studies on the effect of the 2016 interest rate cap law on various types of borrowers will help determine whether the law effectively lowered lending rates below the equilibrium rates which would be evidenced by a decline in credit availed to borrowers. Conversely, it is worthwhile studying whether the interest rate ceiling achieved its intended consequence, which was to increase access to credit to key economic sectors of the country. So far, the studies on this have focused on the effect of the interest rate cap on banks' performance, lending to businesses in general and on personal lending. There has not been much study on the sectoral impact of interest rate ceilings to determine whether the effect was differentiated or similar across all economic sectors.

This study focuses specifically on agriculture, given its importance to Kenya's economy, and the low rates of commercial funding that have historically been availed to the sector. The next section introduces the research methodology. It outlines the research design, the rationale behind the estimation approach chosen, and lays out the model specification used in the data analysis.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter is devoted to describing the techniques and the sequence of logical steps that facilitated an effective inquiry into the research problem. The chapter describes the overarching research design upon which the study was framed; the population of interest; variable operationalisation and measurement; the empirical model and the data analysis techniques. The rationale underlying the selection of a given approach in the sections is also highlighted in this chapter.

3.2 Research Design

This study used longitudinal quantitative research. Quantitative research is defined as the systematic empirical investigation of observable phenomena, using statistical, mathematical or computational techniques (Glesne, 2011). A longitudinal design permits the analysis of variables that change over time (Brians et al., 2010), uncovering the interrelationship between the variables of interest in the study. Considering the intent of the study was to explore how credit supply to agribusiness is affected by interest rates at two points in time, before and after capping, this design was thus the most appropriate for use.

3.2.1 Data Period and Source

This research utilised quantitative data to answer the research question outlined in Section 1.2 above. Secondary data, in the form of the banking sector's performance, was sourced from the annual reports published on the banks' websites. The study covered the 5-year period between 2014 and 2018, which consisted of two years of a liberalized interest rate regime (2014 and 2015), and two years under rate ceilings (2017 and 2018).

Data from 2014 to 2018 was collected for purposes of analysis but only data for periods 2014/2015 and 2017/2018 was analysed. Data from 2016 was excluded from the study as it covered a period which was under interest rate ceilings (September to December) and a period that was not under interest rate ceilings (January to August). The study targeted all licensed commercial banks in Kenya. As of 31st December 2019, there were 42 licensed commercial banks (CBK, 2019a) of which three were under statutory management and, therefore, were excluded from the study. Only the banks with continuous data over the periods 2014–2015

and 2017–2018 were included in the study. After all such exclusions, the final vetted balanced panel data set comprised of 26 commercial banks.

Prior to fitting the regression model, the data was tested for classical linear regression assumptions of normality, multicollinearity, heteroscedasticity and autocorrelation. Normality was assessed using a Jarque-Bera test. A Pearson correlation analysis was conducted to assess the data for multicollinearity. The Breusch/Pagan/Cook-Weisberg test was employed in the assessment of heteroscedasticity, and the Wooldridge test for checking autocorrelation. A test of significance was based on a 5% significance level.

3.3 Empirical Model Specification

The key interest in the study was to determine whether there are differential effects in agriculture sector lending by commercial banks during pre-capping and post-capping periods. These effects were estimated using the following model:

$$AGRIL_{i,t} = \beta_0 + \beta_1 IC_t + \beta_2 BSIZE_{i,t} + \beta_3 EQR_{i,t} + \beta_4 LIQ_{i,t} + \beta_5 ASQ_{i,t} + \beta_6 IS_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $AGRIL_{i,t}$ represents the percentage proportion of loans advanced to the agricultural sector by bank i at a time t; $IC_t$is a dummy variable taking 0 to represent the pre-capping period (2014-2015) and 1 the post-capping period (2017-2018) for a bank i and year t; $BSIZE_{i,t}$ denotes the size bank i and year t; $EQR_{i,t}$ represents the equity of a bank *i* at time *t;* $LIQ_{i,t}$ is the liquidity of bank i and year t while $ASQ_{i,t}$ and $IS_{i,t}$ represent asset quality and interest spread of bank i and year t. respectively. Lastly, $e_{i,t}$ denotes the error term, which includes other unobserved bank-specific effects and idiosyncratic error.

β_0 is the value of the dependent variable ($ARGIL_{i,t}$) assuming all independent variables are zero. β_1 to β_5 are the regression coefficients of the independent variables while ε is the error term which is assumed to be independent.

3.3.1 Measurement of Variables

Loans and advances offered to customers in the agricultural business segment of the banks represented the dependent variable of the study. The predictor variable included a dummy variable representing the pre-capping regime and post-capping regime. The periods 2014 to 2015 and 2017 to 2018 were selected to represent the pre-capping and post-capping regimes,

respectively. A series of firm-specific characteristics that may have had an influence on the banks' capacity to advance loans to the agricultural sector were controlled for.

A description of the study variables is presented below.

i. *Loans to the agricultural sector:* This represented the study's dependent variable. It was measured in terms by the agricultural-gross loans ratio computed as the percentage of total annual loans advanced to the agricultural sector in the total annual loan portfolio of a bank. It was hypothesised that interest rate capping would have a significant effect on the volume of loans to the agricultural sector.

ii. *Interest rate capping:* This represented the study's predictor variable. This was taken as a dummy variable with 0 representing the pre-interest rate capping period (2014-2015) and 1 the post-interest rate capping period (2014-2015). It was hypothesised that interest rate capping would have a significant effect on the amount of loans advanced to the agricultural sector (Madeira, 2019).

iii. *Firm size:* This was measured by the natural logarithm of a bank's total assets in a given year (Yasmin & Rashid, 2018). A study by Ellinger, Katchova and Nam (2007) established a positive relationship between the size of a financial institution and lending to agriculture by commercial banks. Therefore, it was anticipated that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of the bank size.

iv. *Equity:* This was measured by the equity-asset ratio. This was computed as the percentage of total annual equity to the total assets of a bank (Prabowo et al., 2019). There is no consensus in regard to the true nature of the relationship between equity and lending to the agricultural sector in the extant literature. For instance, Koch (1988) observed that banks with a large equity base are more willing to engage in more risks by investing more in loans. In contrast, Betubiza and Leatham (1995) posited that financial institutions with a smaller equity base are more willing to invest in riskier assets, such as loans, in a bid to boost expected returns. However, based on the basis of the trade-off theory advanced by Berger (1995), a positive relationship exists between equity and the amount of credit supplied by a financial institution. Therefore, it was expected that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of the equity of the banks.

v. *Liquidity:* This was measured as the ratio of a bank's cash balances to total deposits expressed as percentage. Previous studies by Olusanya (2012) and Timsina (2017) established that a bank's liquidity level has a significant effect on its lending behaviour. Therefore, in an effort to determine the relationship between interest rate capping and the volume of loans

advanced to the agricultural sector, it was important to control for the effect of the banks' liquidity. It was expected that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of the banks' equity levels.

vi. *Asset quality.* This was measured by the ratio of non-performing loans to the annual total loan portfolio of a bank. Shirzadi (2015) established a negative relationship between asset quality and credit advanced to the agricultural sector. Therefore, in order to determine the relationship between interest rate capping and the volume of loans advanced to the agricultural sector, it was important to control for the effect on the banks' liquidity. It was expected that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of asset quality.

vii. *Interest spread:* This was measured by the ratio of net interest income to the annual total assets of a bank. In general, the interest spread is positively related to lending (Klein, 2020). To determine the link between interest rate capping and the volume of loans advanced to the agricultural sector, it was important to control for the effect of a bank's interest spread. It was anticipated that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of interest spread. Table 3.1 below shows a summary of how the study variables were measured.

Table 3.2: Variable Description

Type	Measurement	Source of data	Literature Sources
Dependent Variable			
Loans to agricultural sector	Ratio of a bank's loans to the agricultural business segment to total loans advanced expressed as a percentage in a given financial year	Each bank's annual report	(Maloba & Alhassan, 2019)
Independent Variable			
Interest rate capping	Dummy variable taking 0 to represent the pre-capping period (2014–2015) and 1 the post-capping period (2017–2018)	Derived by the researcher	(Madeira, 2019)
Control Variables			
Firm size	Natural logarithm of a bank's total assets in a given year	Each bank's annual report	(Yasmin & Rashid, 2018)
Equity	Ratio of equity to total assets in a given year	Each bank's annual report	(Prabowo et al., 2019)
Liquidity	The ratio of cash balances to total deposits	Each bank's annual report	(Timsina & Pradhan, 2017)
Asset quality	The ratio of non-performing loans to gross loans	Each bank's annual report	(Shirzadi, 2015)
Interest spread	The ratio net interest income to total assets	Each bank's annual report	(Klein, 2020)

3.3.2 Estimation Approach

The collected data was analysed using STATA statistical analysis software. The analysis commenced with the computation of descriptive statistics for the study variables. These statistics included the mean, minimum, maximum and standard deviation. A panel regression approach based on Ordinary Least Squares was then used to examine the effect of interest rate capping on credit supply to the agriculture sector. There are two panel regression techniques, namely fixed effects and random effects. Fixed effects models capture attributes that are specific to an individual unit and which do not vary over time (Allison, 2009). On the other hand, random effects models are concerned with unique and time-invariant attributes of an individual unit that are a product of random variation (Brooks, 2008). The Hausman test was used to determine which approach was effective for analysis of the study's data.

Prior to fitting the regression model, the data was tested for classical linear regression assumptions of normality, multicollinearity and heteroscedasticity. Normality was assessed using the Jarque-Bera test. A Pearson correlation analysis was conducted to assess the data for multicollinearity. The Breusch/Pagan/Cook-Weisberg was employed in the assessment of heteroscedasticity and the Wooldridge test for checking autocorrelation.

The results derived from the analyses were presented in tabular format. These results are presented and discussed in the next section.

CHAPTER 4: PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the findings uncovered from the analysis of the data collected in the study. It commences with the explication of descriptive statistics that render a broad view of the primary elements in the study. The second section is a presentation of the results of the inferential statistical analysis that was conducted using panel regression. The final section briefly captures the interplay between what has been found in this study and others.

4.2 Summary Statistics

In this section, the goal was to determine if there was a difference in the manifestation of the study variables before and after the interest rate capping period. Mean and standard deviations were invoked, the results of which are presented in Table 4.1 below:

Table 4.1: Descriptive Statistics of Study Variables

	Pre-Cap			**Post-Cap**			**Total**		
	Mean	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
AGRIL	0.0866	0.1304	47	0.0668	0.1135	71	0.0747	0.1204	118
BSIZE	10.6461	1.2742	74	10.7050	1.4104	111	10.6815	1.3543	185
EQR	0.1935	0.1641	74	0.2558	0.2317	112	0.2310	0.2092	186
LIQ	0.1535	0.2045	60	0.4085	1.7110	100	0.3129	1.3615	160
ASQ	0.1822	0.2672	72	0.2343	0.2579	108	0.2134	0.2622	180
IS	0.0567	0.0249	58	0.1068	0.5212	97	0.0880	0.4125	155

Note: AGRIL=Agricultural lending; BSIZE= Bank Size; EQR=Equity ratio; LIQ=Liquidity ratio; ASQ=Asset quality; IS= Interest Spread

The results show that the average volume of loans advanced to the agricultural sector during the entire study period was 7.47% (*SD*=0.1204). However, there was a decline in these loans. On average, agricultural loans held 8.66% (*SD*=0.13) share of the gross loans advanced by the commercial banks during the pre-capping period (2014–2015) compared to 6.68% (*SD*=0.11) during the post-capping period (2017–2018). It is also evident that the average size of a commercial bank remained relatively the same before and after interest capping rates were established. In particular, before and after capping, the average firm size was 10.65 (*SD*=1.27) and 11.35 (*SD*=1.41), respectively.

On average, the equity of the banks through 2014 to 2018 stood at 23.1% (SD=0.21). The results also indicated that there was an increase in the equity of the banks before and after the capping of the interest rates. In particular, through 2014 to 2015, the average equity represented 19.35% (*SD*=0.1641) of the banks' total assets compared to 25.58% (*SD*=0.23) for the period 2017 to 2018. The results further show that the asset quality ratio of the banks increased from 18.22% (*SD*=0.267) in the pre-capping period to 23.43% (*SD*=0.26) in the post-capping period. A similar incremental pattern was reported for interest spread. The interest spread ratio rose from 5.67% (*SD*=0.025) to 10.68% (*SD*=0.52).

4.3 Inferential Results

This section serves to present the outcomes from applying the study' model. As a prerequisite, the data had to be checked for any evidence of violating the standard assumptions of regression. To this end, the data was conveniently examined for normality, stationarity, collinearity and heteroscedasticity

4.3.1 Diagnostic Tests

A set of investigative tests were conducted to determine whether or not the data contained any serious violations of the regression assumptions. A correlation analysis was performed to detect the presence of multicollinearity, while the Wooldridge test was conducted to test for serial autocorrelation. To find out whether or not the data displayed heteroskedastic tendencies, the Breush-Pagan/Cook-Weisberg test was conducted. With respect to the choice of a fixed or random effects model, the Hausman specification test was employed. Three models were estimated, the first being the basic model while the second and third models were re-estimations of the basic model for the pre-interest rate cap and post-interest rate cap periods respectively.

4.3.1.1 Multicollinearity

Multicollinearity is observed when two or more predictor variables are highly associated or correlated, the presence of which substantially reduces the validity of the results displayed by the model. To determine which independent variables displayed multicollinearity, a correlation analysis was conducted, the results of which are displayed in Table 4.2 below.

According to the results of the correlation analysis, there is a weak and statistically non-significant correlation between interest rate capping and the amount of loans advanced to the agricultural sector by commercial banks (r=-0.097, p.0.05). In addition, the correlation between the control variables did not have coefficients greater than 0.8 which implies that multicollinearity is not indicated in the dataset.

Table 4.2: Pearson Correlation Results

	1	**2**	**3**	**4**	**5**	**6**	**7**
1.AGRIL	1						
2.INTCAP	-0.097	1					
	(0.2963)						
3.BSIZE	-0.4283	0.0214	1				
	(0.000)	*(0.7729)*					
4. EQR	-0.0596	0.1562	-0.0502	1			
	(0.5195)	*(0.0333)*	*(0.4954)*				
5. LIQ	-0.0252	0.0171	0.1711	0.164	1		
	(0.7854)	*(0.8302)*	*(0.0300)*	*(0.0371)*			
6. ASQ	-0.0154	0.1158	0.0417	-0.1076	-0.0442	1	
	(0.8695)	*(0.1215)*	*(0.5774)*	*(0.1482)*	*(0.5837)*		
7.IS	-0.0426	-0.1308	0.2415	-0.0026	0.1338	-0.0363	1
	(0.6455)	*(0.1046)*	*(0.0024)*	*(0.9739)*	*(0.0948)*	*(0.6585)*	

Note: AGRIL=Agricultural lending; INTCAP=Interest rate cap; BSIZE= Bank Size; EQR=Equity ratio; LIQ=Liquidity ratio; ASQ=Asset quality; IS= Interest Spread. P-values on parenthesis; p <0.001 at 1%; p <0.05 at 5%; p <0.10 at 10%

4.3.1.2 Non-autocorrelation

This assumption holds that the error terms are uncorrelated. To assess non-autocorrelation, the Wooldridge test was used, the results of which are displayed in Table 4.3 below.

Table 4.3: Wooldridge Test Results

	F	**Prob > F**
All (2014-2018)	8.539	0.0087
Pre-Cap	8.725	0.0031
Post-Cap	9.499	0.0059

The Wooldridge test was applied at the 5% level of significance. Table 4.3 reports p-values that were less than 5% for the pre-cap and post-cap periods. As such, the null hypothesis that there was no serial autocorrelation in the model specification was rejected.

4.3.1.3 Homoscedasticity

Homoscedasticity is present when residuals portray a variability that does not change irrespective of their predicted values. This characteristic was examined with the aid of the Breusch-Pagan/Cook-Weisberg test. The outcome of the test is shown in Table 4.4 below.

Table 4.4: Breusch-Pagan/Cook-Weisberg Test Results

	χ^2	**Prob** >χ^2
All (2014-2018)	87.47	0.000
Pre-Cap	28.58	0.000
Post-Cap	61.7	0.000

Table 4.4 indicates that the *p*-values linked to the chi-square statistics were less than 5%; hence the null hypothesis of constant variance was rejected.

4.3.1.4 Specification Test

Before producing the final model, a decision had to be made whether to use a fixed or random model. To arrive at this decision, the Hausman test was performed. The outcome of the test is illustrated in Table 4.5 below.

Table 4.5: Hausman Test Results

Model	χ^2	**Prob** >χ^2
All (2014-2018)	7.1	0.3121
Pre-Cap	7.71	0.1731
Post-Cap	1.14	0.9505

As illustrated in Table 4.5, the *p*-values surpassed the 0.05 cut-off. On these grounds, the null hypothesis that the random effects model is the better option was not rejected. Consequently, the random effects model was employed for this study.

4.3.2 Regression Results

The final model was estimated using the random effects technique to investigate the relationships between the agri-lending and interesting rate cap while adjusting for equity, firm size, liquidity, asset quality and interest spread. The models are estimated for the full data period, in addition to the pre-cap period and post-cap period. The results are illustrated in Table 4.6 below.

The results indicated that the basic model explains 20.13% of variation in the volume of loans to the agricultural sector when accounting for interest rate capping. Similar explanatory power is also observed for the pre-cap and post-cap estimations. The random effects model was found to be statistically significant because the Wald test *p*-value linked to the model was less than 0.05. Therefore, the model could be used to explain the effects of interest rate capping on the amount of loans to the agricultural sector.

Table 4.6: Random Effects Regression Model Results

	Dependent Variable: *Loans to the Agricultural Sector*		
	Model 1	**Model 2**	**Model 3**
	All (2014-2018)	**Pre-Cap Period**	**Post-Cap Period**
	Coef.	*Coef.*	*Coef.*
Constant	0.5360***	0.7694***	0.4725***
	(0.1205)	(0.1717)	(0.1352)
Interest rate cap	0.0105*		
	(0.0059)		
Bank size	-0.0423***	-0.0555***	-0.0363***
	(0.0107)	(0.0145)	(0.0118)
Equity ratio	-0.0452**	-0.2449	-0.0608**
	(0.0208)	(0.2099)	(0.0277)
Liquidity	0.0439*	0.0940***	0.1012**
	(0.0262)	(0.0306)	(0.0416)
Asset quality	-0.0034	0.0015	0.0149
	(0.0180)	(0.0186)	(0.0267)
Interest spread	0.0511	-0.9659**	-0.0234
	(0.1920)	(0.4097)	(0.2710)
Wald χ^2	22.1*	22.92	15.9
Prob > χ^2	0.0012	0.0004	0.0071
R-squared	0.2013	0.2080	0.2096
Banks	26	23	25
Observations	114	45	69

Note: Heteroskedastic and autocorrelation consistent (HAC) standard errors in parentheses. ***, ** and * denotes significance at 1%; 5% and 10% respectively.

The results further indicated that controlling for bank size, equity, liquidity, asset quality and interest spread, the loans issued to the agricultural sector during a post-capping period were 0.011 times the volume of loans issued during the pre-cap period. This effect was also found to be statistically significant at a 10% significance level. This indicates that lending to the agricultural sector increased post-interest capping. A possible explanation of this phenomenon, as suggested by Ochenge and Tiriongo (2018), is that the banks lent more to

clients with collateral or better risk profiles, a criterion which a lot of the agricultural practitioners met. Hence, the null hypothesis that the interest rate ceiling has no effect on the agricultural loans and advances issued by commercial banks in Kenya is rejected. The finding contradicts the non-price rationing theory, which postulates that establishing interest rate ceilings leads to a reduction in the total loan portfolio. The finding contradicts the evidence presented by Kiseu (2017) that interest rate capping does not have a significant effect on the loan portfolio of commercial banks in Kenya. However, the finding is consistent with Mokaya (2018), who found a significant relationship between interest rate capping and the volume of loans issued to SMES in Kenya.

The results also show that of the five control variables, only bank size, equity ratio and liquidity has a significant effect on agri-lending. Specifically, the coefficient of bank size is observed to be negative and significant at 1% across all the three models which indicates that the larger a financial institution is, the lower their level of lending to the agricultural sector. This finding suggests that firm size plays an important role in agri-lending by Kenyan banks and supports the finding Ellinger et al. (2007). However, the estimated effect of bank size on the agri-lending was lower during the post-capping period (-0.036) than during the pre-capping period (-0.056) and indicates that the negative effect of bank size on agri-lending reduced after post-capping. This implies that larger banks had the largest capital erosion compared to small ones after interest rate capping, which could be attributed to reduced earnings. This contradicts Gounder and Sharma (2012), who established that the larger the bank the more loans it can make available to customers.

Similarly, the effect of equity is observed to be negative across all three models but only significant in Models 1 (All Sample) and 3 (Post-cap) at 5% which suggests that an increase in the bank's equity ratio leads to a decrease in the volume it lends out to the agricultural sector. A possible explanation of this relationship is that the banks had sufficient sources of income and were, therefore, better able to achieve their targeted return rate without taking unnecessary risk of lending at a capped interest rate. This is consistent with Mbella and Magloire (2017), who found that financial institutions with a low equity base lend more proportionately as a strategy to boost expected returns. Based on the estimated significant effect for the post-cap sample (Model 3), a unit increase in bank equity results in 0.061 unit reductions in agri-lending. This further confirms that banks with enough source capital were able to accommodate capital losses.

On the contrary, the coefficient of liquidity is positive and significant across Models 1 (10%), 2 (1%) and 3 (5%), which indicates that increases in bank liquidity results in increases in bank agri-lending. This could be attributed to the fact that high liquidity ratios point to better protection from shocks to their deposit size and ability to expand lending. This outcome is consistent with Olusanya (2012) and Timsina (2017), who established that a bank's liquidity level has a significant effect on its lending behaviour. Unlike bank size, the effect of liquidity on agri-lending was observed to be greater during the post-capping period (0.101) than the pre-capping period (0.094).

Both asset quality and interest spread were found to have no significant effect on agri-lending during the entire study period at both 1% and 5% level respectively. This implies that the negative effect of asset quality and the positive effect of interest spread on agri-lending by Kenyan banks could be attributed to chance. This finding contradicts Shirzadi (2015), whose study established a negative link between asset quality and volume of loans advanced to the agricultural sector. Similarly, the finding that interest spread has no significant effect on agri-lending is inconsistent with Klein (2020), who found a positive and significant relationship between interest spread and bank lending.

In light of the above observations, the final section of this study coalesces the key conclusions from the study and makes recommendations on how central banks can utilize various policy tools at their disposal to increase access to financing to key sectors such as the agricultural sector.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

A summary of the key insights derived from this study is presented herein. Accompanying the summary are conclusions and useful recommendations to different stakeholders. Also captured in this chapter are research opportunities that aspiring future researchers may find helpful.

5.2 Summary of Findings

The main goal of this inquiry was to examine the influence of interest rate capping on the loans issued to the agricultural sector by commercial banks in Kenya. The results revealed that the amount of credit supply to the agricultural sector increased following the imposition of interest ceilings. The findings from the panel regression analysis confirmed that the variations in the amount of loans to the agricultural sector are affected by imposition of interest ceilings.

5.3 Conclusion

The key finding in this study is that the imposition of interest rate ceilings has a significant impact on credit supply to the Kenyan agricultural sector. The finding holds after controlling for bank-specific characteristics such as firm size, equity, asset quality, liquidity and interest spread. This suggests that interest ceilings may be effective in boosting lending to the sector.

The government has a critical role of ensuring a stable policy environment that enhances the growth of the financial sector, which by extension facilitates the growth of other key sectors through the provision of business funding. With this in mind, incentivising and dis-incentivising policies or regulations must be long term and stable in order to ensure investment certainty, which, in turn, motivates private funding and business activity in the financial sector. Interest rate ceilings are commonly said to be necessary to ensure access to ‘fair’ interest rates. The assumption underlying this view is that the demand for loans would be higher if the interest rates charged by banks are lower, and there would be no dampening of the supply of credit to the private sector as a result of the ceilings. The imposition of an interest rate ceiling on lending rates and a floor on deposit rates was anticipated to attract a

greater flow of savings into the Kenyan commercial banking system and to facilitate a more efficient allocation of funds for longer-term credit arrangements resulting in better intermediation. With a greater bulk of total bank deposits, it would be expected that the outcome would fundamentally lead to more positive returns for the banks in terms of profitability and dividend payouts to the shareholders. The analysis in this study attests to the success of ceilings in attracting borrowers.

5.4 Recommendations

The results of this study point to the effectiveness of interest rate capping in meeting its objectives. This calls for the strengthening of cooperation between the government and key players in the financial sector. This will allow for the effective enforcement of policies by the regulatory powers in a manner that guarantees sound and dynamic financial systems. In this regard, there is a need for continuous engagement between the banking sector, the non-financial sector and the CBK. This is necessary to explore additional measures and strategies that can support the banking sector, protect consumers from exploitation and protect borrowers from excessive interest rates.

The state should strive to provide an enabling environment set up to elevate the competitiveness of the banking sector, which could potentially lower the cost of credit access by many citizens. A number of steps can be undertaken to facilitate this, such as stabilising macroeconomic factors, charting sound legal regulations, launching widespread financial education initiatives and diversifying the financial ecosystem through efforts, such as setting up credit agencies or expanding the role of existing credit bureaus to enhance the sharing of credit profile information across banks.

Interest capping legislation poses a significant investment risk to investors in the banking industry. As such, legislation should be reviewed in order to isolate its positive effects from the negative effects. For instance, interest rate capping law directed to specific sectors of interests in the economy, such as agriculture and manufacturing, could be implemented rather than being directed at all sectors. In addition, government incentives such as rebates and guarantees for small-medium enterprises should be considered as alternative ways to direct more funding to agriculture.

There is a need for policy consistency and sustainability as far as financial sector regulation is concerned. Finally, it is important to protect the financial sector from political whims through institutionalisation and depersonalisation of financial sector policies and laws.

5.5 Limitations of the Study

A number of challenges were encountered in conducting this study. To begin with, not all aspects of interest rate capping and loans to the agriculture sector were addressed with adequate depth. The study relied primarily on secondary sources of data and suffered from the scarcity of resource materials for some commercial banks due to their lack of efficient means to disseminate financial results.

Another limitation is in relation to the generalisability of the study's findings. At the onset, the inquiry had a target of 42 commercial banks that had remained operational through 2014 to 2018. However, only 26 of these banks were in operation over that period and had complete data. This could potentially hamper the extrapolation of results for the entire Kenyan banking industry. In the same light, while the findings can be generalised to other populations, there are limits to the transferability to other contexts. The study concentrated on commercial banks in Kenya. Accordingly, the findings may not provide much meaningful insights into non-financial companies or commercial banks in other countries**.**

5.6 Suggestions for Further Research

The present study primarily relied on secondary data. Secondary data is associated with a number of limitations as previously highlighted, such as inaccuracies and instances of missing data. As such, it is suggested that future researchers consider carrying out more robust studies utilising mixed methodology designs in uncovering the effects of interest rate capping.

The generalisability of this study's findings has also been identified as a limitation due to the study's focus on commercial banks in Kenya. As such, it is important to conduct studies giving more insight into the effect of interest rate capping on the credit supply by other financial institutions, such as microfinance institutions. A more broadened range of studies would offer researchers adequate information to facilitate comparison and contrast of the implications of interest capping across different financial institutions.

Finally, the interest rate ceilings were lifted in November, 2019 (Kiruga, 2019) after a concerted campaign by commercial banks, supported by the Central Bank of Kenya which cited declining rates of credit access as an adverse effect of the rate cap. It would be instructive to study the effect of the lifting of the rate cap on interest rates, and whether this resulted in improved access to credit for the agricultural sector.

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APPENDICES

Appendix 1: List of Commercial Banks in Kenya

1	KCB Bank Kenya Limited	21	Credit Bank Limited
2	Equity Bank Kenya Limited	22	Guaranty Trust Bank Ltd
3	Co-operative Bank of Kenya Ltd	23	Gulf African Bank Ltd
4	Standard Chartered Bank Kenya Ltd	24	Bank of Africa (K) Ltd
5	Barclays Bank of Kenya Limited	25	Development Bank of Kenya Ltd
6	Diamond Trust Bank Kemya Limited	26	African Banking Corporation Ltd
7	Stanbic Bank Kenya Ltd	27	Paramount Bank Ltd
8	I&M Bank Ltd	28	Ecobank Kenya Ltd
9	Commercial Bank of Africa Limited	29	M-Oriental Commercial Bank Ltd
10	NIC Bank PLC	30	UBA Kenya Bank Ltd
11	Citibank N.A. Kenya	31	Middle East Bank (K) Ltd
12	Bank of Baroda (Kenya) Limited	32	Transational Bank Limited
13	Bank of India	33	Mayfair Bank Ltd
14	Prime Bank Ltd	34	First Community Bank Ltd
15	SBM Bank Kenya Ltd	35	Spire Bank Limited
16	National Bank of Kenya Ltd	36	Consolidated Bank of Kenya Limited
17	Victoria Commercial Bank Limited	37	Jamii Boara Bank Ltd
18	Family Bank Ltd	38	Sidian Bank Ltd
19	Habib Bank AG Zurich	39	DIB Bank Kenya Ltd
20	Guardian Bank Limited		