

Determinants of Agri-lending among Financial Institutions in Kenya

A Dissertation

presented to

**The Development Finance Centre (DEFIC),
Graduate School of Business
University of Cape Town**

In partial fulfilment
of the requirements for the Degree of
Master of Commerce in Development Finance

by

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February 2018

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ABSTRACT

This study seeks to examine the factors that influence Kenyan financial institutions' lending behaviour towards the agricultural sector. Secondary panel data from 15 licensed financial institutions (commercial banks and deposit-taking microfinance institutions) for a period of 6 years (2011-2016) was used after which a panel multiple regression model was estimated using random-effects to examine the significant determinants of agri-lending by financial institutions.

The study found that financial institution equity and risk on credit were negative and statistically significant in affecting the gross agricultural loans ratio while financial institution size, return on credit and financial institution liquidity were insignificant. As a result, the researcher recommends that financial institutions should devise better risk management strategies in order to reduce volume of non-performing loans in agriculture. Furthermore, the Kenyan Government should enforce the requirement that regulated financial institutions should hold a minimum of 10%-15% agricultural loans in their portfolios. This would steer larger banks to increase their investments in the agriculture given the economic benefits that the country would receive as a result.

ACKNOWLEDGEMENTS

To my parents, Mr. Emman Maloba and Mrs. Hellen Maloba for supporting me through life and instilling in me that I can pursue anything I wish for as long as I do it with genuine effort and positivity. To my sister, Nicole for providing useful networks who have contributed greatly towards the development of this dissertation. To my immediate boss, Mr. Maarten Susan who believed in me and whose skill in writing is admirable; thank you for giving me the opportunity to deepen my knowledge in a field that is of keen interest to me as I remain of service to the organisation. I also wish to extend my gratitude to my partner, Eric, for his understanding throughout this intellectual journey and always providing words of encouragement even when the chips were down.

Lastly to my supervisor, Dr. Latif Alhassan, with whom I have engaged tirelessly throughout this experience and whose advice I value greatly, not only for this dissertation but also towards future engagements of a similar nature in my career.

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LIST OF ACRONYMS

AFC	Agricultural Finance Corporation of Kenya
AGRA	Alliance for Green Revolution in Africa
AMFI	Association of Micro Finance Institutions
CBK	Central Bank of Kenya
CGAP	Consultative Group to Assist the Poor
FAO	Food and Agriculture Organization of the United Nations
FI	Financial Institution
FSD	Financial Sector Deepening Kenya
FSDT	Financial Sector Deepening Tanzania
GDP	Gross Domestic Product
IISD	International Institute for Sustainable Development
KBA	Kenya Bankers Association
KEPCO	Kenya Producers' Coalition
KES	Kenyan Shilling
KNBS	Kenya National Bureau of Statistics
MFI	Micro Finance Institution
NPL	Non-performing loan
OLS	Ordinary Least Squares
PPP	Public-Private Partnership
SACCO	Savings & Credit Co-operative Society
SME	Small and Medium-sized Enterprises
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States Dollar

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Agriculture is the mainstay of Kenya's economy, contributing up to 27% of its GDP and employing 13.6% of its labour force (KNBS, 2016). Like most countries worldwide, demand for food in Kenya is rapidly increasing. According to the KNBS (2016), Kenya's current population stands at 44 million, making it the 7th highest in Africa. However, 42% of Kenyans live below the poverty line (UNICEF, n.d.) while 35% of the children under the age of five suffer from stunted growth (Feed the future, n.d.).

Unfortunately, productivity in the country is very low; Kenya belongs to a group of African countries where the rates of yield improvement are lower than the population growth and the yields in this group are decreasing by between -0.2% to -7.6%, whereas the population is growing (Ray, Mueller, West, & Foley, 2013). This suggests that the production per capita is likely to decline in the future. Agriculture should thus become much more efficient, professional and sustainable in order to contribute to food security and economic growth. Furthermore, additional investments are required; every 1% increase in agricultural income per capita reduces the number of people living in extreme poverty by between 0.6% and 1.8% (Feed the future, n.d.). However, most financial institutions are reluctant to invest in agriculture. Wahome (2011) reported that the Kenyan Ministry of Finance identified the agricultural finance gap in the country as KES 90 billion (USD 1 billion).

In the recent past, the Kenyan Government has made reasonable effort to shift focus to the agricultural sector as a means to eradicate poverty and increase food security¹. However, Kenyan banks still hold less than 5% of agricultural loans in their portfolios (Kenya Bureau of Statistics, 2013). The role of financial intermediation in development of the agricultural sector in Kenya is crucial and as such, it would be important to understand the driving force behind financial institutions investment in the agriculture. Furthermore, the clear misalignment between GDP contribution and formal lending investments in Kenya's

¹ Once such initiative is the *Strategy for Revitalizing Agriculture* which aims to increase private sector participation in the management and delivery of services to the agricultural sector in order to raise productivity at farm-level. This presents a suitable opportunity for Public-Private Partnerships between the Kenyan Government & other private sector stakeholders including banks.

agriculture industry also calls for a need to understand the factors that influence funds flow towards this sector.

1.2 Problem Statement

Nwankwo (2000) posits that lending is the largest income-earning asset in the portfolio of most banks. Since commercial banks and other deposit-taking financial institutions carry out the role of resource mobilization and subsequent allocation of the same towards productive investments, they play a critical role in economic development of any country. Kenya has great potential for increasing its agricultural output thereby contributing towards food security and financial upturn of its citizens and economy. However, there is a clear mismatch between the contribution level that agriculture makes towards Kenya's GDP and the amount of investment allocated to the agricultural sector by financial institutions. Farmers experience difficulties in accessing finance to increase their production capacities and improve their farming methods. Financial institutions shy away from agri-lending mainly due to the reason that agriculture is perceived as a volatile sector of the economy. According to Inderst and Mueller (2006), collateral offers reasonable assurance to financiers for their adverse selection decisions; that is, a well-informed lender failing to select profitable loans based on information advantage they possess over less knowledgeable lenders. Hence collateral may be viewed as the perceived risk level of a borrower. However, Chodechai (2004) states that FIs use restrictive lending policies in order to avoid possible loss on investments. He argues that, owing to the negative effects of adverse selection, lenders cannot freely increase their interest rates on those they perceive to be risky borrowers, but rather reject such borrowers; the same is believed to be manifested in agri-lending.

It may be argued that the banking industry is dynamic hence factors that affect lending behaviour may vary overtime. Stiglitz and Weiss (1981), Ewert, Szczesmy and Schenk (2000), Chodechai (2004) and Berger and Udell (2002) all present different theoretical approaches which don't seem to concur on the determinants that affect general bank lending. Within the context of agricultural lending in Kenya, different studies conducted in the past by Langat (2013), Musuva (2014), Njuguna and Nyairo (2015) focused exclusively on commercial banks. However, there are other formal players in the agricultural lending space. According to Central Bank of Kenya (2016), there are 43 licensed commercial banks and 13 licensed microfinance institutions (MFIs). This study therefore aims to determine the factors that influence supply of credit to the agricultural sector by commercial banks and MFIs

(hereinafter collectively referred to as “FIs”) in Kenya. Subsequently the question that this research aims to answer is:

What are the factors that influence Kenyan FIs to lend to the agricultural sector?

1.3 Research Objective

The objective of this research is to determine the factors that influence Kenyan FIs to provide credit to the agricultural sector.

The research hypotheses are:

- H₀**: No functional relationship exists between the dependent variable (Loans to clients operating in agricultural sector) and the specified independent variables.
- H₁**: There is a functional relationship between the dependent variable (Loans to clients operating in agricultural sector) and the specified independent variables.

1.4 Justification for the study

The research gap identified in this study concerns lack of adequate and up-to-date information regarding agri-lending policies among licensed FIs, particularly MFIs. Agriculture is the backbone of the Kenyan economy and has great potential to positively contribute towards food security and financial development of its citizens in line with *Vision 2030*². This calls for need to build a conducive environment that would lead to increased investment in Kenya’s agricultural sector by FIs.

The findings of this study will be of significance to various stakeholders; scholars and researchers who will use these findings as a basis to build on and carry out further research in future. Public sector bodies and Government ministries who can gain a better understanding of the dynamics of the agri-lending sector and work together to build policies which seek to stimulate increased lending in agriculture. Through the findings of this research, FIs will be able to create well-tailored solutions to tap into the agri-financing market thereby increasing their return on investments.

² *Vision 2030* is a national long-term development policy that aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment. (vision2030.go.ke, 2016)

1.5 Scope of the study

This study will be limited to analysis of agricultural portfolios in registered deposit-taking financial institutions in Kenya as licensed by Central Bank of Kenya.

1.6 Organization of the study

This study is organised in five main chapters; this chapter serves as an introduction to the research topic. The second chapter contains empirical and theoretical literature review on determinants of lending among commercial banks. Chapter three explains the methodology, model specification, expected relationship between variables and data analysis techniques used in the study. Chapter four presents the estimation results including those of diagnostic tests to ensure efficiency of the model used. Lastly, an overview of the study together with suitable conclusions and policy recommendations are discussed in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section begins by interpreting key terms used in this study which provide a suitable background against which the literature review is developed. Next, an overview of the Kenyan banking system as well as recent trends in agri-lending assists in gaining an appreciation of the status quo. An analysis into the risk and return relationship as well as how it affects agri-lending decisions among FIs is presented. Finally, a review of existing theoretical and empirical literature on factors affecting commercial banks' lending decisions is done.

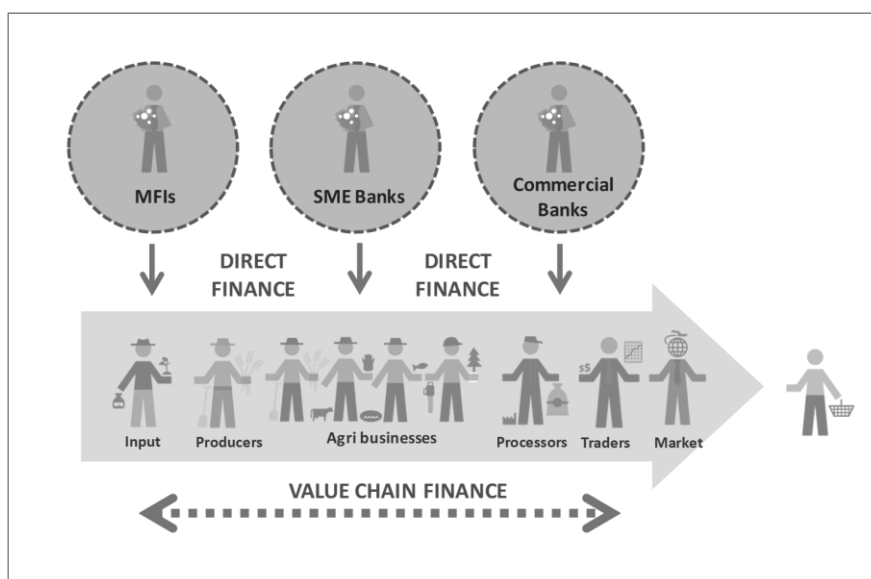
2.2 Definition of key concepts

Agricultural Finance (Agri-lending) is the provision of finance (in form of debt, equity or quasi debt/equity or other similar means) to agents in the agricultural sector and value chains. Contrary to popular belief, agri-lending is not restricted to rural dwellers although in Kenya, they produce more than 75 percent of the agricultural output and account for about 70 percent of marketed agricultural produce (World Bank, 2013).

Agricultural finance includes *value chain finance*, that is, financial flows within a particular process of activities by different players who seek to add value to a commodity (Pelrine, 2009). In order to understand and address the lack of agri-finance in certain parts of the value chain, it helps to make a distinction between two distinct types of agricultural finance:

- **Direct Finance:** finance from banks, MFIs and other financial institutions, directly granted to individual agricultural value chain players for working capital or acquisition of fixed assets. Some of the financial instruments used under direct finance include invoice factoring, savings and credit schemes and credit guarantee schemes;
- **Supply Chain Finance (or Value Chain Finance):** finance between the different agricultural value chain players, such as small-holder farmers, aggregators like co-operatives, processors (both SMEs and large corporates), traders, and exporters, mostly used to finance shortfalls in working capital). Trade credit is the most popular form of supply chain finance.

Figure 2. 1 Direct finance vs Supply Chain finance



Source: IISD (2015)

From both perspectives, there are constraints and bottlenecks to be addressed in order to solve the agricultural finance gap. It is important to realize that certain finance gaps in agriculture are better addressed through the extension of direct credits to agri-businesses, while in other cases a ‘horizontal’ intervention (supply chain finance) would be the preferred choice (IISD,2015).

Rural finance comprises the full range of financial services: loans, savings, insurance and payment and money transfer services which are needed, offered, or used in rural areas by household and enterprises; this term encompasses *agricultural finance*. (Swiss Contact, 2012)

Agribusiness is the undertaking of agricultural production for commercial benefit. It includes farming as well as production, processing, marketing and distribution of agricultural products and the manufacture of farm machinery, equipment and supplies for example, SME processors (with and without out grower schemes), traders, producer organizations like cooperatives and unions and distributors (Sonka & Hudson, 1989).

2.3 The Kenyan banking system

FIs have the basic functions of resource mobilization, resource allocation and risk transfer³. By efficiently performing these roles, they contribute towards economic development while

³ Resource mobilization achieved through receiving deposits while resource allocation is achieved through advancing loans. Risk transfer is the process of FIs shifting exposure they face in carrying out their core functions to a third-party firm (insurance company).

also maintaining their desired profitability, solvency and liquidity requirements. Unfortunately, Kenya's poor population, who are characterised by low education levels, low resource accumulation and poor access to financial markets are most vulnerable to negative effects of food insecurity (Ndung'u, 2010). By improving each of the three factors, Kenya's poor will be able to save small amounts of their earnings and use them to invest in a wide range of opportunities which would alleviate their long-term economic status. Their savings can also act as collateral to access credit in addition to reducing their susceptibility to external shocks that increase hunger and food insecurity. (World Bank, 2013).

Kenya's financial sector has undergone major reforms in the past few years which have resulted in increased access to financial services for the country's poor as well as reduced cost of owning and maintaining a bank account. For instance, since introduction of *M-shwari*⁴, the number of users on its platform who are below the poverty line increased from 19% in 2013 to 30% by end of 2014. This goes to show that millions of poor Kenyans now use savings and credit services which help them to manage risks, mitigate the impact of shocks and increasingly invest in improving their livelihoods (FSD Africa, 2016). The latest transformation experienced in September 2016 saw the Banking Amendment Act of 2015 come into effect. The revised legislation placed restrictions on interest rates offered by Kenyan banks on loans and deposits. Prior to that, the rates were mostly liberalised and allowed lenders to enjoy interest rate spreads of up to 11.7%; a rate significantly above the worldwide average of 6.6% (World Bank, 2016). With the interest rate capping came increased credit rationing, particularly among SMEs, who are viewed as being "high risk" borrowers when compared to larger and established institutions such as Governments and multinational companies.

Supply of credit by banks is influenced by both internal and external factors; Olokoyo (2011) and Olusanya, Oyebo and Ohadebere (2012) enlist prevailing interest rates, the volume of deposits, level of a bank's domestic and foreign investment, bank's liquidity ratio, prestige and public recognition. Timsina (2016) adds that GDP and a bank's liquidity ratio have the greatest impact on its lending behaviour in Nepal. On the other hand, Khangalah (2016) cites

⁴ *M-Shwari* is a combined savings and loans product launched through a collaboration between the Commercial Bank of Africa (CBA) and Safaricom. The M-Shwari account is issued by CBA but must be linked to an *M-Pesa* mobile money account provided by Safaricom. The only way to deposit into, or withdraw from, *M-Shwari* is via the M-Pesa wallet. (FSD Africa, 2016)

the borrower risk profile and bank-client relationship as the two most important elements banks consider when making lending decisions.

Lenders active in the Kenyan financial system are both formal and informal. Formal financial service providers are classified into commercial banks, non-bank financial institutions⁵, cooperative societies and agricultural finance corporations. With specific reference to target market, each of these institutions focus on different segments of the market for instance, AFC is the leading government institution mandated to provide credit to rural land owners for the sole purpose of developing agriculture ⁶(AFC, 2014). On the other hand, commercial banks focus on large scale producers who have operational and management structures in place and thereby have ability to commercially sustain their businesses (Ndung'u, 2010). Informal agri-lending institutions are not covered in this study as they are, by and large, unregulated and unstructured in terms of credit scoring and lending decisions.

As presented in Table 2.1, CBK (2016) reported that the Financial Services sector recorded the highest increase in value of loans expended by commercial banks for year ended 30th June 2016 (42.7%). This was attributed to increased demand by MFIs and SACCOs to fund their activities. Other sectors that benefitted from increased lending were Tourism (9.3%), Building and Construction (7.3%) and Real Estate (6%). The changes were mainly caused by market forces prevalent in the different sectors, for instance, a recovery of the Kenyan tourism industry following lifting of travel advisories, enhanced marketing and increased international conferences which led to increased business tourism. Mining and Quarrying sector recorded the highest decrease (15.7%), predominantly caused by repayment of gross loans.

⁵ This encompasses micro-finance institutions (both deposit-taking and non-deposit taking).

⁶ AFC has a total of 48 branches across Kenya with 41 of the outlets located in rural areas of Kenya's high potential agricultural zones.

Table 2. 1: Distribution of loans from licensed FIs by sector 2015-2016 (KES Billions)

Sector	Jun-15	Jun-16	Percentage change
Personal/Household	540.8	552.5	2.2%
Trade	430.2	446.5	3.80%
Real Estate	322.9	342.4	6.00%
Manufacturing	267.4	272.3	1.80%
Transport & Communication	180.7	179.1	-0.90%
Financial Services	80.1	114.3	42.70%
Energy & Water	99.4	102	2.60%
Building & Construction	90.7	97.3	7.30%
Agriculture	89.8	94.1	4.80%
Tourism, Restaurant & Hotels	49.4	54	9.30%
Mining & Quarrying	15.3	12.9	-15.70%
Gross Loans	2,166.90	2,267.30	4.60%

Source: Central Bank of Kenya (2016)

2.4 Commercial Agricultural lending in Kenya

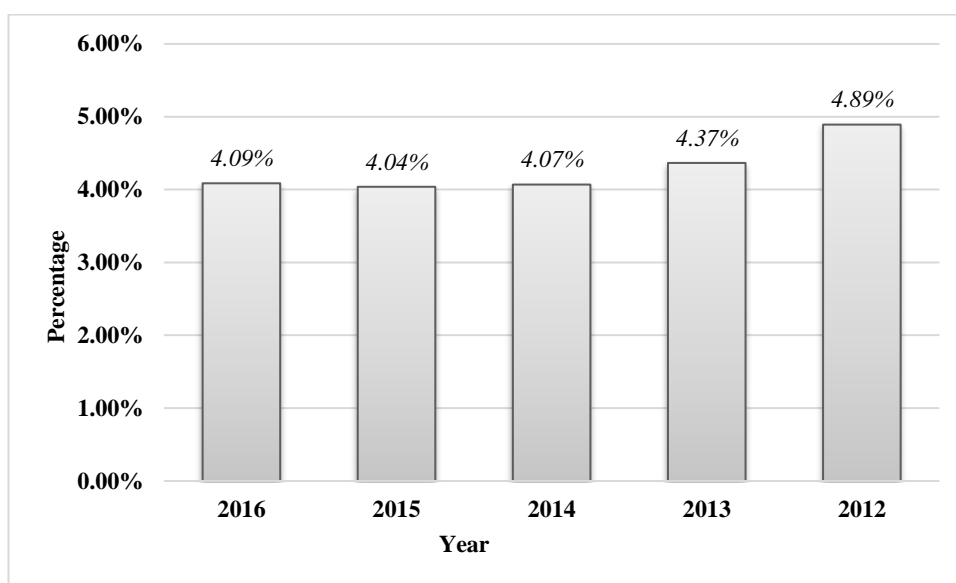
The main players involved in commercial lending to the agricultural sector in Kenya is comprised of 56 registered institutions; 43 banking institutions⁷ and 13 microfinance institutions (CBK, 2017). Despite a legal requirement for banks and MFIs to dedicate a minimum of 17%-20% and 10%-15% (respectively) of their portfolio to agriculture, the financial system has generally maintained reluctance to invest in this sector. Figure 2.2 illustrates that in the recent past years, loans made to the agricultural sector are between 4%-5% which is significantly below the regulations set by the Kenyan Government to boost credit provision towards this sector.

The conservative nature of FIs towards agri-lending in Kenya is attributed to various reasons; KEPCO (2010) mentions liberalization of interest rates⁸ while IISD (2015) cites lack of proper records on farming which makes credit assessment challenging for an FI. Moreover, there is a lack of innovative financial products that are tailored to mitigate risks inherent in agri-lending.

⁷ 42 commercial banks and 1 mortgage Company (Central Bank of Kenya, 2017)

⁸ Until September 2016, interest rates in Kenya were liberalised which meant FIs could charge significantly higher interest rates for agricultural loans as a trade-off for the perceived high risk.

Figure 2. 2: Agricultural loans to total loan disbursements by licensed FIs (%)



Source: Central Bank of Kenya Annual reports

A report by Swiss contact (2012) explains that challenges pertaining to financial inclusion in rural areas are prevalent in Kenya, despite presence of well-established FIs. Most FIs tend to be concentrated in urban areas therefore rural areas remain underserved. In addition, financial products offered to rural dwellers are often generic and not specifically tailor-made towards unique characteristics of the agricultural sector. However, in the recent past, the emergence of innovative financial products as a means to reduce inherent risks in agricultural lending have led to increased supply of credit to the sector. Although most of these mechanisms have long standing principles in traditional finance, the manner in which they are combined with other financing concepts in order to apply to an un-bankable population are what make them effective, for instance, value chain financing allows a lender to shift the risk to the more established player such as a processor or buyer, who would be more favourable in the eyes of the lender. Credit guarantee schemes also promote financial inclusion by allowing high-risk individuals or organisations to access credit on the assurance that the guarantor (usually an institution) will cover a pre-agreed portion of the default risk (FAO, 2013). Other commonly used methods include micro leasing, warehouse receipt financing, credit vouchers and asset financing.

2.5 The lack of adequate Agricultural Finance in Kenya

In order to successfully bridge the gap in agricultural finance in Kenya, one has to fully understand what drives decision making in formal FIs. The traditional relationship between

risk and return lies at the centre of each investment as posited by Tóth, Lančarič, Piterková, and Savov (2014).

2.5.1 Risk

From a macro-perspective, agriculture is perceived as a high-risk sector. This is for solid reasons, as this sector is exposed to different forms of risk. While various authors use different classification methods, this study follows the one used by Hollinger (2004):

- *Co-variant or systematic risks*: these are all risks which are non-exclusive in their exposure. In other words, every entity in a certain sector or region will be exposed to the risk and cannot escape it at reasonable costs. These risks are usually hard to predict and near impossible to prevent in occurrence, for instance, weather risks (drought, floods), crop failure (pests and diseases) and market risk (price risk).
- *Idiosyncratic or firm-level risk*: these are all risks which are exclusive in their exposure. These risks apply to an individual company or organization and can be mitigated at reasonable costs. They are assessed through analysing the characteristics of the organization and specific interventions can be designed to minimize the impact. Examples include poor corporate governance, sub-standard production capabilities, and inadequate marketing skills.

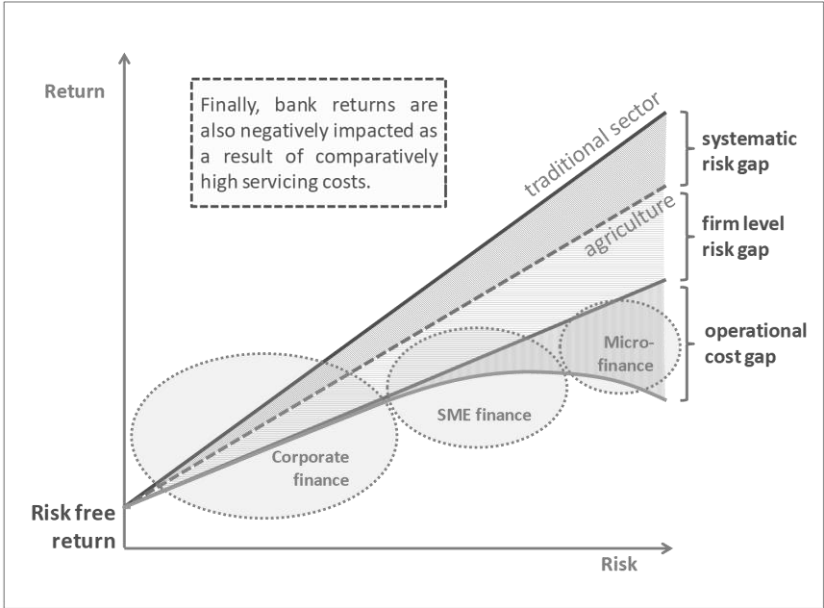
One of the main characteristics of agriculture is that the sector is highly exposed to systematic risk, which makes it wholly unattractive to FIs (Ruiz, 2014). In Figure 2.3, the risk-return matrix for agriculture is structurally less steep compared to other sectors, reflected by the *systematic risk gap*.

Another characteristic of agriculture is that value chains are poorly connected, tend to concentrate power at a few value chain players and are exposed to the macro risks described above (Max and Ramirez, 2017; Musuva, 2014). This translates into high levels of non-systematic (also known as *firm-level risk*) at many smaller and middle-sized agricultural companies and organizations. Majority of these companies and organizations are structurally poorly managed. This is related to the characteristics of the sector where majority of commercial farmers operate on a small scale and only several hundred larger corporates are active in agriculture. Upstream⁹ production has not yet reached the scale and professionalism

⁹ Refers to the raw material production segment of agricultural sector value chains and includes players such large and small-scale farmers and agricultural input dealers.

seen in most western economies. Larger companies in the Food and Agriculture chain are generally well managed and are therefore capable of mitigating the systematic risk that they are exposed to. They also have the means to accumulate capital (collateral) and they have the power to transfer some of their risks to smaller value chain players who are more upstream in the value chain. On the other hand, smallholder farmers and the SME agri-businesses in general tend to be less well managed and do not have the means or skills to mitigate risks, let alone have the power to transfer risk along the chain and typically suffer from a lack of collateral or adequate financial buffers to withstand adverse events.

Figure 2. 3: Firm-level risk gap



Source: SCOPEInsight (2014)

The implicit outcome of this situation is that in agricultural value chains, mostly the larger corporates are attractive to FIs from a risk-return perspective. As a group, SMEs and smallholder farmers offer far less attractive propositions from a risk perspective due to a structural lack of management quality: the firm-level risk gap.

The combination of a high exposure to systematic risk, high perceived firm-level risk and high default rate effectively exclude the large majority of those active in the agricultural sector from accessing finance. According to CBK annual supervision reports, the agricultural sector has consistently shown a high level of non-performing loans (NPLs) when compared to other areas of the economy. As presented in Table 2.2, 2015 and 2016 witnessed agriculture record

the third highest rate of NPLs at 10%¹⁰. The liberalization of interest rates (prior to September 2016) meant that borrowers were faced with significantly higher interest rates and were therefore struggling to keep up with loan repayments. The CBK are yet to release 2017 report on sectoral performance of loan repayments.

Table 2. 2: Non-performing loans from commercial banks by sector 2014-2016

All figures in Ksh. (Millions)									
	2016			2015			2014		
	Gross Loans	NPLs	%	Gross Loans	NPLs	%	Gross Loans	NPLs	%
Financial Services	86,834	2,726	3%	80,905	2,273	3%	72,612	1,726	2%
Energy and water	102,877	5,129	5%	100,144	3,666	4%	88,692	1,073	1%
Personal/Household	584,549	37,172	6%	551,063	26,096	5%	516,320	27,478	5%
Real Estate	357,558	27,600	8%	293,989	12,426	4%	282,396	12,662	4%
Transport and Communication	201,531	15,583	8%	185,167	12,143	7%	150,488	9,507	6%
Tourism, Restaurant and Hotels	55,117	4,619	8%	54,529	2,562	5%	34,249	2,578	8%
Mining and Quarrying	12,297	1,099	9%	21,860	2,471	11%	18,783	1,117	6%
Manufacturing	266,803	25,300	9%	266,389	16,773	6%	236,962	10,215	4%
Agriculture	93,712	9,042	10%	87,456	8,384	10%	80,195	4,670	6%
Trade	438,856	62,232	14%	423,626	44,294	10%	375,525	27,552	7%
Building and Construction	93,057	23,872	26%	100,200	16,243	16%	84,559	9,722	11%
Totals	2,293,191	214,374		2,165,328	147,331		1,940,781	108,300	

Key:

- First position (highest level of NPLs)
- Second position
- Third position

Source: Central Bank of Kenya Annual reports

2.5.2 Return

The challenge to overcome unattractive risk levels is compounded by high FI servicing costs which have a negative bearing on the overall risk-return equation as well. A 2012 agri-lending toolkit prepared by USAID stipulates that lenders that are interested in pursuing an agricultural financing strategy should search for an acceptable risk-return balance against the lowest cost base. Within the context of FIs, cost is a direct driver for return because of two reasons as outlined by Fabbro and Hack (2011): *cost of capital* (which is driven by the actual risk profile of the FI) and *operational costs* (which is driven by the cost of running daily processes-physical infrastructure, personnel and systems).

In agriculture, operational costs tend to be higher. This has several reasons:

- High cost of creating a bankable pipeline: Due to the poor average quality of information about agribusinesses, a lack of readily available information, and a sector

¹⁰ This percentage was computed as the proportion of bad debts to outstanding loans (both in the Agricultural sector).

which is on average poorly managed and not creditworthy, it is very expensive for individual FIs to differentiate low-risk agribusinesses from high-risk agribusinesses;

- The infrastructure to maintain a banking network for the complex and diverse agricultural sector is much higher than for other sectors which are more concentrated around urban areas;
- The credit analysis process is relatively costly because:
 - credit analysis skills require specific training, up-to-date information and inputs on market developments;
 - there is a lack of business formalization at the SME agribusiness level;
 - the loan process is more complicated as SME agribusinesses are not always financially literate enough to participate in a smooth process (from intake to loan disbursement);
 - the physical distance between the FI and the agribusiness is relative long;
- Monitoring costs are high compared to other sectors;
- Collateral collection costs are high compared to other sectors.

These cost drivers have a direct impact on an FI's returns and explain why they prefer to serve large corporate clients who are the most profitable clients from a risk-return perspective. Large corporates in the value chain are indeed ideal customers for banks; they usually need large ticket loans for post-harvest stock building and are therefore not exposed to some of the typical agricultural systematic risks. Likewise, banks tend to avoid the high costs related to the loans typically needed by the smaller value chain players which include pre-harvest loans or longer-term debt.

Credit information sharing through independent credit reference bureaus is gradually picking up in Kenya. Since 2010, CBK has mandated 3 bureaus to collect and share information regarding consumer credit history in the country. Commercial banks and MFIs are required to provide monthly updates to the bureaus to assist in building their respective records although a majority of the population who are un-bankable remain outside the database. As a result, efforts are underway to expand sources of credit information from SACCOs, non-regulated finance companies and utility service providers so as to include as many Kenyans as possible. This will avoid information asymmetry, lower costs of borrowing as well as cases of loan delinquency and contribute to financial inclusion of Kenya's poor.

In conclusion, the agricultural finance gap is not caused by cultural differences across the world or wrong perceptions regarding the sector; it is driven by basic economic principles. Banks have learnt harsh lessons from deviating too far (in terms of risk and return) or too long (in terms of time) from their equilibrium risk-return curve. With reference to Figure 2.3, it is only when the risk-return equation for agri-lending approaches the standard accepted risk-return curve of an FI that financing propositions will become technically feasible for them. It would therefore be ineffective to design an intervention logic which does not close the full gap between the actual risk-reward curve and the preferred risk-reward curve. For as long as the full gap is not addressed, formal lending institutions will not be incentivized to increase agricultural lending. An ideal solution would therefore be one that addresses the three main risk drivers: systematic risk, non-systematic risk and operational cost gap.

2.6 Review of theories

In examining the behaviour of banks towards lending in general, several theories are relevant towards explaining the underpinning factors that guide their decision-making. These are discussed below:

2.6.1 Loan pricing theory

According to Stiglitz and Weiss (1981), banks would set high interest rates in an effort to earn the highest possible profits on their investments but this could subsequently introduce the possibility of adverse selection; that is, selecting only borrowers that are willing to accept these rates due to their high-risk profile. Thereafter, these borrowers would take on high risk investments due to moral hazard (the perception that their high loan payments justify high risk investment activities) which could be detrimental to the lender (Karumba & Wafula, 2012). It is on the premise of the theory by Stiglitz and Weiss (1981) that Olokoyo (2011) argues that the level of interest rate set by banks is not always indicative of the risk of the borrower.

Within agricultural lending in the Kenyan context, this theory seems to apply only to the extent that the loans disbursed would be subjected to high interest rates by FIs. However, since the introduction of innovative agricultural credit products such as value chain financing and asset financing, borrowers are unlikely to undertake alternative investments in a bid to generate higher returns. Most FIs have structured their products in a manner that the funds from the loan are only utilised towards the agricultural investment thereby making the risk of fund diversion impossible. Nonetheless, this theory is applicable to this study because it justifies

why FIs should not set unreasonably high interest rates particularly to the agricultural sector. This is because the FIs are likely to suffer from the effects of moral hazard and adverse selection which would in turn result in a higher proportion of NPLs.

2.6.2 Neoclassical credit market theory

This is also known as the credit market clearing theory which holds that interest rate is the only determinant of how much funds can be lent in a market. While collateral and other terms remain constant, an increase in demand for credit will lead to increase in lending rates while a decrease in demand for credit leads to a decrease in lending rates (Olokoyo, 2011). Furthermore, Ewert *et al*, (2000) argue that there is a positive relationship between the interest premium and risk of default of a borrower in order to compensate for the high exposure of default a bank would face. Since collateral is not a relevant factor according to this theory, it implies that a risky borrower may intentionally increase the collateral pledged to a bank in order to reduce his interest premium. The likelihood of moral hazard and adverse selection will once again emerge because of this situation (Karumba and Wafula ,2012). The relevance of the credit market clearing theory to this study is in trying to explain the perceived high-risk of the agricultural sector as a basis for high interest rates charged by FIs.

2.6.3 Signalling theory

This argument states that good borrowers provide more collateral to banks to signal their high credibility in terms of loan repayment and subsequently secure favourable (low) interest rates. The reverse signalling theory states that banks require more collateral from borrowers they perceive to be risky and additionally charge these borrowers high interest rates. (Chodechai, 2004; Ewert and Schenk, 1998).

This theory is applicable to this study because it explains how the nature and value of collateral pledged by a borrower to an FI in trying to access credit acts as a major determinant. Resultantly, within the agricultural sector, banks would take credit decisions based on how much collateral borrowers are willing to pledge.

2.6.4. Trade-off theory

Berger (1995) postulated the *expected bankruptcy costs hypothesis* as part of the trade-off theory which states that when the banking sector is under distress, banks with higher capital face less risk, less returns on investments as well as lower bankruptcy costs. However, higher capital also means higher operating costs due to capital market imperfections and no tax

advantages offered by the Government when compared to debt (Osborne, Fuertes, and Milne, 2012). This implies a positive relationship exists between a bank's capital adequacy ratio (as measured by equity-to-asset ratio) and its amount of lending. When related to this study, it is expected that a high equity-to-asset ratio will increase the amount of credit extended not only to the public but also the agricultural sector.

2.7 Empirical literature

Vast empirical literature exists in as far as identifying factors that affect lending behaviour among banks. Most studies employ both firm-specific and external factors in attempting to understand the relationship.

A study by Chodechai (2004) on determinants of bank lending in Thailand asserted that their decisions are mainly influenced by the past relationship with the borrowers. Prior knowledge on a borrower can aid banks to obtain more private information, leading to a more accurate understanding of the borrower's credibility. The same was observed by Tara and Kauffman (1999). In rural areas, most borrowers lack formal administrative structures in their businesses which leads to information deficiency therefore relationships play a significant role in determining whether to advance credit to a specific borrower. Featherstone, Jones, Kastens, and Wilson (2006) found that both financial (represented by risk) and non-financial data (in terms of borrower character and Fair Isaac credit bureau score) were necessary for banks when analysing agricultural loan applications.

Betubiza and Leatham (1995) used a tobit econometric procedure to determine the factors affecting commercial banks' lending to Agriculture in Texas. More specifically, the effect of two events relevant at the time were analysed; increased bank reliance on interest-sensitive deposits following deregulation on amounts that banks could allocate to agriculture and how a bank's organization structure (multibank holding company vs. independent banks) affects the share of agricultural loans in its asset portfolio. Time-series data of 1,053 banks was used and the results showed that the more sensitive a bank was to interest rates, the less the proportion of agricultural loans in its portfolio. Moreover, multibank holding companies advanced less credit towards agriculture than individual banks therefore an increase in the former would mean an overall reduction in loans made available towards agriculture. In the Kenyan context, interest rate sensitivity may be argued to have a negative relationship to proportion of agricultural loans in a bank's portfolio. This is because, where the interest on

deposits has increased sensitivity, banks will choose to invest in instruments whose interest rate movements match those of deposits such as treasury bills thereby reducing loan investments. Moreover, loan investments made will be to those borrowers who are perceived as least risky which going by history, does not constitute those operating in the agricultural sector.

Munyiri (2010) conducted a study on lending policies and their effects on performance using 46 commercial banks in Kenya. From the findings, he concluded that lending policies formulated by the commercial banks had an effect on their overall performance. This was supported by banks' efforts to continuously attract, retain and increase their customer base, increase shareholders' value, reduce non-performing loans and increase bank profitability. The study found that there was a relationship between bank lending policy and its profitability. These findings were in tandem with those of an earlier study conducted by Ndung'u (2003).

Chizea (1994) stated that certain elements of fiscal and monetary policies could influence lending patterns in Nigerian banks, the most important being interest rate. He argued that interest rates could be too low such that they are negative in real terms, for instance, low interest rates on bank deposits would be eroded by high inflation rates in an economy. Similarly, high interest rates would increase inflation rates which in turn creates negative impact on rate of investment. Usman (1999) made a similar argument that stated a rigidly administrated interest rate structure will negatively affect the optimal performance of commercial banks which includes loans advanced to borrowers.

Njuguna and Nyairo (2015), in carrying out a study on formal conditions that affected agricultural credit supply to small-scale farmers in rural Kenya, used a simple regression model with two variables; interest rates and collateral requirements. A descriptive research design was used with credit and loan officers of four major banks in Kenya as respondents. They established that both factors affected agricultural credit access. High interest rates were found to discourage farmers from taking loans because of their concerns on difficulty of meeting loan repayments. Furthermore, lack of collateral by farmers meant they could not take any loans as the banks would feel overexposed. Several policy recommendations were made; first, that banks should structure loan products in a unique manner that suits small scale farmers' needs such as tapping into the advantages that group lending offers. Secondly, banks should carry out public awareness campaigns on their credit policies and loan terms. They argued that this would encourage farmers to apply or renegotiate terms of their previous loans

and subsequently reduce uncertainty around credit supply. However, the practicality of the second recommendation (without involvement of the Central Bank through regulated interest rates) is questionable given small-scale farmers, by virtue of the fact that the amounts they borrow are negligible¹¹ loan amounts, are unlikely to single-handedly have significant influence on getting concessional rates or loan repayment terms.

Musuva (2014) carried out a qualitative study on various commercial banks in Kiambu county, Kenya which found that:

Input prices, prolonged decline in output selling prices, changes in operation of input providers, operations of domestic and international output market, natural events or disasters and changes in exchange rate were the main risk factors that influence commercial banks' decision to lend to agricultural sector. Furthermore, banks were found to reduce their risks through government policies, business contracts, stringent loan application process, adequate collateral, loan guarantors and investment in mobile money transfer and information technology systems.

Subsequently, she advised that banks should come up with various means of managing risks related to agri-lending, such as partnering with the Government to provide guarantees (either directly or through third-party donors) in order to encourage participation of the banks' participation in agri-lending.

Lukwiya (2016) found that, although major banks and non-bank financial institutions in Uganda employed conventional risk models and risk management measures in agricultural lending, they were generic and ineffective within the framework of how agriculture as a sector operates, that is, the risks involved and nature of most borrowers being rural dwellers. These findings concur with Castro and Garcia (2014) who proceeded further to create a credit risk model suitable for a rural bank which would assist in estimating the loss distribution and the economic capital required to cover the said losses.

A study to explore the relationship between agricultural loans and NPLs of commercial banks by Onguka (2014) employed OLS regression model using data from all 43 licensed banks in Kenya. The study found that in as much as NPLs had no direct effect on growth of agricultural credit, both variables had a positive relationship in that increased volume of agricultural loans

¹¹ Most small-scale farmers are likely to request for loans of between USD 50- USD 30,000 based on Kenya Commercial Bank's (a commercial bank in Kenya) *Mavuno tea* loan product.

led to increased amount of NPLs within the same sector. In addition, he found that there was a positive relationship between interest rates and agricultural loans meaning that borrowers were not discouraged from taking up loans despite interest rates that were above market average. Umoren, Akpan, and Udoh (2016) made similar observations in a study conducted on the Nigerian banking system.

Ellinger, Katchova, and Nam (2007) examined the effect of various factors on changes in agri-lending using quantile regression data of commercial banks data. They found that bank asset and deposit growth rates had a positive effect while population growth rate, loan-to-deposit ratio and equity-to-asset ratio and bank location had a negative impact on agricultural loan growth rate.

2.8 Summary of literature review

While the traditional risk-return relationship guides most lending decisions among FIs, other firm- specific elements (such as borrower information, bank profitability and balance sheet ratios) and macro-economic factors (GDP, inflation, exchange rate) have been found to also influence provision of agricultural credit. Most theoretical and empirical studies done previously use both internal and external factors in attempting to investigate agricultural lending behaviour among commercial banks (Betubiza and Leatham,1995; Njuguna and Nyairo, 2015); none has been able to place more emphasis on factors internal to an FI. In addition, past Kenyan studies have focused on factors determining agri-lending within the commercial banking sector while leaving out MFIs (Onguka, 2014; Langat 2013). MFI information on the same issue is scanty. As a result, this study aims to fill the two gaps by examining to what extent firm-specific factors influence agricultural lending and secondly by incorporating licensed deposit-taking MFIs who also play an active role in Kenya's banking system.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research approach used to conduct the study. It provides further information on the research design, population, data collection (data type and source) and analysis methods as well as the empirical model used in the study.

3.2 Research design

Glass and Hopkins (1984) maintained that descriptive research involves gathering data which describes events then proceeds to organize, tabulate, depict and describe the data collection. Likewise, the researcher adopted a descriptive research approach in trying to find out *what* factors influence lending decisions among Kenyan FIs. Additionally, this research approach was selected because it is very efficient in transforming large amounts of raw data into a workable form and organise the same into patterns that develop during the analysis. As will be observed in the next chapter, this was the most suitable approach to conduct the study as it utilizes numerical data of 6 variables from 15 Kenyan FIs.

3.3 Data Collection

This study made use of quantitative data because the variables under review were measurable and therefore used to uncover patterns in trying to answer the research question outlined in chapter one. Secondary data in the form of financial records (management and system reports, audited financials and key performance indicators) were collected from the population sample, CBK and KBA. However, only agricultural funding information was of interest to the researcher. The period under study was 6 years (2011-2016) in order to allow for meaningful analysis of the selected variables over time.

3.4 Population & Sampling

The target population in this study consisted of all 43 licensed commercial banks and 13 MFIs in Kenya; a list of existing FIs has been provided in Appendix 1 & 2. As all commercial banks and MFIs have their headquarters located in Nairobi, collection of the data was manageable.

However, the researcher selected a sample of 15 FIs to use for this study for two reasons; first, resource constraints could not permit a thorough review of all FIs in Kenya. Secondly, since

not all FIs in Kenya actively carry out agricultural lending, only those that have designed unique loan products targeted towards at the agricultural sector or had dedicated agri-lending departments were purposefully selected. This would allow the researcher to focus on the most relevant data that would present better findings on the study. The sample comprised of 11 commercial banks and 4 MFIs. Commercial banks in Kenya are classified into 3 tiers that is, large, medium and small which is founded on their capital base. Four large tier banks, four medium tier banks and three small tier banks will be selected for this study in order to create a well-represented sample and thereby capture information from banks operating at different levels.

3.5 Model specification

From the literature reviewed in Chapter 2 of this study, it can be inferred that agricultural lending (or lending in general) by FIs is influenced by both bank-specific and macroeconomic factors. The main objective of the empirical model used in this study is to test the hypotheses outlined in Chapter one, that is, to investigate whether a relationship exists between loans to clients operating in the agricultural sector and each of the explanatory variables that have been selected for use in this study. These are: return on loans advanced to borrowers (lending interest rates), credit risk, FI size, FI equity and FI liquidity. Other factors that have not been included in the model as stand-alone independent variables such as past relationship with the borrower and collateral requirements will be captured by the error term in the model.

To determine the factors affecting credit supply to the agricultural sector, this study adopted an empirical model from Mukhanyi (2016) and Khangalah (2016) who examined aspects influencing credit supply by banks in Kenya:

$$AGRIFIN_{i,t} = \beta_0 + \beta_1 LIQ_{i,t} + \beta_2 ROC_{i,t} + \beta_3 RIC_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 EQR_{i,t} + \varepsilon_{it}$$

Where i and t denotes financial institution and year respectively.

AGRIFIN- the proportion of loans to clients operating in agricultural sector

LIQ – Financial institution liquidity

ROC- return on credit (%)

RIC- risk on credit to borrowers

SIZE – Financial institution size

EQR – Financial institution equity

β_0 is the value of the dependent variable (AGRIFIN) assuming all independent variables are zero, β_1 to β_5 are the correlation coefficients of the independent variables while ε is the error term which is assumed to be independent. The model presented above assumes an underlying relationship between the variables. A 5% significance level will be used throughout the regression analysis. The *t*-statistic will be used to measure the significance of the constants of regression $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ and β_5 . The strength of the level to which the five independent variables LIQ, ROC, RIC, SIZE & EQR explain the variation in AGRIFIN will be assessed using the coefficient of determination R^2 , and the *Adjusted R*².

3.5.1 Variables used

For each of the selected FIs used in this study, loans to clients in the agricultural sector will be the dependent variable while the independent variables will be FI liquidity, return on credit to borrowers, risk on credit to borrowers, FI size and FI equity.

- i. *Loans to clients operating in agricultural sector* will be measured by the agricultural gross loans ratio which is computed as the percentage of total annual credit advanced to the agricultural sector in the total annual loan portfolio of an FI.
- ii. *Financial institution liquidity* will be measured by ratio of loans to deposits held by an FI (in KES). A high loan to deposit ratio denotes limited availability of funding for additional lending. This is expected to have a negative effect on agri-lending as was found by Ellinger *et al* (2007).
- iii. *Return on credit to borrowers* will be measured by average annual lending interest rate (in real terms) by selected FIs between 2011-2016. This is expressed as a percentage. Within the Kenyan context, it is expected that a positive relationship will be observed, that is, a higher lending rate will result in more credit being expended to the agricultural sector. This is because licensed FIs, whose loan interest rates are controlled by CBK, would expect the higher returns to compensate for the perceived high risks of investing in this sector. Oluwasola and Alimi (2008) reached the same conclusion in a study conducted in Nigeria.
- iv. *Credit risk on loans* will be measured by the agricultural non-performing loans ratio. This is calculated as proportion of NPLs of clients in the agricultural sector

against the total NPLs in an FI for a particular year. Athanasoglou, Delis, and Staikouras (2006) and Shirzadi (2015) discussed the use of NPLs as a suitable proxy to determine asset quality¹² of banks. A higher value of NPLs advanced to the agricultural sector denotes higher credit risk which would negatively impact (reduce) credit advanced to the agricultural sector. Owing to this, a negative relationship is expected. Cucinelli (2015) also made this observation while investigating lending behaviour in the Italian banking sector. In a market where interest rates are liberalised, the level and age of delinquent loans would direct the risk estimates for granting new loans which are likely to be reflected with higher interest rates.

- v. *Financial institution size* will be measured by the natural logarithm of value of total assets of an FI (Zhang and Epperson, 2004). A larger FI (as indicated by higher value of total assets) is able to raise deposit funds easily as well as have more opportunities to invest in different sectors. (Ellinger *et al*, 2007) A positive relationship is therefore anticipated.
- vi. *Financial institution equity* will be measured by ratio of equity to total assets. Different scholars have made contrasting arguments on the relationship between an FIs equity and its volume of agricultural loans. Koch (1989) posits that an adequately capitalized bank can manage risk better by absorbing any operational losses. This implies that a bank with a large equity base would be willing to take more risk by investing more on loans as opposed to safer assets such as Government securities. On the other hand, Betubiza and Leatham (1995) suggest that less capitalized FIs, in an effort to increase expected returns, would be willing to invest in riskier assets such as loans. It is therefore difficult to predetermine the relationship between this independent variable and the loans advanced to the agricultural sector. However, on the basis of the trade-off theory as postulated by Berger (1995), the researcher expects a positive relationship.

¹² Asset quality reflects the quantity of existing and potential credit risk associated with the loan, investment portfolios and off-balance sheet transactions. (Shirzadi, 2015)

Table 3. 1: Summary of variables and measurement

Variable	Description	Predicted effect	Data sources
<i>Dependent variable</i>			
Loans to clients operating in agricultural sector	Proportion of agricultural gross loans and advances that are in the total loans and advances portfolio of a commercial bank or licensed MFI in the same year.		CBK
<i>Independent variables</i>			
Financial Institution liquidity	Ratio of loans-to-deposits (per annum)	Negative	Bank's or MFIs financial statements
Return on credit to borrowers	Average annual lending interest rate on bank loans by selected commercial banks and licensed MFIs for the period covered under this study.	Positive	CBK
Credit risk on loans	Percentage of agricultural NPLs in total NPLs value in a particular year.	Negative	Bank's or MFIs financial statements
Financial Institution size	Annual value of total assets	Positive	CBK
Financial Institution equity	Ratio of equity-to-total assets per annum.	Positive	CBK

3.6 Estimation and Analysis Techniques

The study used panel data to estimate the regression which includes time-invariant and firm-invariant variables. Hsiao (2007) notes some of the advantages of panel data over time-series and cross-sectional data as: providing more accurate inference of model parameters, controlled impact of any omitted variables, reduced collinearity and having simplified computation and statistical inference¹³. Baltagi (2008) adds that panel data allows for control of individual heterogeneity which reduces bias in estimates.

¹³ Panel data is less likely to be non-stationary and contain less measurement errors due to multiple observations using both cross-sectional and time series dimensions.

Since the data used for this study was quantitative, a descriptive approach and analysis was used to determine the weighting, as well as provide meaningful discussion and comparison of each of the variables. In order to test the strength and degree of correlation between the independent and dependent variables, this study employed one of the panel estimation techniques. Fixed effects assume that each of the individuals in the model are heterogeneous and that this difference, which is represented by a dummy variable, is related to the other explanatory (independent) variables used in the model. Based on this presumption, the included dummy variable controls for the individual-specific and time-specific effects. However, this approach reduces the degrees of freedom and explanatory power of the independent variables as well as increases the standard errors in the model. On the other hand, random effects model incorporates heterogeneity by assuming exogeneity variance exists between the variables in the study, that is, the individual-specific and time-specific effects are uncorrelated with the independent variables. Clark and Linzer (2014) argue that in selecting which panel estimation technique to apply, a trade-off between bias and variance is one of the considerations made by the researcher.¹⁴

The Hausman specification test (1978), which is used to statistically detect whether the specific errors are correlated with the regressors, was conducted to decide which technique was best to use between fixed-effect (within) regression and random effect (generalized least squares) regression. The null hypothesis states that no omitted variable bias exists in the model while the alternate hypothesis states that fixed effects should be included in the model. The resulting p-value from the Hausman test provides a basis for the decision on which approach to take; a p-value above 5% significance level implies that the individual-specific effects are best modelled using the random effects method, that is, it would be selected because it is a more efficient estimator since the null hypothesis cannot be rejected. The regression model was estimated using STATA version 12 package for data collected from the selected FIs for the period under review. The data was also tested for classical linear regression model assumptions of multicollinearity, heteroskedasticity, and autocorrelation. The basis for the conducting these tests together with the hypotheses formed, test results and their subsequent implications on the study are presented in the following chapter.

¹⁴ Fixed effects model produces unbiased estimates for β which will vary highly from sample-to-sample. Inversely, random effects models have biased estimates of β while the variance between samples is constrained. (Clark & Linzer, 2014)

3.7 Limitations of the study

The limitations identified in this study are:

- i. Inadequate resources to carry out an extensive research on the entire population of all licensed 43 commercial banks and 13 MFIs in Kenya. Subsequently, a carefully selected sample population will be made to provide as clear as possible representation of the total population as possible.
- ii. Owing to lack of clear-cut criteria of classifying borrowers within the FIs, some of the borrowers are likely to be agro-processors or middlemen and not direct agricultural producers (farmers). For purposes of this study, the borrower classification of FIs will be assumed to be correct.

CHAPTER FOUR

DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the findings of data analysed from 15 FIs in Kenya for the period between 2011 to 2016. Within the sampled population, one of the selected banks was placed under liquidation by the regulator in the year 2015. This resulted in an unbalanced panel since the bank did not produce any reports for the last two years covered in this study (2015 and 2016). The output of the results is broadly classified into two parts: descriptive statistics (mean, mode, median and standard deviation) and inferential statistics (correlation analysis and regression results). Additionally, the estimation results are interpreted to determine the relationship between agricultural lending and the selected independent variables; return on loans advanced to borrowers, credit risk, FI size, FI equity and FI liquidity.

4.2 Descriptive Statistics

The summary of descriptive statistics shown in Table 4.1 below was carried out on all variables to examine the trend over the 6-year period of the data set used. The mean proportion of credit advanced to the agricultural sector was 0.0394 (3.9% of the total loan portfolio of an FI). The minimum proportion was 0, denoting that at least one FI did not advance any credit to the agricultural sector within the period under review. The maximum proportion of agricultural loans was 0.1297 (12.97%) which is still significantly below the required minimum loan portfolio allocation of 15% for MFIs and 17% for commercial banks as set by the Kenyan Government.

FI size and FI equity had a mean of 10.5343 and 0.1682 with a standard deviation of 1.6274 and 0.095 respectively. The study found that overtime, FI liquidity had a maximum value of 5.1637. The high ratio of loans to deposits indicates a significantly high liquidity strain on one FI. A standard deviation of 0.5602 shows negligible variance from its mean reported as 1.0063. Further, return on credit as indicated by average lending rate by an FI had an average of 0.1644 (16.44%), maximum of 0.1480 (14.8%) and a minimum 0.1910 (19.10%). The standard deviation of 0.0950 denotes that it is not highly dispersed from the mean. On analysing the risk on credit as denoted by proportion of agricultural NPLs to total NPLs among selected FIs, the mean ratio was 0.1017 while the maximum ratio was 0.3254. The standard

deviation of risk on credit was reported as 0.0645 indicating it was not highly dispersed from the mean.

Table 4. 1: Summary descriptive statistics

Variable	Mean	Median	Std. Dev	Min	Max	Observations
AGRIFIN	0.0394	0.0403	0.0224	0.0000	0.1297	90
SIZE	10.5343	10.4547	1.6274	6.0890	13.1319	88
EQR	0.1682	0.1548	0.0950	0.0000	0.7377	90
LIQ	1.0063	0.9011	0.5602	0.0000	5.1637	90
ROC	0.1644	0.1606	0.0150	0.1480	0.1910	90
RIC	0.1017	0.0867	0.0645	0.0000	0.32539	90

Note: AGRIFIN= Agricultural gross loans ratio; SIZE= Natural Logarithm of Total assets; EQR= Equity to total assets ratio; LIQ=Liquidity ratio; ROC= Lending rate; RIC=Agricultural non-performing loans ratio. Source: Author's estimate from Research data, 2017.

It is worth noting that the minimum values of 0 recorded under FI equity, FI liquidity and risk on credit are due to the unobserved data of the bank under liquidation which did not publish any financial reports for two years covered under the period of this study.

4.3 Correlation Analysis

According to Jain and Jhunjhunwala (2006), correlation analysis measures the degree and direction of relationship between two or more variables. In order to establish the relationship between each independent variable and the dependent variable (agricultural gross loans ratio), a correlation coefficient matrix was developed and is presented in Table 4.2 below.

Table 4. 2: Correlation matrix

Variable	AGRIFIN	SIZE	EQR	LIQ	ROC	RIC
AGRIFIN	1					
SIZE	0.1022	1				
EQR	-0.1313	-0.3222***	1			
LIQ	0.0552	-0.2876***	-0.007	1		
ROC	-0.0378	-0.0545	0.0242	0.1479	1	
RIC	-0.2092**	-0.2484**	-0.2005*	0.3905***	0.1443	1

*Note: AGRIFIN= Agricultural gross loans ratio; SIZE= Natural Logarithm of Total assets; EQR= Equity to total assets ratio; LIQ=Liquidity ratio; ROC= Lending rate; RIC=Agricultural non-performing loans ratio; ***, ** and * denotes significance of 1%, 5% and 10% respectively. Source: Author's estimate from Research data, 2017.*

As shown in Table 4.2 above, both FI liquidity and FI size are positively and moderately related to loans advanced to the agricultural sector. This means that an increase in FI liquidity will result in an increase in credit advanced to the agricultural sector, all other factors held constant. The same is true for FI Size. However, contrary to the trade-off theory by Berger (1995), FI equity is negatively and moderately correlated to gross loans. This denotes that a

decrease in FI equity will lead to a moderate increase in agricultural credit. There is a weak and negative correlation between agricultural loans and both risk on credit as well as return on credit.

Kennedy (2008) posited that two independent variables are said to possess multicollinearity when their relationship (or correlation coefficient- r^2) is above 0.7. Since none of the correlation coefficients were greater than 0.7, the researcher concluded that no multicollinearity existed among the variables and proceeded to include all variables in the regression model.

4.4 Tests for heteroskedasticity and autocorrelation

The researcher conducted the Breusch-Pagan test to examine whether the residuals were homoscedastic, that is, whether the variance of the residuals is constant across all levels of the predicted values. If the variance was not the same, then the residuals were found to be heteroskedastic which results in biased estimation of variance and co-variance of the coefficients (β). The null hypothesis tested whether there was a constant variance of the residuals, that is, data was homoscedastic. A p-value above 5% significance would mean that the researcher would not reject the null hypothesis as the data was found to be homoscedastic. Table 4.3 shows that the test produced a p-value of 0.7655 (76.55%) which is higher than test significance level therefore concluding that there was no evidence for presence of heteroskedasticity.

Table 4. 3: Breusch-Pagan heteroskedasticity test results

<i>H₀: Constant variance (Homoscedasticity)</i>	
$\chi^2 =$	0.09
Prob. > $\chi^2 =$	0.7655

Source: Author’s estimate from Research data, 2017

Autocorrelation is said to exist when the covariance between the error terms over time is equal. This affects the efficiency of the OLS estimators in a manner that the standard errors would be lower than the actual standard estimates. To check for autocorrelation, the Wooldridge test (2002), as simulated by Drukker (2003) was performed. The null hypothesis stated that there was no first-order autocorrelation, that is, errors from one year were not correlated with errors from another year. If the resultant test statistic was significant, then there was indication of the presence of serial correlation. Table 4.4 presents a p-value was less than 5% significance

level meaning the null hypothesis was rejected denoting presence of serial correlation. This was corrected by replacing the OLS standard errors with robust standard errors.

Table 4. 4: Wooldridge autocorrelation test results

<i>H₀: no first-order autocorrelation</i>	
F (1, 14)	8.642
Prob. > F	0.0108

Source: Author's estimate from Research data, 2017

4.5 Hausman specification test results

The Hausman test was applied to determine which model would best fit for the data used in the study. First, the fixed-effects (within) regression was estimated and the coefficient results stored. The same process was repeated with the random-effects (generalised least squares) regression after which the results of the two models were compared. The null hypothesis was that the difference in the co-efficients from the two models was not systematic, which indicates use of the random-effects model due to better efficiency.

Table 4. 5: Hausman specification test results

Variable	<i>Co-efficients</i>			
	(b) Fixed	(B) Random	(b-B) Difference	Sqrt (diag (V_b-B_B)) S.E.
<i>SIZE</i>	-0.00081	-0.0006176	-0.0001969	0.0021157
<i>EQR</i>	-0.03654	-0.0457017	0.0091649	0.0082424
<i>LIQ</i>	-0.00082	0.0001116	-0.0009281	0.0008679
<i>ROC</i>	0.060535	0.0594274	0.0011075	0.0151633
<i>RIC</i>	-0.05984	-0.0717962	0.0119566	0.0067136
Hausman χ^2	2.61			
Prob > χ^2	0.7596			

Source: Author's estimate from Research data, 2017

Table 4.5 shows the differences between the fixed-effect and random-effect co-efficients which are inconsistent therefore we have no basis to reject the null hypothesis. Furthermore, to determine whether the exclusion of the dummy variables had any significant effect on the model, the p-value of 0.7596 proved that the random-effects model was suitable for the data used in this study since failure to include dummy variables had negligible effect on the results of the estimation.

4.6 Regression results

Based on the results of the regression diagnostics discussed in the previous section, the Random Effects model (REM) was employed in the estimation of the regression model. The REM technique was implemented to account for the presence of serial correlation as evident from the Wooldridge test of serial correlation. As a form of robust analysis, the Ordinary Least Squares-Panel Corrected Standard Errors (OLS-PCSE) technique of Beck and Katz (1995) in the presence of serial correlation was also employed to estimate the regression model. These results were compared with the REM and are presented in Table 4.6. The R^2 is 0.2485 denoting that 24.85% of effects in loans advanced to the agricultural sector by Kenyan FIs is explained by variables in the model. Moreover, the p-value of the Wald-Chi Square test indicates that all variables used in the model are jointly significant, that is, FI size, FI equity, FI liquidity, return on credit and risk on credit all contribute towards explaining the change in gross loans to the agricultural sector.

The results reveal that return on credit is positively related to volume of agricultural credit supplied. In addition, these findings concur with those of Oluwasola and Alimi (2008) in depicting that interest rate charged has an insignificant effect on volume of bank lending. Contrary to findings by Ellinger *et al* (2007), FI liquidity and FI size has a positive and negative relationship with agri-lending respectively. Both factors are also insignificant since their p-values were above the significance level used in the regression. The study also found that FI equity and risk on credit were significant in determining loans to the agricultural sector among Kenyan FIs which concur with previous studies by Betubiza and Leatham (1995) and Cucinelli (2005).

With specific focus on the significant variables, a unit of increase in an FI's equity-to-assets ratio (EQR) will result in a decrease of agricultural loans advanced (AGRIFIN) by 0.0457 units while holding other factors constant. This result confirms findings by Betubiza and Leatham (1995) and could be attributed to the fact that less capitalised FIs with lower ratios have assumed more risk by investing in loans to the agricultural sector in a bid to get higher returns.

Similarly, a unit of increase in non-performing loans ratio (RIC) will lead to a decrease in volume of agricultural loans advanced by Kenyan FIs all factors held constant. These findings

are consistent with those of Athanasoglou *et al* (2006) and Shirzadi (2015) in indicating that the volume of agricultural loans by FIs is driven by the latest proportion of NPLs within the same sector. If the ratio is high, FIs will intuitively shy away from investing in agriculture to manage their credit exposure.

Table 4. 6: Regression results using random-effects

Model technique	REM	OLS-PCSE
Variable	Coef.	Coef.
Constant	0.0502**	0.0608***
	(0.022)	(0.014)
<i>SIZE</i>	-0.0006	-0.0009
	(0.001)	(0.001)
<i>EQR</i>	-0.0457***	-0.0718***
	(0.015)	(0.018)
<i>LIQ</i>	0.0001	0.0026
	(0.002)	(0.002)
<i>ROC</i>	0.0594	0.0480
	(0.090)	(0.073)
<i>RIC</i>	-0.0718***	-0.1045***
	(0.025)	(0.023)
R-squared	0.2377	0.2485
Wald $\chi^2(5)$	33.76	41.09
Prob > χ^2	0.0000	0.000
Number of FIs	15	15
Observations	88	88

*Note: AGRIFIN= Agricultural gross loans ratio; SIZE= Natural Logarithm of Total assets; EQR= Equity to total assets ratio; LIQ=Liquidity ratio; ROC= Lending rate; RIC=Agricultural non-performing loans ratio. Values in parenthesis are autocorrelated consistent standard errors; ***, ** and * denotes significance of 1%, 5% and 10% respectively. Source: Author's estimate from Research data, 2017*

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter highlights information from previous sections of this study which assist in drawing suitable conclusions based on the research findings. In addition, recommendations on policy improvements by both the Kenyan Government and licensed FIs are made to stimulate lending to the agricultural sector. Finally, opportunities for further research in agri-lending are suggested to contribute towards development of the topic.

5.2 Summary and Conclusion

For the past 15 years, agriculture has consistently been the highest contributor to Kenya's GDP and among the top employers of the country's population. However, due to perception of the sector being defined as highly risky, there is significant underinvestment in agriculture by commercial banks and MFIs in terms of volume of credit disbursed. Additional funding is required in agriculture in order to increase the country's food productivity as well as economic benefits that would emerge as a result thereof. The objective of this study was to determine the factors that influence agricultural lending behaviour among licensed FIs in Kenya. A review of past empirical and theoretical literature on the topic provided a good understanding of factors that guide bank lending decisions in general, some of which could also be applied contextually to agri-lending. To address one of the gaps identified in previous studies, this paper sought to include licensed MFIs, who like commercial banks, are also regulated by CBK but target a different segment of the population.

Subsequently, the sample population consisted of 11 commercial banks selected from all 3 tiers as well as 4 deposit-taking MFIs. Secondary panel data from 2011-2016 (6 years) was sourced from CBK annual reports and the respective FIs' published financial statements. Through application of the Hausman test, random-effects was established to be the most appropriate model to use after which a multiple panel regression model was estimated. The results revealed that FI liquidity and return on credit had a positive but insignificant relationship with volume of agricultural credit disbursed by Kenyan FIs. This depicts that a higher loan-to-deposit ratio resulted in increased lending to the agricultural sector among the selected FIs. As had been concluded in previous studies, the findings of this research also confirmed that an increase in lending rate would motivate FIs to extend credit to the

agricultural sector to compensate for the perceived high exposure. FI size was found to be negatively and insignificantly related to agri-lending signifying that volume of assets had no meaningful contribution in explaining FI behaviour towards loans advanced to the agricultural sector.

FI equity, which was measured by ratio of equity-to-total assets, was found to have a negative yet significant relationship to agri-lending. This indicates that FIs with less capital reserves choose to invest in agriculture as opposed to less risky assets such as Government securities with the objective of getting higher returns. Risk on credit to the agricultural sector also had a negative and significant effect on gross loans advanced to agriculture. This finding concurs with previous studies and implies that FIs are discouraged from investing in agriculture if there is a high ratio of delinquency among borrowers from the sector.

By and large, FIs possess different risk appetites which ultimately drives their expected returns and credit allocation decisions. This is because the findings on direction and significance of relationship between FI Size and FI liquidity with agri-lending are inconsistent with previous studies. More specifically, the insignificant relationship observed in this study between an FIs liquidity and volume of agri-lending which was expected to have a strong positive relationship while the inverse has been revealed from the findings.

The sensitivity of agricultural NPL ratio towards agri-lending infers that FIs rely heavily on information pertaining to borrower credit history, sector outlook and internal asset quality ratios to guide their credit decisions. Periodic and up-to-date information on agricultural sector performance as well as loan portfolio ratios are easily accessible by an FI. However, borrower credit history lies with a licensed credit reference bureau and where an FI is unable to obtain the credit rating of a potential borrower then it is likely to decline the loan application due to likelihood of moral hazard or adverse selection.

5.3 Policy Recommendations from findings

In order to minimise high value of NPLs in agriculture, Kenyan FIs should consider incorporating innovative risk mitigation mechanisms such as shifting the exposure to more reliable parties. Institutions such as AGRA and World Bank offer third-party guarantees¹⁵ to

¹⁵ AGRA has partnered with FSDT to take a credit guarantee scheme with National Microfinance Bank in Tanzania. (Swiss Contact, 2012)

FIs by taking shared risk (normally on 50-50 basis) on the agricultural loans disbursed. Through this arrangement, the FI's risk is controlled to a predictable level. In addition, the FI's loan book grows by including borrowers who would otherwise not have been considered for credit on the basis of being too risky. Development of value chain intermediation as a specialised agricultural credit product by Kenyan FIs will also enhance financial inclusivity among rural farmers.

The Kenyan Government should enforce the minimum loan allocation requirement in the portfolios of commercial banks and MFIs. While it is appreciated that banks have a motive to profit from their activities, the benefits accruing from investment in agriculture are far-reaching. Implementing this requirement could be done in various ways such as introducing tax benefits for those banks that meet the minimum threshold. Alternatively, the Ministry of Agriculture could utilise its' available funding by partnering with FIs to create tailored funding programs for Kenyan individuals or companies operating in the agricultural sector which will assist in boosting the volume of agri-lending among licensed FIs in Kenya.

5.4 Areas for future studies

The purpose of this study was to determine factors that influence agricultural lending behaviour among 15 FIs in Kenya. While the sample population contained commercial banks and MFIs considered most active in agri-lending, a similar study incorporating all Kenyan licensed FIs (43 banks and 13 MFIs) would be beneficial. Since the target population is definitive (as presented in Appendix 1 and 2), this is possible provided adequate resources are available.

Furthermore, various qualitative elements not captured in this study are believed to influence lending decisions (including those in agriculture) among FIs, for instance, credit scoring mechanisms used by various lenders, bank competition. This information is best captured through primary data. The inclusion of additional macro-economic indicators (such as exchange rates, GDP and inflation) would also have added robustness to the empirical model in terms of unearthing the more reasons behind the behaviour of Kenyan FIs towards agri-lending. Therefore, a study incorporating both qualitative and quantitative aspects in FIs would be ideal towards reaching clearer conclusions on the research objective of this study.

The 2015 Banking Amendment Act came into effect in Kenya within the last half of 2016. The new regulation, which put a ceiling on the interest rates that licensed FIs could charge on deposits and loans, was received with mixed reviews across all sectors of the economy. As the last year covered in this study was 2016, it was not possible to observe any effect of the new legislation on agri-lending since a longer time record is required. As the law has been in effect for the past 18 months, adequate data is now available to justify a study on the impact of interest rate capping on agri-lending behaviour among Kenyan FIs.

Lastly, there is need to carry out further research on the same topic with regard to agricultural SACCOs in Kenya. Since the regulatory framework¹⁶ for SACCOs in Kenya is different from that of licensed FIs, an analysis of factors that determine volume of loans disbursed would be a suitable area of interest for future research.

¹⁶ Deposit-taking SACCOs in Kenya operate under the 2010 SACCO Societies Act and are regulated by SACCO Societies Regulatory Authority (SASRA). Banks and MFIs operate under the 2016 Banking Act and are regulated by CBK.

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Appendices

Appendix 1: List of Commercial Banks in Kenya

1. African Banking Corporation Ltd.
2. Bank of Africa Kenya Ltd.
3. Bank of Baroda (K) Ltd.
4. Bank of India
5. Barclays Bank of Kenya Ltd.
6. CFC Stanbic Bank Ltd.
7. Charterhouse Bank Ltd
8. Chase Bank (K) Ltd*
9. Citibank N.A Kenya
10. Commercial Bank of Africa Ltd.
11. Consolidated Bank of Kenya Ltd
12. Co-operative Bank of Kenya Ltd.
13. Credit Bank Ltd.
14. Development Bank of Kenya Ltd.
15. Diamond Trust Bank Kenya Ltd.
16. Ecobank Kenya Ltd.
17. Spire Bank Kenya Ltd
18. Equity Bank Ltd.
19. Family Bank Limited
20. Fidelity Commercial Bank Ltd
21. Guaranty Trust Bank Ltd
22. First community Bank Limited
23. Giro Commercial Bank Ltd.
24. Guardian Bank Ltd
25. Gulf African Bank Limited
26. Habib Bank A.G Zurich
27. Habib Bank Ltd.
28. Imperial Bank Ltd*
29. I & M Bank Ltd
30. Jamii Bora Bank Limited.
31. Kenya Commercial Bank Ltd
32. Sidian Bank Ltd
33. Middle East Bank (K) Ltd
34. National Bank of Kenya Ltd
35. NIC Bank Ltd
36. M-Oriental Commercial Bank Ltd
37. Paramount Universal Bank Ltd
38. Prime Bank Ltd
39. Standard Chartered Bank Kenya Ltd
40. Trans-National Bank Ltd
41. UBA Kenya Bank Limited
42. Victoria Commercial Bank Ltd
43. HFC Limited (Mortgage Finance Company)

Source: Central Bank of Kenya (2016)

**-denotes bank under receivership*

Appendix 2: List of licensed Microfinance Institutions in Kenya

1. Choice Microfinance Bank Limited
2. Faulu Microfinance Bank Ltd
3. Kenya Women Microfinance Bank Ltd
4. SMEP Microfinance Bank Ltd
5. Remu Microfinance Bank Ltd
6. Rafiki Microfinance Bank Ltd
7. Uwezo Microfinance Bank Ltd
8. Century Microfinance Bank Ltd
9. Sumac Microfinance Bank Ltd
10. U&I Microfinance Bank Ltd
11. Daraja Microfinance Bank Ltd
12. Caritas Microfinance Bank Ltd
13. Maisha Microfinance Bank Limited

Source: Central Bank of Kenya (2016)