Flexible Loans and Access to Agricultural Credit for Smallholder Farmers in Siaya County, Kenya

By

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DEDICATION

For my grandma Maria, mother Margaret, my wife Doreen, my daughter Sheryl, my son Aiden, and all farmers in Kenya.

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ACRONYMS

AFC	Agricultural Finance Corporation
AGRA	Alliance for a Green Revolution in Africa
ANOVA	Analysis of Variance
BCA	Business Climate Index for Agriculture
CAW	County Assembly Ward
CBK	Central Bank of Kenya
CGS	County Government of Siaya
DID	Difference-in-Difference
DIDM	Difference-in-Difference Matching
EABL	East African Breweries Limited
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
IDS	Institute for Development Studies
KBA	Kenya Bankers Association
KIHBS	Kenya Integrated Household Budget Survey
KII	Key Informant Interview
KNBS	Kenya National Bureau of Statistics
KSh	Kenya Shilling
LFI	Loan Flexibility Index
MFI	Microfinance Institution
MFI	Microfinance Institution
MIS	Management Information System
MSE	Mean Squared Error
NACOSTI	National Commission for Science, Technology and Innovation
OAF	One Acre Fund
OLS	Ordinary Least Squares
PSM	Propensity Score Matching
RCT	Randomised Control Trial
SACCOs	Savings and Credit Cooperative Societies
SID	Society for International Development

SME	Small and Medium Enterprise
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children Education Fund
UoN	University of Nairobi
US$	United States Dollar
VIF	Variance Inflation Factor

DEFINITION OF TERMS

Credit access	Credit access means different things including applying for credit or not, getting credit or not, the amount of loan received, credit constraint or credit rationing. In this study, credit access refers to the volume of credit that a farmer receives.
Credit constraint	Credit constraint refers to two things. First, it refers to whether a borrower who got credit actually got enough credit or not. Secondly, one could be credit constrained if they were in need of credit but did not apply for it for one reason or another.
Credit rationing	Credit rationing refers to situations where one receives less credit than they requested.
Flexible loan	Flexible loans are credit facilities that are designed to respond to unique needs of borrowers. In this paper, flexible loans are loans offered to farmers and have features such as grace period, repayment schedule, bullet payment, rescheduling options, refinancing options or lines of credit.
Grace period	Grace period refers to a period of loan within which the borrower is not expected to start making a loan repayment. This is usually a period immediately after the loan is approved and disbursed and could be a few weeks or months.
Repayment schedule	Repayment schedules are loan repayment periods or instances within which one is expected to make a loan repayment. For example, it could be a standard repayment schedule such as weekly monthly or I could be a flexible repayment schedule where one makes a repayment at his or her own pace and in the amounts of his or her choosing.
Bullet payment	Bullet payment refers to instances where one has to make a loan repayment in one full payment of interest and principal usually at the end of the term of the loan. In this study, it refers to one-off loan repayment during any time within the term of the loan.

Balloon payment	Balloon payment refers to instances where one pays off the interest part of a loan over the term of the loan and pays off the remaining principal at the end of the period.
Loan rescheduling	Rescheduling refers to situations where the credit institution allows for a renegotiation on the terms in the loan contract especially when a borrower faces shocks or risks that affect the repayment ability of the borrower. The borrower can renegotiate for an extension of the period of loan repayment or for a review and waiver of interests or penalties.
Loan refinancing	Refinancing refers to instances where the lending institution renegotiates the terms of loans by offering to give more credit to a borrower even when the previous loan has not been fully repaid due to risks or shocks that impinge on the borrower's ability to repay a loan.
Line of credit	Line of credit refers to a loan facility where the credit institution allows the borrower access to more credit even before repaying the previous loan as long as the total outstanding credit does not exceed an agreed amount.

ABSTRACT

Access to credit is a pervasive problem for smallholder farmers in developing countries. While there are several factors why this is the case, the manner in which the loans are designed could play a significant role in explaining the low access to credit in Africa. Studies show that this problem might be exacerbated by the strict loan terms available in most standard loans that are irrelevant to farmers' irregular cash flows. Thus, as studies show, the remedy could be in lenders offering flexible loans. As more lenders, especially in the microfinance sector, design flexible loan products, research shows conflicting results in terms of whether such products improve access to credit. These conflicts are due to methodological, measurement and contextual differences. Further, previous studies focus on single elements of flexible loans and not an index of several elements of flexibility to determine whether the varying levels of flexibility in loan products would explain credit access. Due to the limitations of these prior studies, this study attempted to re-examine the effect of flexible loans on credit access in the agricultural sector by assessing whether the degree of loan flexibility matters in credit access. The study used a cross-sectional survey design where structured questionnaires were used to collect quantitative data from 103 farmers simple random sampling method and who had taken up loans with various credit institutions in Ugenya sub-county. Further qualitative data on the supply side of credit access were gathered through stylised facts where interviews were conducted with farmers, and local authorities as well as secondary information. The questionnaire was pre-tested on a sample of farmers and changes made before the final survey was conducted. The tool was also examined for both validity and reliability. Using a combination of various data analysis software, the study conducted descriptive, bivariate and regression analyses in order to answer the research questions and test the hypotheses. Results of the descriptive analysis showed that the average age of heads of households in the sample was 49 and that majority of heads of households were men. The study also found that majority of the farmers had a secondary level of education. The average household size in our sample was six people while the average wealth of households, which was measured as the number of items owned, was four. Majority of the farmers were enrolled in input credit programmes and the average size of credit was KSh. 14,777. The descriptive results also showed that the average loan flexibility as measured by the Loan Flexibility Index (LFI) was 0.419. The bivariate relationships performed using chi-square tests showed that access to credit differed across sex, education, type of credit, and wealth status of households. The results also showed that access to credit differed across bullet payment, loan refinancing and loan rescheduling. The regression results showed that none of the flexible loan elements had a significant influence on access to credit and neither did LFI at 5% level of significance. The study concludes that while flexible loans do not have a significant effect on access to credit, the direction of the relationship suggests that farmers are credit rationed when the loans are highly flexible. The study recommends that credit institutions should re-design their loan products in order to meet the needs of farmers as well as eliminate informal and subconscious barriers to exploitation of elements of flexible loans. The study also recommends that the government should encourage and incentivise financial institutions to offer flexible farm loans through targeted policies such as credit guarantee schemes. Further research should also be carried out in this area to have a better understanding of the determinants of credit access in general and the link between flexible loans and access to credit in particular.

CHAPTER 1 : INTRODUCTION

1.1 Background of the Study

Credit access is a pervasive problem for most farmers worldwide. Global credit demand by smallholder farmers is estimated at US$ 450 billion yet only three per cent of this demand is met (Hanson, 2015). This problem is much more pronounced in Africa. With farm sizes shrinking due to demographic pressures and other factors that put pressure on land use (World Bank, 2007; Jayne, Yeboah, & Henry, 2017), the sector is increasingly being dominated by smallholder farmers (World Bank, 2007) who mostly produce for subsistence. As commercial banks mostly provide secured loans, smallholder farmers are underserved by the banks as the dwindling land sizes affect the value of land to be used as collateral for farm loans. Further, commercial banks perceive agriculture as being too risky due to the dependence of the sector on rainfall, low use of technology, poor skilled farmers, and dominance of the sector by smallholder farmers. For these and other reasons, most banks do not lend to the sector and those that do so only provide limited financing to the large-scale farmers who can afford collateral. This has seen less than one per cent of lending in Africa going to the sector (FarmDrive, 2019).

The sector is should play a major role in the structural transformation of developing economies (World Bank, 2007). In this scenario, agriculture is expected to increase its productivity and production while reducing its contribution to the Gross Domestic Product (GDP) and its share of employed persons in developing economies as other sectors, especially agro-based manufacturing, absorb the labour released from agriculture and contribute more to GDP. One of the services that is envisaged to support this transformation is finance. The World Bank (2007, p.138) calls for innovations in finance to "provide smallholders with better access to credit". Thus, studies on determinants of access to credit in the sector are important in helping design financing products that meet the needs of farmers. The uniqueness of the agricultural sector has led to the design of flexible loans that match the income cycles of farmers and, therefore, more relevant to farmers than the standard loans. This strand of enquiry is still under-researched as only a few studies are currently available (for instance, Weber & Musshoff (2013) and McIntosh (2007).

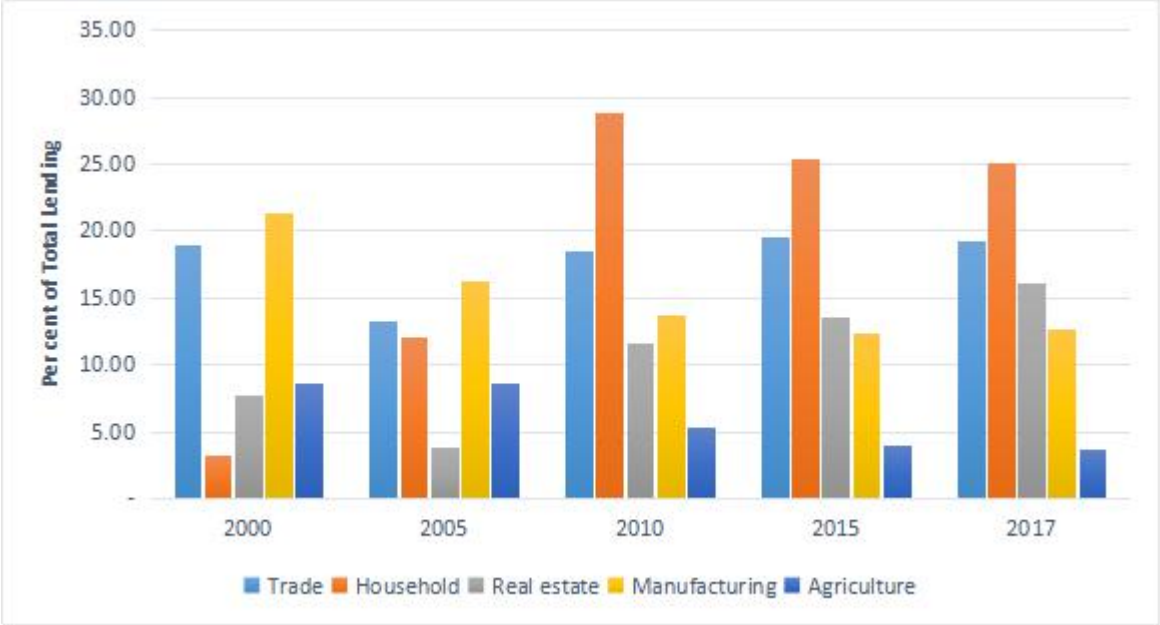
This paper is organised into five chapters including this introduction. The introduction details the background of the study where the paper provides a brief background on the state of agricultural financing in Kenya in section 1.1.1 as well as an explanation of the concept of flexible loans and how this may influence access to credit in

section 1.1.2. This section also presents the statement of the problem in 1.2, the objectives of the study in 1.3, research questions in 1.4 and significance of the study in 1.5. Chapter 2 is the literature review followed by research methodology in chapter 3. Chapter 4 is the presentation and discussion of findings and chapter 5 is the conclusion of the study where the study presents a summary of findings, the conclusions based on the findings and recommendations for policy, practice and further research.

1.1.1 The State of Agricultural Financing in Kenya

Lending to the agricultural sector in Kenya is still low. A report by the Kenya Bankers Association's (KBA) notes that commercial lending to agriculture between 2005 and 2016 was 4 per cent of total lending portfolio (KBA, 2018). In 2017, agricultural loan accounts accounted for only one per cent of total loan accounts in commercial banks (Mentoria Economics, 2018), an indictment on banks as it shows that they are unwilling to or incapable of financing the sector. Data from the Central Bank of Kenya's (CBK) supervision reports and Economic Surveys also show that, compared to other sectors, lending to agricultural sector has been on the decline (see Figure 1.1). Lending to the agricultural sector as a percentage of total private sector lending has declined from 8.7 per cent in 2000 to 3.7 per cent in 2017.

The 2015/16 Kenya Integrated Household Budget Survey (KIHBS) shows that 6.9% of borrowers access credit for purposes of agricultural activities such as purchase of inputs, machinery and livestock (KNBS, 2018). The report also notes that of the people who borrow for agriculture, 55% do so from formal sources while the rest do so from informal sources (see Table 1.1). In as much as the report does not provide an analysis of the credit access by size of the farms, it can be deduced that most of the formal financing in the sector is in favour of the large farms as smallholder farmers are locked out.



Source: CBK Supervision Reports (various) and KNBS Economic Survey (various)

Figure 1.1: Bank lending to selected sectors of the economy in Kenya

Table 1.1: Access to agricultural credit by source in Kenya

Source of credit	Use of Credit (Purchase of …)			
	Inputs	Machinery	Livestock	Total
National	**5.4%**	**0.2%**	**1.3%**	**6.9%**
Formal Sources	**56.0%**	**77.7%**	**48.7%**	**55.3%**
Commercial Banks	10.5%	20.3%	10.7%	10.8%
Microfinance institutions	6.1%	9.2%	16.4%	8.1%
Government Funds	2.4%	0.0%	1.7%	2.2%
SACCOs	17.2%	12.9%	19.9%	17.6%
Religious Institutions	0.1%	2.2%	0.0%	0.1%
NGOs	19.8%	33.1%	0.0%	16.5%
Informal Sources	**44.0%**	**22.3%**	**51.3%**	**44.7%**
Employer	1.8%	0.0%	0.6%	1.5%
Merchant/Shops	1.3%	0.0%	0.0%	1.0%
Shylock	0.6%	0.0%	1.8%	0.8%
Relative/Friend/Neighbour	13.2%	0.0%	2.6%	10.8%
Mobile Platforms	2.4%	0.0%	2.8%	2.4%
Self-Help Groups/Chamas	24.8%	22.3%	43.3%	28.2%

Source: 2015/16 Kenya Integrated Household Budget Survey

Smallholder farmers are mostly served by the micro-credit providers, savings and credit cooperative societies (SACCOs), cooperatives and informal finance. A 2016 survey among micro, small and medium enterprises in Kenya showed that most farmers receive credit services from informal services (KNBS, 2016). While it may be assumed that

microfinance institutions reach most of the intended clients, studies show that loan uptake among this group is generally low. According to Karlan, Morduch, & Mullalnathan (2010), take-up in microcredit is often less than 50% with different country variations around the world. In Kenya, Kosgey (2013) found that only 37% of sampled grain farmers had access to credit with women even having lower access to credit. The reason for low take-up of credit could be the inflexibility in most of the loans offered by most of the lending institutions, including the microfinance institutions.

Generally, there are two broad categories of loans: formal and informal loans. Formal loans are loans offered by formal lending institutions such as commercial banks while informal loans are loans provided by informal providers such as private moneylenders and other people (Pham & Lensink, 2007). One of the differentiating feature between the two types of loan is usually on the repayment terms. While formal loans normally require regular repayments (weekly, monthly or annually), informal loans do not necessarily have these features. Thus, formal loans are generally regarded as being standard loans while informal loans are regarded as being flexible as the borrower can make repayments based on their own timings. However, formal loans are increasingly becoming more flexible as formal lenders, especially MFIs, introduce some of the flexible features of informal loans into the design of their loans.

According to Labie, Laureti, & Szafarz (2017), few MFIs offer flexible loan contracts worldwide. Nonetheless, a few organisations already offer flexible loans in Kenya. One Acre Fund (OAF), for instance, not only offers flexible loan products that are designed to meet the needs of farmers but also employ asset-based financing where farmers are provided with inputs instead of cash to ensure that the funds are not diverted to non-agricultural activities (OAF, 2015). *Kilimo* Booster is another agricultural microfinance that uses a mobile money platform (MPESA) to offer flexible loans to farmers. Farmers benefit from a flexible repayment schedule and the loan is disbursed immediately (Ernst & Young, 2018). Further, Kenya's state corporation that is mandated with financing farmers, the Agricultural Finance Corporation (AFC) also offer a combination of loan products that include those with flexible terms, such as the seasonal crop credit (AFC, 2019). These examples highlight a few institutions that have flexible loan arrangements with the farmers in Kenya. Therefore, it is worth examining whether the availability of such loan products has increased access to credit in the sector.

1.1.2 Flexible Loans and Access to Credit

Collins, Morduch, Rutherford, & Ruthven (2009, p. 181) defines product flexibility as "ease with which transactions can be reconciled with cash flows". According to these authors, tying loan repayments to business returns is what explains flexibility. Weber & Musshoff (2017, p.537) define flexible loans as those that "allow a redistribution of principle payments during periods with low agricultural returns to periods when agricultural returns are high through pre-defined grace periods". Thus, the authors define flexible loans in terms of existence of a grace period within the loan contract as well as tying of loan repayments to agricultural returns. This is the standard definition used by most scholars. In other words, flexibility in loan contracts can be viewed in terms of relaxing repayment schedules (Meyer, 2002; Chatterjee & Banerjee, 2018; Field & Pande, 2008) or offering a grace period (Field, Pande, Papp, & Rigol, 2013; Czura, 2015; Chatterjee & Banerjee, 2018).

According to Chatterjee & Banerjee (2018), other forms of flexibility are prepayments and lines of credit. Collins et al. (2009) add that flexibility may entail loan renegotiation and loan refreshing during the loan cycle. Khandker, Khalily, & Samad (2015) describes a flexible loan that provides both production and consumptions loans to smooth consumption and on flexible repayment terms. This definition includes the type of loan products offered and the design of terms of such loans. Labie et al. (2017) groups flexible loans into three categories. The first category is the *ex-ante* flexibility where a borrower's expected cash flows are adapted to the financial transactions before resolving the uncertainty. Thus, the financial transactions are adapted to the client's expected cash flows and thus disbursements and prepayments are pre-set to match these cycles. The durations are customised to the client. In *ex-post* flexibility, the variations from pre-established financial transactions are allowed after an unfavourable outcome. Such contracts include the likelihood of transactions dependent on the prevailing state of the world. For example, should a farmer's repayment capabilities change, a loan can be rescheduled to match their new repayment capability. Lastly, full flexibility authorises any transaction at any time and excludes any predetermined transaction plan. They leave transactions open as opposed to *ex-ante* or *ex-post* flexible contracts that predetermine transactions as either fixed or contingent on future events. In a fully flexible loan contract, the client freely chooses her transaction as the financial institution only offers a maximum credit line without offering a repayment schedule or any other conditions. In this paper, flexibility is defined in terms of the degree of flexibility in loan contract. This entails issues ranging from provision of grace periods,

flexible repayment terms, allowance for loan renegotiations, availability of credit lines, and absence of prepayments.

Buckley (1997, p.1081) suggested that tackling the problems microenterprises in Africa require "a fuller understanding of the psyche of entrepreneurs" and fundamental structural changes, not just injection of capital. Such an understanding includes the behaviour of micro-enterprises towards loan uptake. Flexible loans are a prerequisite for the financial inclusion of farmers (Weber & Musshoff, 2017). While standard loans are adequate for businesses that generate regular returns (Weber & Musshoff, 2017), they are insufficient for some clients whose incomes are usually seasonal (Weber & Musshoff, 2017; Barboni, 2017). MFIs prefer fixed repayment schedules because it allows them "to reduce transaction costs, simplify procedures and inculcate fiscal discipline for better repayment" behaviour (Czura, 2015, p.1). However, most MFI clients have neither regular incomes nor singular moments that allow them to make lump sum investments throughout the year (Czura, 2015). This mismatch creates welfare loss as it produces a cash flow disconnect because of the liquidity constraints of most MFI clients.

Flexible loans help the clients to diversity income and reduce income and poverty seasonality (Khandker et al., 2015). The biggest risk for offering flexible loan repayments is the balance between flexibility and repayment (Tsukada, 2014) as some studies show that flexible loans in agriculture can lead to higher delinquencies (Weber & Musshoff, 2017). Tsukada (2014) noted that having flexible loan contracts is beneficial to clients who are affected by income fluctuations such as farmers. In a study on women's Small and Medium Enterprises (SMEs) and their role in poverty alleviation in Kenya, Siringi (2011, p.195) concluded that MFIs operating in Kenya need to provide flexible products in terms of "loan sizes, withdrawing savings, and modular home improvement loans" as agile product offering with end-user flexibility will have a competitive advantage. Wawire (2008) in a study of women groups in Kenya also recommended a need for lending institutions to offer grace periods as well as flexible repayments as a way of lessening lending conditions to enable more women access credit. The study also recommended an application of flexible repayments to businesses and farmers based on the frequency and timing of their incomes. Dodson & Ahrendsen (2017) point out the need for developing flexible loan agreements to finance large farms with multiple owners and operators. Zietsman, Mostert, & Svensson (2019) argues that flexible loan terms address the financial flexibility needs of most microenterprises.

While some studies have examined flexibility as a predictor of access to credit, the results are still mixed and conflicting. For instance, Weber & Musshoff (2013) revealed that flexible loans determined credit access. Further, Fecke, Feil, & Musshoff (2016) also concluded that clients who choose grace periods demand more loan amounts than those who do not choose any grace period. Shoji (2012) and Krishnaswamy (2015) showed that lines of credit improve credit access and Soman & Cheema (2002) concluded that rescheduling loans reduced credit constraint and the likelihood to borrow from the informal sector. Pearlman (2010) further concluded in a review of literature that repayment flexibility explains the demand for credit. Some studies, on the other hand, have found a negative influence of flexibility on access to credit. For instance, McIntosh (2008) found that less people borrowed from a microfinance in Uganda when flexible loans were introduced. Given this conflicting results, it is important to re-examine this relationship from a different perspective.

1.2 Statement of the Problem

Access to credit is one of the major problems faced by farmers worldwide (Saqib, Kuwornu, Panezia, & Ali, 2018). In Kenya, only 1.8 per cent of farmers have access to formal credit (CBK, KNBS & FSD, 2019). In terms of credit volumes, smallholder farmers are disadvantaged among the lot of farmers with access to credit (Rahman, Hussain, & Taqi, 2014). Given the low levels of credit access especially among the smallholder farmers, it is important to understand why this issue persists. While this remains a topic of interest for most scholars, studies mostly focus on access from the supply-side of the problem. This study seeks to understand the determinants of access to credit by examining the issue from the perspective of farmers.

Siaya County is predominantly rural with most farmers practicing subsistence farming. According to a study by Kiplimo, Ngenoh, Koech, & Bett (2015), 75 per cent of households in the county practice crop and livestock farming. From the study, only a third of the smallholder households had access to formal credit. Earlier, Owuor, De Groote, & Wangia (2004) noted that smallholder farmers in the county had no access to formal credit as majority farmers could only access informal credit. Even those who accessed informal credit reported that they were credit constrained. This low access to especially formal credit in the county calls for an investigation on why this is the case as it may hamper growth of farmers out of subsistence farming to commercial agriculture. The low formal credit access among farmers in Kenya in general, and Siaya County in particular, may be because farmers, as

opposed to other clients, have unique financing needs as they do not have regular incomes. Thus, since most financial institutions only offer standard loans that have rigid repayment terms, most farmers find the loans less attractive for their seasonal cash flows (Weber & Musshoff, 2017; Weber & Musshoff, 2013). This has led some institutions to design flexible loans that respond to the unique needs of farmers. Most financial institutions consider these products risky (Labie et al., 2017; Weber & Musshoff, 2017) hence are sceptical about offering them. In contrast, there are studies that show that flexible loans are not as risky as they are thought to be (Field & Pande, 2008) while others note that through strategies such as volume rationing (Weber & Musshoff, 2017), pricing (Barboni, 2017) and other disciplining mechanisms (Laureti & Hamp, 2011), these risks can be ameliorated.

Results from prior studies on the effect of flexible loans on access to credit are conflicting. For instance, while some studies show that offering flexible loans increases access to credit (Weber & Musshoff, 2013; Fecke, et al. 2016) others show that flexibility does not influence credit access (McIntosh, 2008). One of the reasons why these conflicts may persist in literature is in the way flexibility is measured in the models. In these studies, loan flexibility is measured based on a dichotomous conceptualisation of flexibility where the loan taken up by the farmer is either flexible or standard. This is a narrow approach to flexibility, as it does not take into account the degree of flexibility in loan contracts. Labie et al. (2017) noted that loan contracts differ in their levels of flexibility. Thus, the differences in the degree flexibility of loans may offer a better insight into how flexibility influences access to credit. This study attempted to resolve the conflict in literature by taking this approach and combining several elements of loan flexibility into an index variable to re-examine how flexibility affects access to credit.

1.3 Research Questions

The study sought to address the following research questions:

1. What are the characteristics of smallholder farmers that have access to credit in Siaya County?
2. What is the level of flexibility of formal loans offered to smallholder farmers in Siaya County?
3. What is the effect of flexible loans on formal credit access among smallholder farmers in Siaya County?

1.4 Objectives of the Study

1.4.1 General Objective

The purpose of this study was to examine the effect of flexible loans on formal credit access by smallholder farmers in Siaya County.

1.4.2 Specific Objectives

Specifically, this study sought to achieve the following objectives:

1. To analyse the characteristics of smallholder farmers with access to credit in Siaya County.
2. To determine the level of flexibility in loan products offered to smallholder farmers in Siaya County.
3. To assess the effect of flexible loans on access to formal credit among smallholder farmers in Siaya County.

1.5 Significance of the Study

This study contributes significantly to literature, policy and practice. The study is among the first in Kenya to examine the relationship between flexible loans and access to credit. Thus, the study adds onto the growing literature on flexible loans as a predictor of access to credit from the perspective of a sub-Saharan African country. Secondly, the study developed a new measure of loan flexibility based on a composite index that captures the degree of loan flexibility and performs an empirical test of the index on a dataset from Kenya. This contributes to literature by providing a novel way of examining the impact of flexible loans.

This study is also invaluable to lending institutions, especially those lending to farmers. While there are several institutions offering loans and the outreach seems to be expanding, most of the lenders do not lend to the agricultural sector, especially the smallholder farmers. This study points out the credit access gaps in terms of profiling the smallholder farmers and presenting their financing needs as regards the design of loan products. Further, the findings of the study on the effect of flexible loans on access to credit provides lenders with empirical evidence on the need to structure loan products that are more flexible for smallholder farmers.

Finally, this study has policy some implications. The study examined the status of credit access among smallholder farmers. As the Kenyan government pushes to achieve

Vision 2030 where agriculture is expected to play a major role in the economy, the findings provide policymakers with empirical evidence on the financing needs of smallholder farmers. This helps the government channel more financial support towards smallholder farmers.

1.6 Limitations of the Study

This study limited itself to Ugenya sub-county in Siaya County, Kenya. This limits the applicability of the findings of this study to other geographical locations. Thus, while the study has internal validity, it lacks the external validity in terms of being applicable to farmers outside this location. Such a conclusion and application to areas outside the study area should be made with caution.

This study also limited itself to credit access for agriculture. These have a unique cash flow cycle and the flexible loan products are most relevant to them. Therefore, the focus on agricultural loans limits the application of the results to other production or consumption loans. Although conclusions can be made to infer to any production or consumption loan given to households in rural homes, this study was particularly interested in the loans provided for farm production. Any attempt to generalise the findings of this study to other borrowers other than farmers should therefore be made with caution.

The study also focused on farmers who had taken up loans with various financial institutions in the area. This means that farmers who had not taken up loans were left out of the study. The results are therefore only applicable to farmers who have taken up loans and not all farmers in general. As such, credit access in this study refers to the loan volumes as further discussed in chapter 3. The next chapter is the literature review.

CHAPTER 2 : LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature. The chapter is divided into five parts including this introduction. Section 2.2 presents a review of the theoretical literature in which the theoretical relationship between flexible loans and access to credit is discussed. The empirical literature follows in section 2.3 with a review of literature on the influence of flexible loans on access to credit (section 2.3.1), measurement of flexible loans and credit access (section 2.3.2) and other determinants of credit access (section 2.3.3). Section 2.4 presents the conceptual framework where the conceptual relationship between the variables of interest is presented and discussed. Section 2.5 makes a summary of the discussions in this chapter and concludes.

2.2 Theoretical Framework

This study adopts a theoretical model that hypothesizes a positive relationship between loan flexibility and access to credit. This stems from a larger strand of literature that examines the predictors of access to credit. Access to credit theory based on the principles of information asymmetry and moral hazard suggests that borrowers prefer more flexible repayment schedules as it improves their repayment capacity by allowing them to smooth any shocks they experience.[1] However, lending institutions prefer frequent repayments because they impose fiscal discipline on borrowers hence reduce loan defaults (Field & Pande, 2008). As Field et al., (2013) noted, early repayments may discourage risky investments by borrowers as they improve the ability of the lender to monitor the activities of the borrower. In order to address these challenges, Laureti & Hamp (2011) propose combining flexibility in loan contracts with various disciplining mechanisms such as financial collateral, direct screening and monitoring, reputational incentives, and psychological pressure.

This study relies on the threshold decision-making theory. The theory was first advanced by Hill & Kau (1973) and later by Pindyck & Rubinfeld (1998). This theory postulates that when farmers are faced with a decision to adopt an innovation, each one of them has a threshold at which they react. This threshold depends on a number of factors. Thus, below their thresholds, farmers will not adopt the technology. However, at a critical

[1] Moral hazard refers to a situation where one has the incentive to take on risks without having to worry about taking responsibility for the same. Information asymmetry on the other hand refers to a situation where one party has more or better information than the other party in a transaction.

threshold level, the reaction of farmers is stimulated and adoption occurs. The theory can be applied in the decision-making process of farmers when it comes to accessing credit. Just like the theory states, farmers decide to take up credit based on a number of factors. One of these factors could be the structure of loan agreements. Thus, farmers decide whether to take up loans based on the grace period offered or the repayment period provided within the loan terms or any other indicator of loan flexibility. Farmers differ by the thresholds that motivate them to borrow. It is expected that within the continuum of loan flexibility, some farmers may decide to borrow based on just one item of flexibility offered while others will need more flexibility in loan term for them to borrow. Already, Akudugu (2012) applied this theory in modelling an estimation for the determinants of credit demand among farmers in Ghana. Given this precedence and the fact that the present study intends to use an index of flexible loans to estimate the effect on credit access, the threshold decision-making theory applies.

2.3 Empirical Literature

Flexible loans are relatively new in microfinance literature. Microcredit lenders still offer mostly rigid loan terms that only provide no flexibility in repayments. As such, studies on determinants of credit access to rural credit do not focus on flexibility as a predictor of credit access. This section presents an empirical review of literature on flexible loans. In section 2.3.1, the paper reviews literature on the relationship between flexible loans and access to credit (see summary in Table 2.1). Section 2.3.2 reviews the measurement of flexibility and credit access while section 2.3.3 concludes with a review of other factors that explain access to credit.

2.3.1 Flexible Loans and Access to Credit

Many scholars have examined the determinants of access to credit but few studies focus on flexible loans as a determinant of credit access. Even for those studies that attempt to examine flexible loans, the examination on access to credit is not a direct one. There are several indicators of flexible loan contracts as was discussed in section 1.1.2. Some of these include loan repayment schedules, grace periods, prepayments, savings, bullet payments, loan renegotiations and refreshing (rescheduling, refinancing, interest rate reductions), and partial loan write-offs. Each of these indicators may influence access to credit individually or jointly as some studies have concluded.

Most studies examine loan flexibility from the perspective of flexible repayments where the institutions provide either grace periods or allow for repayment schedules to be

flexible. Weber & Musshoff (2013) evaluated a flexible loan that allowed for grace periods to farmers in Madagascar in order to find out whether the flexible loan contracts improved credit access. The results showed that agricultural firms that had access to flexible loans were more likely to access credit than those with standard loans. Further, the study also revealed that firms with access to flexible loans were more volume-rationed than firms with standard loans were. This means that while flexibility increase credit access in terms of the likelihood of agricultural firms accessing loans, it negatively affected how much they could borrow. Fecke et al., (2016) also examined the direct link between flexibility and access to credit in Germany using grace periods as a measure of flexibility. The results showed that loan amounts demanded increased in cases where the clients chose grace periods as compared to when the clients did not choose any grace period. In Uganda, McIntosh (2007) found that the introduction of flexible loans had no impact on loan volume. However, the intervention improved repayments and lowered transaction costs on both sides of the contract. While the three studies cited above show the direct link between flexibility and access to credit, flexibility has varied degrees that are not taken into account in the studies. The studies focus on a single indicator of flexible loans yet literature shows that flexibilities vary from one loan product to the next or from one institution to the next. Thus, other than the fact that the three studies were conducted in different geographical set-ups and, therefore, the conflicting results may be due to country differences hence the need for a study on the Kenyan market, the use of a single indicator of flexibility weakens the wider applicability of the results.

Some studies conclude on the link between flexible repayments and access to credit but fail to provide a direct link as they rely on indirect inferences to make the link. For instance, Jain & Mansuri (2003) concluded that the rigidity of repayment schedules of microfinance loans explained the success of informal lenders as demand for informal credit increased as that of the formal credit fell due to the inflexibility of the formal lenders. Li, Gan, & Hu (2011) examined the determinants of microcredit accessibility by rural households in China and showed that availability of informal credit reduced the probability of households to borrow from formal microcredit schemes. While examining loans that were provided on flexible repayment terms in Ethiopia, Lamessa & Gemechu (2016) found that the perception of loan repayment period influenced access to formal credit. Kosgey (2013) while studying the factors influencing access to agricultural credit among grain farmers in Kenya concluded that the higher number of farmers who were able to access credit could be due to the flexible loan terms that allowed them to renegotiate with the financial institutions. Atieno (2001) found that 36% of small businesses in Western Kenya were credit constrained

and noted that this was more pronounced for formal loans. As such, the study concluded that since most businesses borrowed from the informal sector (77%), the flexible terms offered by the informal lenders were the reason for their popularity. These studies failed to assess directly how flexible repayment schedules affect access to credit and, coupled with the fact that they relied on a single indicator of loan flexibility, they provide a gap that the present study seeks to bridge.

Other than focusing on the repayment schedules, a few studies also assess flexible loans from the perspective of lines of credit. However, most of these do not directly study how lines of credit affect credit access but rather make indirect inferences. For instance, Krishnaswamy (2015) assessed a project in India in which loan applicants were randomly offered term loans or credit lines of similar amounts. The study showed that customers that were offered credit lines were significantly better off six months later and recommended that such an overdraft facility would be beneficial to small businesses. While the study neither focused on farmers not examined the attractiveness of the credit line facility from the clients' point of view, it significantly contributes to literature by showing that flexible loans that offer credit lines can be more attractive to clients than term loans. This may improve loan uptake. Soman & Cheema (2002) examined consumer decisions in utilising a line of credit and concluded that consumers are more likely to use more credit if they have access to a large credit limit. The study noted that this was especially true for consumers with lower credibility as measured by age and level of education. Thus, younger and less educated consumers were more likely to use more credit when the limit was large as oppose to older and more educated consumers. While the study did not examine the behaviour of farmers, the results may apply to smallholder farmers. Thus, farmers with access to higher credit limits within the lines of credit terms may be induced to use more credit especially if they are young and less educated. The two studies mainly suffer from two flaws. First, they do not test a direct link between lines of credit and access to credit. Secondly, they rely on a single indicator of flexible loans. Thus, they offer a gap in literature that the present study seeks to address using a variable that measures the degree of flexibility in loan contracts.

Collins, et al. (2009) note that loan renegotiation and refreshing are some of the indicators of loan flexibility. Renegotiation allows lending institutions to renegotiate a delinquent loan by amending the terms of the loans to stretch out the repayments (this is also known as loan rescheduling) or giving clients new loans, which can be used to pay off the old ones (this is known as loan refinancing) (Schicks & Rosenberg, 2011). These ex-post

adjustments are needed even for borrowers who are motivated to repay as they occasionally become delinquent due to shocks (Meyer, 2002). In worst case scenarios, the financial institutions may "write off part of the loan principal and lower the interest rate on the remaining balance" as a show of good faith to encourage the client to pay part of the loan (Meyer, 2002, p. 359). In 2002, Grameen Bank introduced a new program that it dubbed 'Grameen II' in Bangladesh where defaulters were allowed to renegotiate their loans (Rutherford, 2004). While collections improved on the renegotiated loans, Rutherford, Maniruzzaman, Sinha, & Acnabin & Co (2004) were careful not to attribute the improvements to the borrowers' responses to the product changes. Milgo (2013) found that microfinance institutions in Kenya use loan rescheduling as a strategy to enforce loan repayments. Studies examining the effect of loan ex-post flexibility (loan renegotiation and refreshing) on access to credit are almost non-existent. Shoji (2012) is perhaps the only study currently available that attempts to examine this issue by evaluating the effects of contingent repayments on members of microfinance institutions in the face of negative shocks in Bangladesh. The study found that loan rescheduling reduced the possibility of credit constraints as well as borrowing from the informal credit market. This suggests that in the face of shocks, loan rescheduling cushions microfinance clients against the shocks thereby allowing them to access credit. This study also suffers from the reliance on a single indicator of flexibility without taking into account the fact that the degree of flexibility differs from one loan product to another.

In as much as most studies focus on a single indicator of flexibility, there are a number of studies that have shown that varying degrees of loan flexibility affect access to credit differently. For instance, Fecke et al. (2016) model incorporates different grace periods that a borrower can choose from no grace period to three years grace period. The results showed that one-year grace period was associated with 11% chance of accessing credit; a two-year grace period was associated with 44% chance of accessing credit; and a three-year grace period was associated with a 31% chance of accessing credit. This shows that there is a varying chance of accessing credit based on the degree of flexibility in the loan contract. Shoji (2012) models the effect of loan rescheduling by duration and shows that short-term rescheduling (one week) does not have significant effects while long term rescheduling (more than one week) has significant impacts). While the modelled duration of rescheduling was based on weeks, it points to the varying effect of degree of loan flexibility on credit access with higher levels of flexibilities showing significant impacts. Based on the review, the following hypotheses can be made:

Hypothesis 1: Each element of loan flexibility has a positive and significant effect on access to credit.

Hypothesis 2: The higher the level of loan flexibility, the higher the level of credit access.

Table 2.1: Studies on the relationship between flexible loans and access to credit

Study	Findings	Research Gap
Weber & Musshoff (2013)	Agricultural firms with access to flexible loans have higher probabilities of accessing credit than those with standard loans; agricultural firms with access to flexible loans are more volume rationed than those with standard loans	The study focused on a single indicator of flexibility.
Fecke, et al. (2016)	Loan amounts demanded were significantly higher for borrowers that chose grace periods; bullet loans had a positive effect on loan amounts borrowed	The study focused on a single indicator of flexibility.
McIntosh (2007)	Flexible loans do not have a significant impact on loan volumes	The study focused on a single indicator of flexibility.
Jain & Mansuri (2003)	Inflexibility of formal lenders drove borrowers away from formal credit market to informal credit market	The conclusion is inferred and not directly tested
Li, et al. (2011)	Availability of informal lenders reduced access to formal microcredit	This link is not directed tested but inferred
Lamessa & Gemechu (2016)	Perception of loan repayment period influence access to formal credit	The link between flexibility and access to credit made indirectly
Kosgey (2013)	Farmers accessed credit due to flexible terms of loans offered	This relationship is not directly tested but the conclusion inferred
Atieno (2001)	Access to informal credit was higher due to flexible terms offered	Link is not directly tested but inferred
Krishnaswamy (2015)	The attractiveness of lines of credit could lead to more loan uptake in future	The study failed to make an empirical test of the link
Soman & Cheema (2002)	Customers with larger lines of credit are more likely to access more loans	This link is not directly tested
Shoji (2012)	Loan rescheduling reduced credit constraints and likelihood to borrow from informal lenders	The study relied on a single indicator of flexibility

Source: Author's summaries from literature review

2.3.2 Measuring Loan Flexibility and Credit Access

Scholars measure loan flexibility in various ways (see summary in Table 2.2). In Weber & Musshoff's (2013) study, the flexible loan evaluated had grace periods and allowed clients to repay their loan obligations at the time of harvesting when income is earned. Thus, the authors measured flexible loans in terms of provision of grace periods and flexible repayments that coincided with the harvest. The study defined grace period as a period within which a client only repays part of the loan principal and interest. Fecke, et al., (2016) also used grace period as a measure of loan flexibility but defined grace periods in terms of the periods within which the borrowers do not make any loan repayments. This is a departure from how Weber & Musshoff (2013) perceived grace periods and is a more intuitive way to operationalise grace periods. Some authors operationalise flexible loans in terms of allowing clients to make flexible repayments that coincide with the returns (for instance, Lamessa & Gemechu, 2016; McIntosh, 2007; Kosgey, 2013).

Table 2.2: How loan flexibility is measured in studies on flexibility and credit access

Indicator	Studies	Comment
Grace period	Weber & Musshoff (2013), Fecke, et al. (2016)	The studies use grace period as a single indicator and most do not test the effect of the duration of grace period
Flexible repayment	Lamessa & Gemechu (2016), Weber & Musshoff (2013), McIntosh (2007)	These studies use flexible repayment as a single indicator of loan flexibility and most of these do not vary the degree of flexibility in repayment
Balloon/bullet payment	Bearman et al. (2015)	A single indicator used and the study does not examine effect on credit access
Loan rescheduling	Rutherford, et al. (2004), Shoji (2012)	The studies use loan rescheduling as a single indicator yet financing institutions do not just offer one form of flexibility in loan contracts hence vary by degree of flexibility
Lines of credit	Krishnaswamy (2015), Soman & Cheema (2002),	The studies use lines of credit as a single indicator of loan flexibility without appreciating that flexible loan products vary by the degree of flexibility

Source: Authors summary from literature

Offering grace periods or varying the repayments schedules are the most common ways of studying flexibility as most flexible loan products are offered in that manner. Another variation is bullet payments where the loan repayments are matched to the cash flows of the intended business. Bearman, Karlan, Thuysbaert, & Udry (2015) evaluated a lending program in Mali where agricultural lending had bullet payments. However, with new flexible products offerings, more studies are using other measures of flexibility. Shoji (2012)

measured flexibility through loan rescheduling where clients were divided into two groups of those whose loans were either rescheduled or not rescheduled. Lines of credit are also gaining popularity and so are studies using lines of credit to measure loan flexibility. For instance, Krishnaswamy (2015) and Soman & Cheema (2002) use lines of credit to study loan flexibility. Some institutions also allow for loan renegotiations where loans are either rescheduled or refinanced. Rutherford, et al., (2004) evaluate such as program and Shoji (2012) uses this measure of flexibility in loan terms to study the effect of contingent repayments in Bangladesh.

This study develops a new measure of loan flexibility based on a composite index of the indicators of loan flexibility – the Loan Flexibility Index (LFI). An LFI is an equally weighted index of the sum of responses concerning the availability of various forms loan flexibility in loan contracts offered by agricultural credit lenders. It is an equally weighted sum of responses to the following survey questions: provision of grace period, provision of flexible repayment schedule, provision of bullet payments, provision of lines of credit, provision of loan rescheduling, and provision of loan refinancing (see Appendix I for a detailed discussion of the index). While other studies have not used an index of flexibility as a determinant of credit access, the use of index variable in credit access models is not new. For instance, Fecke et al (2016) used a business climate index for agriculture (BCA) as a determinant of loan amounts borrowed. The study showed that BCA had a positive effect of loan amounts.

The index has the advantage over the use of single elements of loan flexibility in a number of ways. First, loan products are designed with varied elements of flexibility with one product having more than one element. For instance, a loan product may offer borrowers grace period as well as a flexible payment schedule. Using only a single element of flexibility would not capture this aspect of several elements designed within one loan product. Secondly, the level of flexibility of loans from one institution to another differs. Thus, while one institution may offer only one element of flexibility, another institution may offer more than one element within its loan product. Thus, using a single element may not capture this degree of flexibility from one firm to another. It is for these reasons that using an index variable comprising of several elements of loan flexibility was preferred in the present study.

There are also several ways in which studies measure access to credit (see Table 2.3). According to Garcia, Lusardi, & Ng (1997), no single variable can measure access to credit and there are usually several ways in which credit access can be approximated. Weber &

Musshoff's (2013) measured credit access as a dichotomous variable indicating whether a client who applied for a loan was given a loan or not. The measure tends to capture accurately access to credit as it includes only those who were given credit as part of those who accessed credit and not just anyone who applied for it. This is the most common measure of access to credit among scholars. Others like Akudugu (2012) proxy credit access as either applying for credit or not. This measure is more inclusive as it includes everyone who applied for a loan as part of credit demand equation. However, because it includes those who applied for credit but were not successful in the demand equation, studies that use this measure to examine determinants of credit access do not accurately provide the relevant results. It tends to overestimate the number of people with access to credit.

Shoji (2012) uses credit constraint to measure access to credit. The study uses a questionnaire to gather household survey data on credit constraint where a household is credit constrained if they did not borrow as much credit as they wanted or if their credit applications were rejected or if they did not borrow because they felt they would default or if there were not credit sources available for them. This measure is an improvement on the measure that captures everyone who applied for credit as part of the credit demand equation as it breaks down customers into two distinct groups: credit constrained or credit unconstrained. Thus, those who apply for a loan but do not receive any credit are classified as being credit constrained just as those who did not apply for it while those who received credit are classified as being credit unconstrained. However, the group of people that do not apply for loans contains those that did not apply because they did not need the credit at the time (hence credit unconstrained) or had other reasons not to apply for credit but would have wanted to apply (hence credit constrained).

In Shoji's (2012) model, those that apply for credit and receive it can be classified into two groups: those who receive the volumes they applied for (hence, credit unconstrained) and those who receive less than they had requested (hence credit constrained). However, some studies define this as credit rationing (Atieno, 2001). Weber & Musshoff (2013) used this proxy to examine whether firms with flexible loans were more volume-rationed than other firms in Madagascar. This is also tied to studies that use loan amounts to measure access to credit. For instance, Fecke et al. (2016) uses the logarithmic values of loan amounts to measure the level of credit access by borrowers in Germany. McIntosh (2007) also uses loan value as a measure of access to credit in Uganda. Loan volumes can take two trajectories: one where the loan amounts received are used (Fecke, et al., 2016) or the

amount of loan requested (Weber & Musshoff, 2013; Chisasa, 2016). A variation to the use of loan volumes is the use of proportion of loan amounts to another indictor such as the size of landholding as was used in (Saqib et al., 2018).

In this study, credit access is understood in terms of the loan amounts received. The focus of the study was on the characteristics of the loan products. As such, only those who had borrowed loans would accurately respond to whether various elements of loan flexibility were present within the loans they borrowed. Thus, of the five ways of measuring credit access, only three ways were relevant – loan amounts, credit constraint and credit rationing. Thus, given the popularity of use of loan amounts as a proxy for credit access, a decision was made to use it in this study as an indicator of credit access.

Table 2.3: How access to credit is measured in studies on flexibility and credit access

Indicator	Definition	Studies	Comment
Applying for credit	Whether one applied for credit or not	Akudugu (2012)	Overestimates access to credit as it does not consider whether one actually got the credit
Getting credit	Whether one who applied for credit got credit or not	Weber & Musshoff (2013)	It is a better measure especially where borrowers cannot remember the numbers or where asset financing is made
Loan received	Loan amounts received	Fecke et al. (2016), McIntosh (2007), Chisasa (2016), Saqib et al. (2018)	A better measure of access if borrowers remember the figures and if loans are cash-based.
Credit constraint	Whether one who got credit got enough credit / Also those who did not apply but needed credit	Shoji (2012)	Captures not just those who received less credit than they applied for but also those who did not apply for credit for one reason or another but still needed the loan
Credit rationing	Whether the volume of credit received is less than what was requested	Weber & Musshoff (2013), Atieno (2001)	Useful where credit is offered as cash and the clients can remember the loans requested and loans received

Source: Author's summary from literature

2.3.3 Other Determinants of Access to Credit

While the focus of this study is to examine the effect of flexible loans on access to credit, previous studies on how flexibility influences access to credit have also shown that other factors also influence access to credit. Indeed, most studies examining the determinants of credit access by farmers point out the role of household factors, farmer-related factors,

and farm-related factors in explaining access to credit. In this study, a number of these factors are also examined as control factors in the relationship between flexible loans and credit access.

Gender has been shown to explain access to credit. Lamessa & Gemechu (2016) found that sex of the household head influenced access to credit. Kosgey (2013) also found that gender influenced access to credit. On the other hand, Weber & Musshoff (2013) found that gender had no significant influence on access to credit but explained credit rationing as more women than men were credit-rationed. Li et al. (2011) also found that gender had no effect of access to microcredit. Given the importance of gender in accessing credit, this study controls for gender in the relationship between flexible loans and access to credit.

Age has also been shown to influence access to credit. Kosgey (2013) found that age influenced access to credit. Lamessa & Gemechu (2016) found that age did not influence access to credit. Li et al. (2011) found that age had no significant effect on access to microcredit. In Weber & Musshoff (2013), the study found a U-shaped relationship between age and access to credit as well as with credit rationing. Fecke et al. (2016) also found no significant relationship between age and loan amount. Lamessa & Gemechu (2016) also found that age does not influence access to credit. As age is an important factor in credit access, this study controls for the effect of age by recognising the non-linear relationship between age and access to credit.

The size of household has also been examine by scholars as a determinant of access to credit. Li et al. (2011) found that size of household had a significant effect on access to credit. Weber & Musshoff (2013) found an inverted U-shaped relationship between size of the household (measured as number of family members) and access to credit and a U-shaped relationship with credit rationing. Lamessa & Gemechu (2016) found that size of household influenced access to credit. Kosgey (2013) found that household size influence access to credit. This study recognises the non-linear relationship between size of household and credit access and controls for the effect of the size of household on credit access.

Wealth status of a household is also a variable that has been examined as a predictor of credit access in literature. This is usually examined in terms of the assets in the household or the income levels in the household. For instance, Li et al. (2011) found that the value of household assets had a negative effect on access to microcredit. Elias, Ahmad, & Patil (2015) and Saqib et al. (2018) showed that the level of household income determines access to credit.

Sebatta, Wamulume, & Mwansakilwa (2014) found that the number of daily meals served as well as having a phone influenced credit access. These results show the importance of household wealth on credit access. Thus, this study controls for the wealth of households in the relationship between flexible loans and credit access by using the asset wealth index of households as a proxy for household wealth.

Studies have also examined the role of education in access to credit. For example, Lamessa & Gemechu (2016) found that education level of the household head influenced access to credit. Li et al. (2011) also showed that education matters in accessing microcredit, as households who had acquired secondary education or less were highly likely to access microcredit than the uneducated ones. Further, Kosgey (2013) found that education influenced credit access. Thus, this study recognises the role of education on credit access and controls for education in the relationship between flexible loans and access to credit.

Studies have also examined the effect of style of credit on credit access. For instance, Fecke et al (2016) found that style of credit influenced access to credit. The study examined style of credit in terms of how the loan credit was extended to farmers: redeemable loan, annuity loan, or bullet loan. This study recognises the important role played by how the loan is provided to the borrowers on determining their access to credit and controls for it. In this study, style of credit is conceptualised in terms of whether the loan is asset-based (provision of farm inputs instead of cash loan) or cash based.

2.4 Conceptual Framework

The conceptual framework is presented in Figure 2.1. This shows the relationship between variables selected in the study. The independent variable is the loan flexibility measured as an index variable. The index, Loan Flexibility Index, is a weighted sum of flexible loan items as listed in the model –grace period, flexible repayments, bullet payments, loan rescheduling, loan refinancing, and lines of credit. The dependent variable is access to credit. This is measured as the amount of loan received by the farmer.

Several control variables are included in the model since these have been shown to affect access in prior studies. Other than the usual socio-economic factors, the control variables include unique factors that are relevant for the present study. For instance, some of the farmers borrow within a group setting in microfinance institutions while others borrow as individuals in commercial and agricultural banks. Thus, controlling for group membership in the model is important. Further, some institutions lend cash to farmers while others

purchase the farm inputs on behalf of the farmers and do not give cash loans. Therefore, it is important to control for cash and asset-based financing models.

With shrinking land sizes due to population growth and rapid urbanisation, agricultural lands are getting scarce. Thus, some farmers in rural areas are leasing land for agriculture. This model controls for this kind of agricultural land ownership. The model controls for remittances. As some studies show, microfinance institutions have recorded fewer defaults not because borrowers repay the loans from the business returns but because they get remittances from family members working elsewhere.

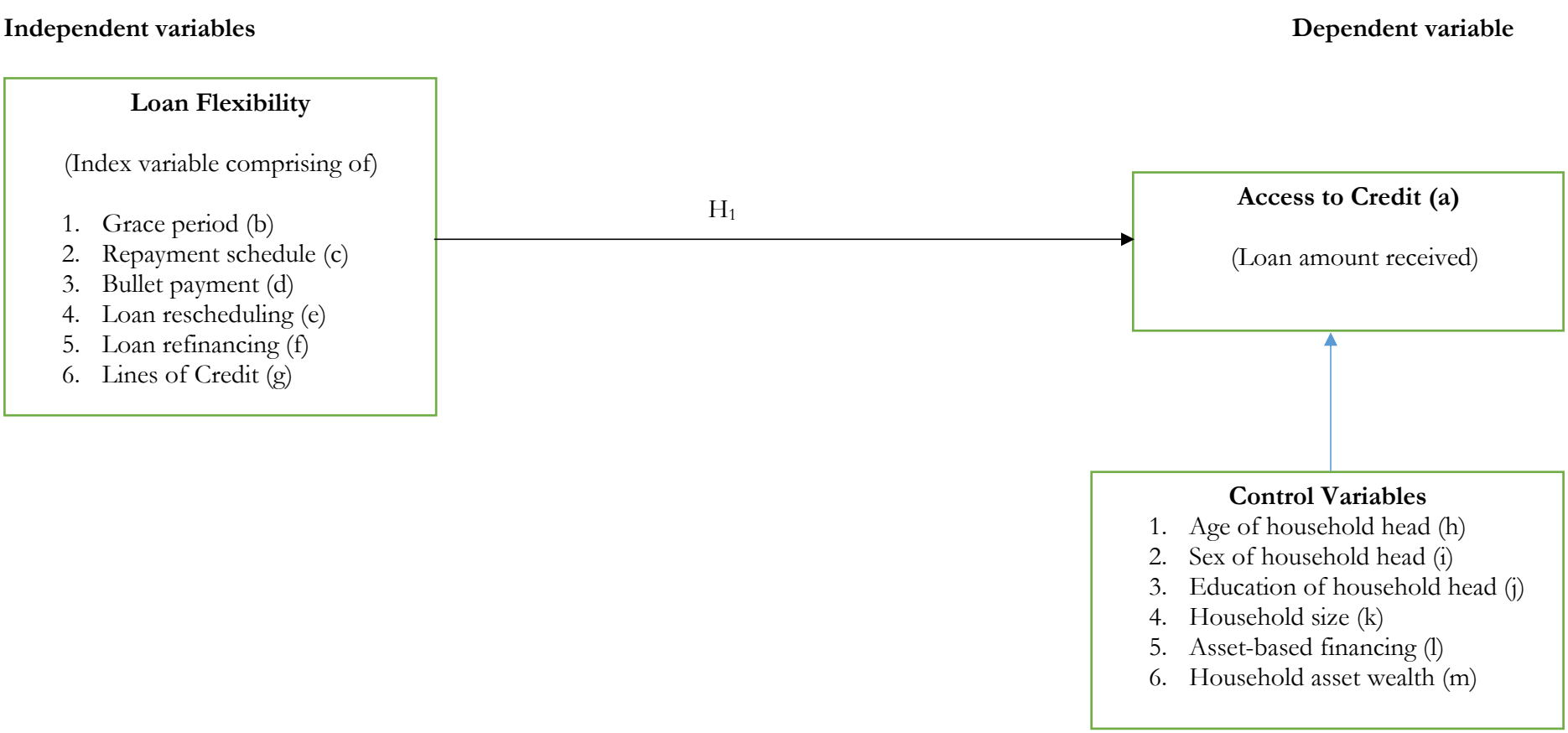


Figure 2.1: The conceptual framework on the effect of flexibility on credit access
Source: Author's Conceptualisation

2.5 Summary

This chapter has discussed the theoretical framework that the study used. The framework explains what drives smallholder farmers to borrow. The theoretical review focuses on the threshold decision-making theory. The threshold decision-making theory posits that farmers make a decision to borrow only when their threshold for deciding whether to take up credit or not is met. Thus, the theory is useful in explaining the threshold index of flexibility at which smallholder farmers decide to access more credit.

The empirical review reveals a number of issues. First, the review on the relationship between flexible loans and access to credit reveals that few studies have examined this link. The review shows that studies mostly show that flexibility influences access to credit although there are a few others that show that either flexibility does not have an influence on access to credit or that the effect is deleterious. However, studies model flexibility in terms of single indicators such as grace period or flexible repayments. In reality, flexibility of loan contracts has levels. In other words, some institutions will only provide one aspect of flexibility within a loan contract while others will offer a range of flexible options within the same loan contract. This calls for a re-evaluation of this relationship using a variable that takes note of the degree of flexibility in loan contracts. This is why this study tests for the effect of an index of loan flexibility (LFI) on access to credit.

Secondly, the empirical review section also presents a discussion on how loan flexibility and access to credit are measured in literature. Here, the review concludes that flexibility is usually measured as standalone indicators such as grace period, flexible loan repayments, lines of credit, and loan rescheduling. The review notes that the measures do not take into account the degrees of flexibility in loan products. Therefore, the study used an index of flexibility to examine the effect of flexible loans on access to credit. Further, the chapter reviews how access to credit is conceptualised from various authors. This ranges from credit application, getting credit, and amounts received (which gives two variants – credit rationing and credit constraint). This study used loan amounts as a measure of credit access.

Lastly, the study recognised that other scholars have examined the determinants of access to credit by focusing on a number of variables that should be controlled for in the present study on the relationship between flexible loans and access to agricultural credit. These factors include age, sex, education, size of household, wealth, and the style of financing. Thus, the review recognised the effect of these factors on access to credit, noted

the conflicting results on their influence on credit access, and proposed to include them in the credit access model to control for the effect of flexible loans on access to agricultural credit.

The next chapter discusses the research methodology.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology employed in this study. Babbie (2010) pointed out that methodology is a subfield of epistemology (the science of knowing) and defines it as the science of finding out or the procedures for scientific investigation. Thus, this chapter presents the procedures that were undertaken to investigate the link between flexible loans and access to credit. The chapter is organised into eight sections including this introduction. In section 3.2, the research design is discussed. Section 3.3 describes the study site in detail. Section 3.4 discusses the target population while section 3.5 discusses the sample and sampling procedure. Section 3.6 discusses the data collection procedures while section 3.7 discusses the data processing and analysis procedures. Section 3.8 concludes with the ethical considerations in the study.

3.2 Research Design

Bryman (2012) defines research design as the criteria that one employs when evaluating social research. In his words, research design is "framework for the generation of evidence that is suited both to a certain set of criteria and to the research question in which the investigator is interested" (Bryman, 2012, p. 45). In other words, it is a framework for collecting and analysing data. As such, he outlines five prominent research designs as experimental, cross-sectional, longitudinal, case study, or comparative. Babbie (2010) on the other hand defines research design in terms of the purpose of the study or the time dimension. Based on the two schools of thought on presenting a research design, the study restricts itself to defining design in the manner in which Bryman (2012) presents it, which is almost similar to Babbie's (2010) time dimension. Thus, this study took a cross-sectional survey design.

Studies examining the effect of flexible loans (see summary in Table 3.1) have largely been surveys (for instance Jain & Mansuri, 2003; Li et al., 2011; Lamessa & Gemechu, 2016; and Soman & Cheema, 2002), experiments (for instance Krishnaswamy, 2015 and McIntosh, 2008) or based on secondary analysis (for instance Shoji, 2012; Weber & Musshoff, 2013; and Fecke et al., 2016). While experiments that use randomised control trials (RCTs) are considered the 'gold standard' in impact evaluations hence most preferred for studies similar to the current one, it is impractical to carry out an experimental study due to limited time and resources. As a field experiment, the RCTs outperform observational studies as far as internal validity is concerned but weaker in terms of external validity (Dimova, 2019). Thus,

it is also for this reason that the present study relies on an observational study rather than the experimental one. Further, while secondary analysis based on data from lending institutions would be preferred based on their reliability and lack of bias, such data may not be easily shared by the institutions. Some scholars also fault such Management Information System (MIS) data as suffering from sample selection bias (Fecke et al., 2016). This is because such sample already has farmers that are more likely to take access credit because they already applied for the same. This is sample selection bias.

Table 3.1: Methodologies used in various empirical studies on flexible loans

Study	Methodology
Weber & Musshoff (2013)	Secondary analysis of MFI data; Probit regression used
Fecke, et al. (2016)	Secondary analysis of time series data; OLS regression used to perform the analysis
McIntosh (2007)	Spatial experiment of 380 MFI clients randomly selected; Difference-in-difference (DID) and spatial matching techniques used
Jain & Mansuri (2003)	Survey of 350 households; Descriptive analysis and t-tests
Li, et al. (2011)	Household survey of 424 households selected through multistage stratified random sampling; Logit regression
Lamessa & Gemechu (2016)	Survey of 148 farmers in Ethiopia; Logistic regression analysis used
Kosgey (2013)	Survey of 130 farmers in Kenya randomly selected; Key Informant Interviews (KIIs) also used; Logit regression model used
Atieno (2001)	Survey of 334 entrepreneurs; Descriptive analysis, Crosstabs, t-tests and ANOVA used
Krishnaswamy (2015)	Randomised Control Trial (RCT) of 360 vendors randomly selected; Descriptive analysis used
Soman & Cheema (2002)	Surveys and experiments used; ANOVA and regression analysis used
Shoji (2012)	Secondary data from MFIs and survey data used; Difference-in-Differences Matching estimator (DIDM), a variant of Propensity Score Matching (PSM), used to test impact

Source: Author's summaries from literature

Given the time and resource limitations of conducting an experiment and the limitations of carrying out a secondary analysis given the research questions in this study, this study employed a cross-sectional survey design. A cross-sectional study is one where observations are made at one point in time (Babbie, 2010). This study gathered data on farmer households in order to examine the association between flexible loans and access to credit. Thus, a cross-sectional survey was most appropriate for the study. According to Bryman (2012), cross-sectional studies entail:

the collection of data on more than one case (usually quite a lot more than one) and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables (usually many more than two), which are then examined to detect patterns of association. (Bryman, 2012, p.58)

In summary, the study settled on the cross-sectional design for the study. It is important to understand the site where this study was carried out. Thus, in the next section, the study site is exhaustively discussed including the motivation for conducting this research in the area.

3.3 Study Site

This study was carried out in Ugenya Sub-county of Siaya County in Kenya. It is located in the former Nyanza Province in western part of Kenya and borders Busia County to the West. Ugenya Sub-County is one of the six sub-counties in Siaya County. Others are Gem, Bondo, Rarieda, Ugunja, and Alego-Usonga. Ugenya Sub-County has four county assembly wards (CAWs) namely Ukwala ward, West Ugenya ward, East Ugenya ward, and North Ugenya ward. The sub-county has six locations and twenty-seven sub-locations (see Table 3.2).

Table 3.2: Ugenya sub-county wards, sub-locations, and land size

Ward	**Sub-locations**	**# Sub-locations**	**Area (km^2)**
West Ugenya	Karadolo East, Karadolo West, Masat East, Masat West, Sifuyo East, Sifuyo West, Nyalenya, Uyundo, Ndenga	9	101.1
Ukwala	Doho East, Doho West, Simur, Simur East, Simur-Kondiek, Siranga, Yenga	7	55.9
North Ugenya	Nyamsenda, Ligala, Jera, Kagonya, Sega	5	68
East Ugenya	Anyiko, Sihayi, Ramunde, Kathieno A, Kathieno B and Kathieno C	6	97.3

Source: CGS (2018)

By 2018, the sub-county was estimated to have a population of 126,942 people occupying 310.2 km^2 of land (CGS, 2018). By 2016, the county was estimated to have 246,000 households (Knoema, 2019) up from 199,034 by the last census survey in 2009 (Hurumap, 2019). As per the 2009 census survey, Ugenya has 48,105 households (KNBS, 2013). Most farmers in Ugenya practice smallholder agriculture with farm sizes averaging 1.5 ha to 7.0 ha (CGS, 2018).[2] Ugenya Constituency has a number of formal lenders that provide microcredit to farmers for purposes of boosting agricultural production. While most farmers

[2] These numbers are for the entire Siaya County. They are representative of the situation in Ugenya. This data is from the Siaya County Annual Development Plan 2018-19

have enrolled in various microcredit programs, it is unclear what drives access to farm credit in the area. This was the main motivation behind selecting this study site.

The next section discusses the target population.

3.4 Target Population and Population for the Study

The study targeted farmers in Ugenya Sub-County. No database of farmers in the sub-county was available at the time of conducting the study. However, it was assumed that all the households in the sub-county were farmers. As was discussed in the conceptual framework in section 2.4 (see Figure 2.1), this study restricted itself to the farmers who had taken up loans since access to credit was defined as the amount of credit borrowed. The decision to target only farmers who had borrowed was also informed by the fact that only those who had borrowed would know the features of the loan products they had borrowed. Thus, including those who had not borrowed would make it hard for the study to test the design of the loan product –flexibility – that was the basis of the study. Farmers who had borrowed loans for purposes of agricultural production therefore formed the target population. However, no data was available on the number of farmers who had borrowed in Ugenya sub-county. Thus, the researcher had to build up this target population (596 farmers) based on interviews with local administration in the area, the farmers as well as some officials from the credit institutions operating in the area.

The study employed a two-stage procedure to build up this population. In the first stage, the study identified institutions that provided loans to farmers within the sub-county. This was done by talking to the local administration as well as a few farmers purposively to identify these firms. From the interviews, the study found that there were three main institutions that offered credit to farmers in the area. These were One Acre Fund, Agricultural Finance Corporation and East African Breweries Limited (EABL). These institutions were identified through discussions with the area administrative officers (the chief and sub-chief) prior to the data collection process. These institutions were therefore used a a basis of finding out the number of farmers who had borrowed loans for purposes of agricultural production. Other than the three institutions operated in the area, they also differed in terms of the loan product design as some offered standard loans while others

offered flexible loans. Further, at least one of them offered asset-based credit as opposed to cash credit.[3] These were desired features for the study.

In the second-stage, the study sought to identify those who had taken up loans with these institutions. It was not possible to find get the three institutions to provide us with the data for loanees. Therefore, the study used used anecdotal interviews with the local authories and a few farmers to find out who the loanees were. It was established that most of the firms used group model to organise farmers. Thus, these groups became the basis for identifying those who had taken up loans with the institutions (see Table 3.3). Interviews with area administration officers revealed that One Acre Fund had 47 groups spread across the sub-county with 517 members. East African Breweries also organised farmers into groups and had seven groups with 63 members spread within the sub-county. Agricultural Finance Corporation did not organise farmers into groups. To identify the people who had taken up loans with the institution, the study used snowballing approach where farmers that had been identified helped trace the rest of the farmers. The study found that sixteen farmers in the sub-county had borrowed from AFC within the year. Since only few (16) farmers had taken up loans with the corporation, the borrowers from the institution were taken as one group. Thus, the sampling frame was 55 groups made up of 596 farmers. This was also the population for the study.

Table 3.3: Lending institutions by groups and members

Institution	**No. of Groups**	**No. of Members**
One Acre Fund	47	517
East African Breweries	7	63
Agricultural Finance Corporation	1	16
Total	**55**	**596**

Source: Interviews with local administration and farmers (2019)

3.5 Sampling

A sample size of farmers was selected based on the groups shown in Table 3.3. From the sample size calculator, the appropriate sample size was 299 farmers.[4] Thus, based on the proportion of farmers in each institution as a percentage of the total number of farmers in the sampling frame, Table 3.4 shows the sample sizes per institution. However, due to

[3] Of the six sub-counties in Siaya County, One Acre Fund predominantly operates only in Ugenya. The institution finances inputs by providing the inputs equivalent to the loan amount to farmers rather than give cash.

[4] The sample size calculator is available here https://www.surveysystem.com/sscalc.htm. This calculation is based on 95% confidence level, a confidence interval of +/- 4 and a population of 596 farmers.

resource and time constraints, a decision was made to trim down the sample size to 200 farmers. This is shown in Table 3.4 as adjusted sample.

Table 3.4: Original and adjusted sample size

Institution	No. of Farmers	% of Total	Original Sample	Adjusted Sample
One Acre Fund	517	86.7	259	173
East African Breweries	63	10.6	32	21
Agricultural Finance Corporation	16	2.7	8	5
Total	**596**	**100**	**299**	**200**

Source: Author's calculations (2019)

To reach the farmers, the researcher relied on group meetings for those with One Acre Fund where weekly meetings were held at specific meeting points. Since the groups were spread across the constituency not all the 47 groups were reached due to resource constraints. In total, 19 groups were reached where four members from each group were picked at random to take part in the survey. Thus, the study interviewed 84 farmers from One Acre Fund. For East African Breweries, four groups were reached where four members from each of the groups were interviewed. This brings the total respondents from the institution to 16 farmers. For both One Acre Fund and East African Breweries Limited, the respondents were selected based on a simple random selection of the farmers that were present during the meetings. This was done through a ruffle method. Here, one had to pick folded papers that had Yes/No writings with the ones taking part in the interviews having to pick a Yes for them to be considered. Three farmers from Agricultural Finance Corporation were also interviewed. Since the farmers borrowing from the Agricultural Finance Corporation were not organised into groups, the researcher reached out to other farmers to identify them. Further, the researcher contacted both the Busia and Siaya offices as well as the local administration to trace the farmers. Thus, these were reached through snowballing technique. In total, the study reached 103 farmers as shown in Table 3.5.

Table 3.5: Farmers and groups interviewed

Institution	Groups Reached	Farmers Interviewed
One Acre Fund	19	84
East African Breweries	4	16
Agricultural Finance Corporation	1	3
Total	**24**	**103**

Source: Field Data (2019)

In summary, the study used a sample of 200 farmers who had taken up credit from three financial institutions in Ugenya sub-county. The sample was selected in three stages and both probabilistic and non-probabilistic sampling techniques were employed. In the end, the study reached 103 farmers from 24 groups. The next section discusses how the data was collected.

3.6 Data Collection Procedure

The study intended to collect both quantitative and qualitative data. The quantitative data was gathered through questionnaires and were administered to the farmers reached through the credit groups as well as individually for the case of the farmers that borrowed with Agricultural Finance Corporation as explained in section 3.5. On the other hand, qualitative data was gathered through observations and further informal interviews with various stakeholders to understand how the credit system worked. Thus, the study used stylised facts where some farmers were informally asked questions about the supply side of the credit system[5]. Informal interviews were also done with the local administration. The study also used secondary sources such are reports and company websites to gather further information on the supply side of the credit system.

The collected data was based on the data needs presented in Table 3.6. This data needs table was based on the research questions in section 1.3 and the conceptual framework in section 2.4. Thus, the questions in the questionnaire were based on the data needs table presented. This is also true for the styled facts gathered during the data collection process.

Table 3.6: Data needs table

Research Question	Data Needed	Source	Type of Data	Tool
What are the characteristics of smallholder farmers?	Age of household head (h)	Farmer	Ratio	Questionnaire
	Sex of household head (i)	Farmer	Nominal	Questionnaire
	Education of household head (j)	Farmer	Ratio	Questionnaire
	Size of household (k)	Farmer	Ratio	Questionnaire
	Asset-based	Farmer	Nominal	Questionnaire

[5] Stylized facts refer to a set of observations that are believed to be factual or to hold for a given issue.

Research Question	Data Needed	Source	Type of Data	Tool
	financing (l)			
	Asset wealth (m)	Farmer	Ratio	Questionnaire
What is the level of loan flexibility?	Grace period (b)	Farmer	Nominal	Questionnaire
	Repayment schedule (c)	Farmer	Nominal	Questionnaire
	Bullet payment (d)	Farmer	Nominal	Questionnaire
	Loan rescheduling (e)	Farmer	Nominal	Questionnaire
	Loan refinancing (f)	Farmer	Nominal	Questionnaire
	Lines of credit (g)	Farmer	Nominal	Questionnaire
What is the view of lending institutions on flexible loans?	Relevance of flexible loans	Farmers/local administration	Qualitative	Stylised facts/secondary data
	Performance of loans	Farmers/local administration	Qualitative	Stylised facts/secondary data
What is the level of access to credit?	Loan amounts received (a)	Farmer	Ratio	Questionnaire

Source: Author's conceptualisation (2019)

The next section presents the data collection tools and methods.

3.6.1 Data Collection Tools and Methods

A structured questionnaire was developed and used to collect data from the sampled farmers. The questionnaire was developed based on the literature. The questionnaire gathered data on the respondent and household characteristics, flexible loan features, and access to credit. Specifically, the questionnaire contained the following main parts (see full questionnaire in Appendix II-A in English):

Part A: Household Selection and Demographic Information

Part B: Loan Flexibility and Access to Credit

The questionnaire administration was done by the researcher through face-to-face interviews. This method of administration is usually preferred where the population has lower levels of education. Siaya County has literacy levels of 66.2%, just a few points below the national average of 66.4% (UNICEF, 2013). Therefore, a large proportion of people in the county cannot read or write. Further, since the local language in the area was Dholuo, the

questionnaire was translated into Dholuo by the researcher before being administered. The biggest challenge was translating various elements of loan flexibility into Dholuo. After careful discussion with the supervisor, the study opted to present the elements in terms of explanatory statements. The translated questionnaire is presented as Appendix II-B. Before the tool was administered, it was pretested as discussed in the next section.

3.6.2 Pretesting of Questionnaires

The questionnaire was pretested through a pilot study on a sample of farmers from the loanees who did not form part of the final survey. The pretesting followed the same procedures that were used in the final survey. Consistent with Mugenda & Mugenda (2003)'s suggestion to keep the sample size for a pilot study between 1% and 10% depending on the sample size, the pilot study for pretesting of the questionnaire were 20 respondents (which is 10% of the suggested sample size). The respondents in the pilot study were encouraged to make comments and suggestions regarding instructions, clarity of questions and relevance of questions. These comments and suggestions were useful in making changes to the questionnaire. For instance, there was confusion in terms of understanding of grace period and flexible repayment schedule. Thus, during translation of the tool and subsequent questionnaire administration, care was taken to ensure that the differences were clear. In the end, pretesting helped enhance reliability of the questionnaire. Mugenda & Mugenda (2003) also noted that no analysis of collected data during pre-testing is necessary if the sample is small. Since that was the case in this study, the pretested questionnaires were not analysed.

3.6.3 Questionnaire Reliability & Validity

Mugenda & Mugenda (2003, p. 95) define reliability as "a measure of degree to which research instruments yield consistent results or data after repeated trials". Once the final survey data is collected, reliability of the instrument was analysed using the internal consistency technique where Cronbach's coefficient alpha was computed. [6] The alpha value for the items was 0.7783, which is considered high. This high coefficient implies that the items in the questionnaire correlate highly among themselves (Mugenda & Mugenda, 2003) hence higher reliability.

Validity, on the other hand, is defined as "the degree to which results obtained from the analysis of the data actually represent the phenomenon under study" (Mugenda &

[6] Internal consistency technique is just one of the techniques for assessing reliability. According to Mugenda & Mugenda (2003), others include test-retest, equivalent-form, and split-half.

Mugenda, 2003, p.99). Validity can be construct validity, content validity, and criterion-related validity or defined in terms of internal and external validity.[7] In this study, construct validity was addressed by deriving the concepts of flexibility and credit access from literature where the theoretical links were observed. Content validity was ensured in this study through deriving the indicators from theory. Further, the indicators used in this study were checked by my supervisor who is an expert in the field of finance as well as other experts and professionals from Agricultural Finance Corporation and One Acre Fund. Criterion-related validity was not relevant to the study since it requires some form of experimentation or long-term observation to assess whether the measures are predictive or concurrent.[8]

Internal validity ensures that changes on the dependent variable are attributable to the independent variables and not through other extraneous variables. In this study, internal validity was addressed by including a set of controls in the regression model (see the conceptual framework in section 2.5 as well as the model in section 3.7 for further discussion on the control variables used). External validity has to do with the representativeness of the sample to the population from which the sample was drawn. Observing external validity ensures that the results are generalizable to the population. This study ensured external validity through randomisation of the sample selection procedure. Since the results of this study are to be generalised on farmers who borrow for farm production, randomisation was done during the selection of respondents within the groups as discussed in section 3.4.

The next section discusses how the data collected was processed as well as how it was analysed.

3.7 Data Processing and Analysis

The data collected in this study was mainly quantitative. The study used Stata v.15 for analysis after coding, entering and cleaning the data in SPSS v.25. In summary, the study used descriptive analysis, bivariate analysis and regression analysis.

Descriptive analysis was conducted in order to show the descriptive statistics (percentages, mean scores and median values) for the variables in the study. Thus, descriptive

[7] Construct validity refers to the degree to which an instrument accurately represents a theoretical concept. Content validity refers to the degree to which indicators represent a particular concept. Criterion-related validity refers to the degree with which a measure assesses behaviour in specific situations.

[8] Predictive validity is a type of criterion-related validity that assesses the extent to which a measure data predicts future behaviour of individuals while concurrent validity assesses whether data assesses behaviour of individuals now and not in the future.

analysis was conducted for the demographic variables (also used as control variables in the model), access to credit and loan flexibility. This was also done for other control variables in the study as described and presented in section 2.4. The results of descriptive analysis are presented in section 4.2 with accompanying tables and charts where appropriate.

The second stage of the analysis was a bivariate analysis. This was conducted by running tests of differences (t-tests) in access to credit for various groups. In this instance, the study ran mean differences in access to credit by age of heads of households, sex of heads of households, education levels of heads of households, size of households, the type of loan, and the asset wealth levels. The reason for running these bivariate relationships was to check whether these groups differed in terms of credit access. If significant differences exist, such variables would be useful in a multiple regression model.

Lastly, the study performed a multiple regression analysis with credit access as the dependent variable, loan flexibility as the independent variable and several control variables included in the model. The regression analyses were run in order to test the two hypotheses presented in section 2.3.1. The model for the first hypothesis, H_1, is presented in Equation 1 as follows:

$$Access = \alpha + \beta_n Flex_i + \beta_{n+1} X_i + \varepsilon \qquad \textit{Equation 1}$$

In the model shown in Equation 1, $ACCESS_i$ is the amounts of loan received by farmer *i*, $Flex_i$ is a level of specific element of loan flexibility (grace period, repayment schedule, bullet payment, loan rescheduling, loan refinancing, lines of credit) offered to farmer *i*, and X_i is a vector of control variables for farmer *i*. Thus, from this equation, five different regression analyses were run. The model using repayment schedule could not be run because there was no variability in the data as all the respondents had noted that their loan product had a flexible repayment plan. The descriptive results of repayment schedule are shown in section 4.2. The results of the analysis on the effect of each of these elements on access to credit are presented in section 4.4.1.

For the second hypothesis, H_2, the multiple regression analysis was run based on the model in Equation 2 with credit access as the dependent variable and Loan Flexibility Index (LFI) as the independent variable together with several control variables as in Equation 1. The details on the definition and construction of LFI are shown in Appendix I.

$$Access = \alpha + \beta_n LFI_i + \beta_{n+1} X_i + \varepsilon \qquad \textit{Equation 2}$$

In this second model, $ACCESS_i$ was the amounts of loan received by farmer *i*, LFI_i was the level of loan flexibility offered to farmer *i*, and X_i is a vector of control variables for farmer *i*. The operational definition of the variables used in the study is presented in Table 3.7 as is based on the two hypotheses presented in section 2.3.1.

To develop the loan flexibility index, the study first selected the items that would go into the index. Based on a review of literature, six elements of loan flexibility were identified. These were grace period, flexible repayment schedules, bullet payments, loan rescheduling, loan refinancing, and lines of credit. Each of these elements were included in a questionnaire with one question each describing the element and with a binary Yes/No response. The second step used Principal Components Analysis (PCA) calculate and assign weights to each element. Since repayment schedule did not vary, the PCA dropped it from the analysis. Using varimax rotation, the results showed that each of the components had equal weight of 20 per cent. Since literature does not show whether one element is flexibility is more important than the other and the PCA method showed that the elements had equal weights, equal weights were assumed for each of the elements. Thus, the weighted sum of the elements to form the index assumed equal weights.

Table 3.7: Operationalisation of variables

Variable name	Variable type	Variable description
Access to credit		
ACCESS (a)	Continuous	The value of loan (in shillings)
Loan flexibility		
LFI (b-g)	Continuous	Loan flexibility index (in numbers)
Grace period (b)	Binary	Loan offered had a grace period (1 = Yes, 0 = No)
Repayment schedule (c)	Binary	Loan had a flexible repayment schedule option (1 = Yes, 0 = No)
Bullet payment (d)	Binary	Loan had bullet payment option (1 = Yes, 0 = No)
Loan rescheduling (e)	Binary	Loan had loan rescheduling option (1 = Yes, 0 = No)
Loan refinancing (f)	Binary	Loan had loan refinancing option (1 = Yes, 0 = No)
Lines of credit (g)	Binary	Loan had an option for line of credit (1 = Yes, 0 = No)
Controls		
AGE (h)	Continuous	Age of household head (in years)
SEX (i)	Binary	Sex of household head (1 = female, 0 otherwise)
EDU (j)	Categorical	Highest level of education
HHSZ (k)	Continuous	Household size (in numbers)
ASSETFIN (l)	Binary	Loan offered as asset financing (1 = yes, 0 otherwise)
ASSETIND (m)	Continuous	Asset wealth index (in numbers)

Source: Author's conceptualisation (2019)

3.8 Ethical Considerations

One of the key ethical considerations in this study was to ensure that farmers participate willingly in this study. Farmers were therefore ask to give the verbal consent before the interviews confirming that they were willing participants in the study. Before this consent was sought and given, the researcher introduced himself and explained to the farmers what the research sought to achieve, their role in the study and how the results of this study would be used. To confirm that the research was indeed a student and conducting the study for educational purposes, the researcher showed the participants the University of Nairobi's introduction letter (attached as Appendix III) as well as the student identity card. The participants were free to drop out of the study at any point during the interviews. All the interviewees that took part in the survey gave their verbal consents and none dropped midway the interviews.

Secondly, the researcher endeavoured to maintain, but not guarantee, the anonymity and confidentiality of the farmers who took part in the survey. Thus, no names were recorded anywhere during the interviews or during the analysis and reporting. The participants were assured of the confidentially and that the results of the study would only be used for purposes of research. Any participant contacts gathered during the interviews were stored separately.

As is required for any research conducted in Kenya, the researcher sought the permission of the National Commission for Science, Technology and Innovation (NACOSTI) to carry out the research in Ugenya sub-county. The research permit was granted on 30th August 2019 under License No. NACOSTI/P/19/385. The research license is attached as Appendix IV.

CHAPTER 4 : RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

As discussed in section 3.5, this study envisaged to reach 200 respondents from all the four county assembly wards in Ugenya sub-county. However, by the end of the survey, 103 respondents had taken part in the survey. Thus, the study reached 52 per cent of the intended sample. Baruch & Holtom (2008) noted that the response rates for surveys that collected data from individuals averaged 52.7 per cent. While such a low response rate may lead to biased results, this is only true for univariate analysis of some demographic variables and not for multivariate analysis that control for background characteristics (Rindfuss, Choe, Tsuya, Bumpass, & Tamaki, 2015).

This response was lower than expected because, as discussed in section 3.5, it was not possible to reach the entire intended sample due to resource constraints that limited covering the entire sub-county. In some cases, it took a lot of time to trace some of the respondents and given the limited time given to collect the data and analyse, it was not possible to reach some of the respondents in time. While the sample reached is low, it is acceptable as most surveys have an average that is closer to the current reach. Further, this study uses multivariate analysis to examine the relationship between flexible loans and access to credit. Thus, based on the conclusions of Rindfuss et al (2015), this sample is acceptable for a multivariate analysis.

The previous section discussed the methodology used in this study. This section presents the findings and discussion of findings. It is organised into four sub-sections including this introduction. The next sub-section presents and discusses the results of descriptive analysis. In section 4.3, the results of the bivariate analysis are presented and discussed. In section 4.4, the study presents and discusses the results of multivariate regression analysis.

4.2 Descriptive Analysis Results

This section results the results of the descriptive analysis. Descriptive analysis was performed for the all the variables previously presented and described in the conceptual framework (see section 2.4) and operationalised in Table 3.7 (see section 3.7). The presentation begins with the descriptive results of the demographic variables (age, sex, education, household wealth, and size of household) followed by loan-specific variables (type of loan and credit access). Then, the descriptive results of loan flexibility (grace period,

repayment schedule, bullet payment, loan rescheduling, loan refinancing, lines of credit and LFI) are presented and discussed. The descriptive results are discussed by comparing each of the variables with existing secondary data to show that while the sample in this study is small, it reflects the characteristics of the population in the study site. Further, in some instances, the descriptive results are discussed with reference to prior empirical literature especially in order to show the relevance of the results on access to credit.

4.2.1 Age of Heads of Households

Empirical evidence suggests that age influences access to credit and this was exhaustively discussed in section 2.3. Table 4.1 shows the age structure of the heads of households in this survey.

Table 4.1: Summary descriptive results of age of heads of households in the study

Age	Obs.	Per cent	Mean	Min	Max
39 years or below	103	10.68	37.364	36	39
40 - 49 years	103	48.54	44.820	40	49
50 - 59 years	103	28.16	53.793	50	59
60 years or above	103	12.62	61.538	60	64
Age of head of household	103	-	48.660	36	64

Source: Survey Data (2019)

The study found that the mean age of the heads of households was 49 years with the youngest being 36 years and the oldest being 64 years. This is significantly lower than the average age of a Kenyan farmer, which is estimated as 60 years (AGRA, 2017). This suggests that most of the farmers that have enrolled in the credit programs in Ugenya are generally younger than the average Kenyan farmer is. However, as the youngest head of household in the sample is 36 years, it means that majority of the youth in the constituency are not engaged in agriculture.[9] This may affect the level of risk appetite farmers are willing to take in terms of the amounts of loans borrowed because financial risk-taking decreases with age (Rolison, Hanoch, Wood, & Liu, 2013).

4.2.2 Sex of heads of households

As was discussed in section 2.3, empirical evidence shows that sex has an influence on access to credit. The results presented in Table 4.2 show the descriptive results for sex of heads of households.

[9] In Kenya, a youth is defined as a person aged between 18 and 34 years. The United Nations on the other hand defines a youth as anyone aged between 15 and 24 years.

Table 4.2: Proportion of heads of households by sex

Sex of head of household	Frequency	Per cent
Male	88	85
Female	15	15
Total	**103**	**100.00**

Source: Survey Data (2019)

The study showed that majority of the heads of households (85 per cent) were male. This is inconsistent with the demographics of Ugenya sub-county farmers as the data from the socio-economic atlas of Kenya shows that about 51 per cent of households in the sub-county are female-headed (Wiesmann, Kiteme, & Mwangi, 2016). However, further calculations from the data published by KNBS and SID on inequalities in Siaya County reveal 56 per cent of households engaged in agriculture are male-headed (KNBS & SID, 2013). This is still significantly lower than the results in this study but point to the fact that most farming households in the constituency are headed by men. In summary, the results show that majority of the farmers that enrol in credit programmes in the constituency are most likely to be in male-headed households. It was observed that women enrolled in the programmes through their spouses. Thus, majority women were the actual participants in the programmes but used their spouses to enrol in the credit programme.

4.2.3 Education level of head of household

The discussion in section 2.3 also showed that prior empirical studies have found a link between education and access to credit. Table 4.3 presents descriptive results on the levels of education of heads of households that took part in the survey.

Table 4.3: Heads of households by highest levels of education attained

Level of education	Frequency	Per cent
Primary schooling	13	12.62
Secondary schooling	75	72.82
Post-secondary schooling	15	14.56
Total	**103**	**100.00**

Source: Survey Data (2019)

The results show that majority of the heads of households (73 per cent) had secondary education (either some level or completed) with 15 per cent having post-secondary education. When the secondary schooling data is further disaggregated by whether the respondents completed secondary school or not, the results show that 45 per cent of the respondents had completed secondary level of education. This is consistent with official data. For instance, farming households' data from KNBS & SID (2013) shows that 43 per cent of male-headed households and 46 per cent of female-headed households in Ugenya

constituency have at least completed secondary level of education. Thus, while the majority of participating households had slightly better education than the average population in the area, the results are within the range of official data on farming households in Ugenya.

4.2.4 Size of household

Prior empirical studies as discussed in section 2.3 also show a link between size of household and access to credit. The descriptive results on the size of households that took part in the survey are summarised and presented in Table 4.4.

Table 4.4: Summary descriptive results for the size of households

Household size	Obs.	Per cent	Mean	Min	Max
Household has 3 people or less	103	7.77	3.000	3	3
Household has 4 to 6 people	103	62.14	5.078	4	6
Household has more than 6 people	103	30.1	7.483	7	9
Overall household size	103	-	5.641	3	9

Source: Survey Data (2019)

The study showed that the mean size of the house was six people with the smallest household having three people and the largest household having nine people. As Table 4.4 shows, majority of the households (62 per cent) had 4 to 6 people as 30 per cent had more than six people. According to data from KNBS, 44 per cent of households have up to three people while 40 per cent of the households have 4 to 6 people (Wiesmann, Kiteme, & Mwangi, 2016). Thus, majority of the household in the sample were larger than the average households in the constituency are. This may be explained by the fact that the official data is from the 2009 census survey, which is a decade old. Over time, families may have grown bigger first because of the time difference and secondly because of natural attrition such as deaths (Otieno & Mutisya, 2018) that has led to increasing cases of child orphans (Mboya, 2018).

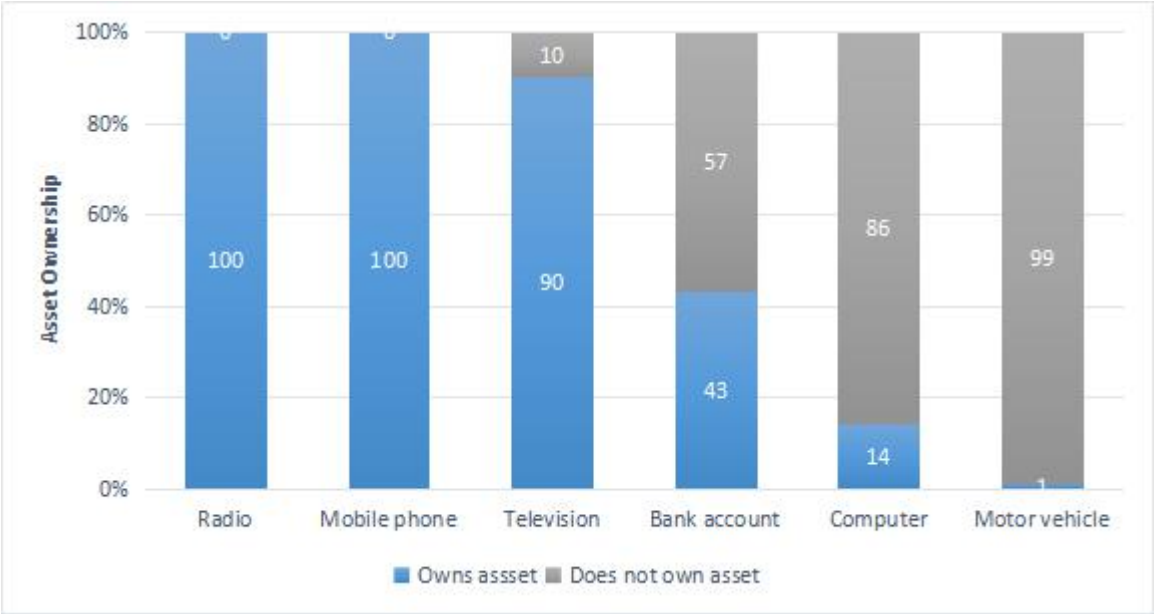
4.2.5 Household wealth

As discussed in section 2.3, prior empirical evidence suggest a link between wealth and access to credit. It is for this reason that a descriptive analysis of the wealth of households was analysed and presented in Table 4.5. Further, Figure 4.1 presents the results in terms of the proportion of farmers that own various assets that make up the wealth index.

Table 4.5: Summary descriptive results for wealth of households

Variable	Obs.	Per cent	Mean	Min	Max
Radio	103	100.0	1.243	1	2
Television	103	90.3	0.942	0	2
Motor vehicle	103	1.0	0.010	0	1
Computer	103	13.5	0.136	0	1
Bank account	103	42.7	0.495	0	2
Mobile phone	103	100.0	2.165	1	4
Household asset wealth	103	-	3.748	1	9

Source: Survey Data (2019)



Source: Survey Data (2019)

Figure 4.1: Proportion of farmers owning various assets

The results show that all the households in the survey had at least one radio and one mobile phone. While the proportion of those owning radios is higher than that of the county, which stands at 73 per cent (Wiesmann, et al., 2016), this may be because farmers are unique as they rely on the radios for news and other programmes that are important to them, including getting information related to farming and credit facilities. Wiesmann, et al. (2016) also noted that 54 per cent of the households in Siaya own a mobile phone. Again, given the unique nature of farmers, the results from the study show a higher than average mobile phone penetration among the farmers because they use mobile money to repay their loans. They are therefore compelled to own at least a mobile phone within the household.

The results further show that 90 per cent of the farmers interviewed had television sets. This is significantly higher than the county average that the official data puts at 14 per cent (Wiesmann, et al., 2016). However, the official data is a decade old and many developments have taken place since then, which explains the high television ownership

among farming households in the study. For instance, there has been an emergence of micro-lenders offering off-the-grip power solutions in the constituency over the years. These include micro-lenders such as MKOPA that provide solar-powered television sets at a daily payment of between KSh. 50 and KSh. 100.[10] The solar system also provides them with a lighting system. Most farmers have enlisted with these micro-lenders hence the higher number of households owning television sets.

Overall, the household wealth index ranged from 1.0 (lowest number of items owned) to 9.0 (highest number of items owned). The median household wealth index was 4.0 with a mean wealth index of 3.74. Thus, majority of the households in the study site had moderate wealth.

4.2.6 Type of loan and crops

Previous studies have shown that the type of loan may influence access to credit. This was discussed in section 2.3. Table 4.6 presents summary descriptive analysis results on the proportion of farmers by various types of credit.

Table 4.6: Proportion of farmers offered various types of credit

Level of education	Frequency	Per cent
Cash credit	12	12
Input credit	91	88
Total	**103**	**100**

Source: Survey Data (2019)

The study found that majority of the farmers (88 per cent) received credit in terms of farm inputs. These included fertiliser and seeds. Stylised facts explain that this may be because One Acre Fund is the most prevalent agricultural microcredit institution in the area providing input loans to farmers. Interviews with the farmers showed that they preferred this model of credit as they noted that the providing them with the inputs makes it easier for them to put the credit into good use. Further interviews with farmers showed that other institutions such as the Agricultural Finance Corporation and the East African Breweries Limited also offered farmers microcredit but in terms of cash. It was noted that East African Breweries Limited offered smallholder farmers loans to grow sorghum for use in the beer production. Farmers were therefore contracted by the company to grow the sorghum and supply to the company.

[10] MKOPA is a mobile-based loan for solar powered lighting system offered through Safaricom mobile platform. While the service began with solar lighting systems, it can increasingly added other services such as solar powered TV sets, radios and refrigerators.

From observations, the study established that most farmers were crop and livestock farmers. This is consistent with Kiplimo et al. (2015) who showed that up to three-quarters of farmers in Siaya County were crop and livestock farmers. The farmers affiliated with One Acre Fund were financed to plant maize mainly for subsistence purposes. Thus, they were provided with maize seeds mainly as the main crop to plant. However, majority of these farmers also planted beans within the same farms where they planted maize. The same case was true for farmers affiliated with AFC who were provided with seasonal loans to plant large tracts of maize farms. Those affiliated with EABL were mainly sorghum farmers who were provided with loans and contracted by the company to plant sorghum. In terms of livestock ownership, most of these farmers reared goats, sheep, cows, pigs and chicken at home. A few of the farmers had improved breeds of cows and pigs for commercial purposes but most of them reared the same for subsistence use. This is also in line with the Siaya County Integrated Development Plan (CIDP), which lists the main food crops in the county as maize, sorghum and beans while main livestock are listed as cattle, goats, sheep and pigs (CGS, 2013).

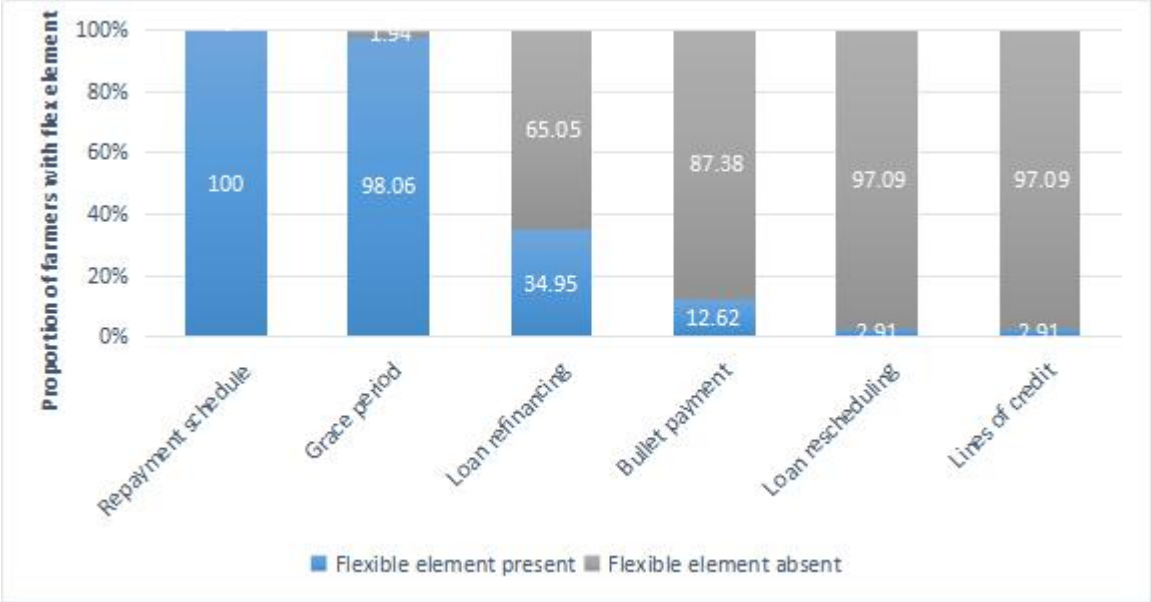
4.2.7 Loan flexibility

Loan flexibility was the main predictor variable in this study. Table 4.7 presents the results of the descriptive analysis on the variable. In Figure 4.2, we present the graphical results on the proportion of farmers whose loans had various elements of loan flexibility.

Table 4.7: Descriptive results on loan flexibility

Variable	Obs.	Per cent	Mean	Min	Max
Grace period	103	98.06	0.981	0.00	1.00
Repayment schedule	103	100.00	1.000	1.00	1.00
Bullet payment	103	12.62	0.126	0.00	1.00
Loan rescheduling	103	2.91	0.029	0.00	1.00
Loan refinancing	103	34.95	0.350	0.00	1.00
Lines of credit	103	2.91	0.029	0.00	1.00
Loan flexibility index	103	-	0.419	0.17	1.00

Source: Survey Data (2019)



Source: Survey Data (2019)

Figure 4.2: Proportion of farmers with various elements of flexible loans

The results show that all the respondents agreed that the credit they were offered allowed them to decide when to make the loan repayments. However, for some institutions like the One Acre Fund, the repayments began before the loans were given to the farmers as the farmers had to meet a certain minimum level of repayment before they were given the farm inputs. Thus, they had to make some loan prepayments for the loan they needed before the loans could be approved and farm inputs provided. Afterwards, they had to make some repayments over the period of the loan and be able to complete the repayments within a year. Those who completed payments earlier than their loan terms were incentivised with some gifts. It is important to point out that the effect of repayment schedule on access to credit was not tested and presented in the next section because there was no variation in the data.

The results also show that 98 per cent of the respondents noted that they were offered a grace period within which they were not expected to start making loan repayments. However, the fact that some of the institutions such as One Acre Fund expected the farmers to meet a certain minimum level of repayment before they could be given the farm inputs compelled most of them not to take advantage of this grace period but to start repaying the next loan allocations immediately they make a request for the same. Thus, while this grace period was available on paper, it was not the practice among most of the farmers. This was a different case for the farmers enrolled with other financing institutions such as AFC as they took full advantage of the grace period and took some time before they could start repaying their loans.

Further, just over a third of the respondents (35 per cent) noted that they were offered loan refinancing in cases where they were unable to repay the loans especially when factors beyond their control such as drought affected their harvest. The respondents narrated such few instances when One Acre Fund provided the farmers with more fertiliser and seeds when the rains failed just a few weeks after the planting season. The loan amounts were never adjusted upwards but each farmer that had taken a loan received a few packets of maize seeds and fertiliser. This is a form of loan refinancing. Some of the farmers that had borrowed from AFC also narrated instances where they were refinanced but at an additional cost to their original loans.

The results also show that 12 per cent of the respondents noted that their loans terms allowed for bullet payments. As was explained earlier, bullet payments are made once after the farm produce is harvested and sold off. This happens towards the end of the term of the loan or just as at the end-date of the term of the loan. Further interviews with the respondents revealed that a few farmers with some credit institutions that offered this in the loan agreement took advantage and paid once at the end of the term of the loan. However, for most farmers, this was not the case and those who made bullet payments did so as a prepayment.

For instance, for farmers with One Acre Fund, it was noted that some of them made the entire loan prepayments once before the loans were even provided. As soon as a loan application was accepted, they made a one-off payment to cover their entire loan for the year and only waited for the farm inputs to be provided. A further enquiry on such loanees revealed that most of them were "telephone farmers"[11] that used proxies to enrol in the programme to take advantage of the training and other extension services provided by the institutions.

Another reason for making bullet loan prepayments according to the interviews with some farmers was that the farmers believed that the inputs (seeds and fertilisers) provided by the credit institutions were of superior quality. Thus, while they would easily keep the money and buy the inputs during the planting season, they chose to take up the loan and prepay it at once so that they would benefit from the quality seeds supplied by the credit institution. This was especially true for the farmers enrolling for One Acre Fund microcredit. However, the

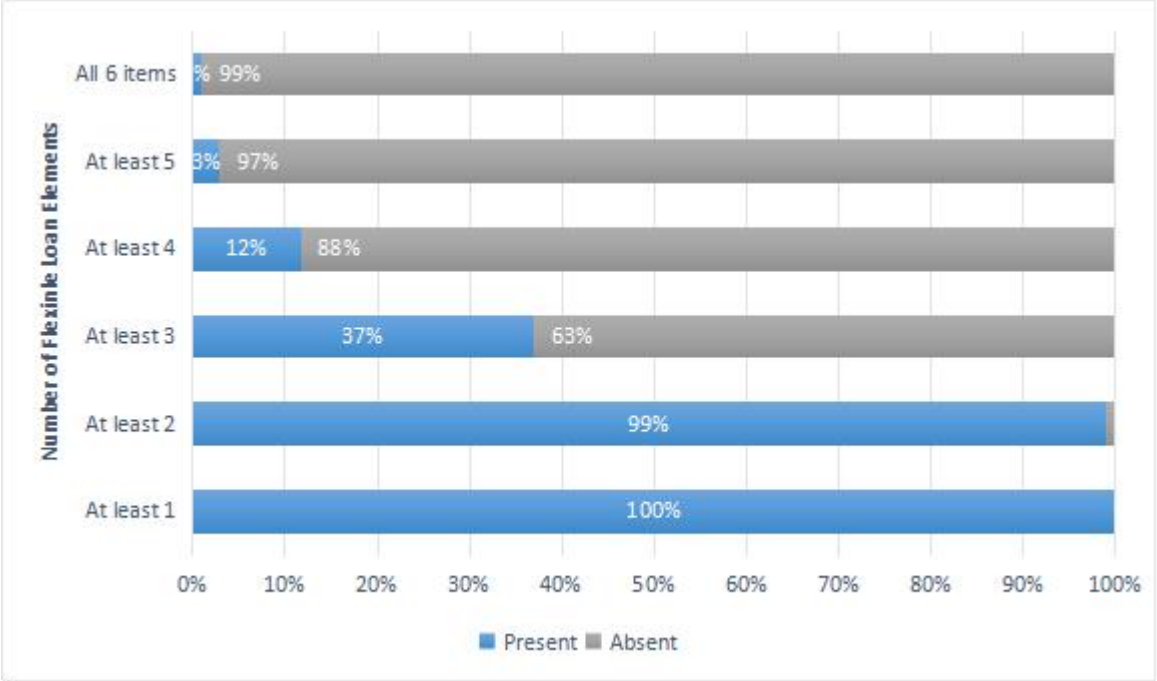
[11] Telephone farming is a term used to describe the practice of farming without being on the farm. The farmer lives in a different town far away from the farm and sends money to someone to do farming for them. They make calls to check up on the progress of their farms hence the inclusion of the word 'telephone'.

institution does not allow for a one-off payment at the end of the loan term, as one would be considered a dormant member for the entire period before the loan repayment is made. This affects the overall credit standing of the group and members as well as the institution do not encourage it.

For those borrowing from AFC, such loan terms were allowed and farmers took advantage of the same to repay their loans once they harvested and sold off their farm produce. According to AFC's website, these types of loans are referred to as 'seasonal loans' and are given to farmers that require loans for growing seasonal crops such as maize. The loans are one-year loans and one can choose to make monthly interest payments alone and pay up the principal loan at the end of the loan period (balloon payments) or just make no monthly interest payments but pay up the entire loan once at the end of the period (bullet payments). Interviews with farmers that took up loans with AFC revealed that this was a popular and most preferred loan and was mostly popular among salaried employees such as teachers and civil servants who doubled up as farmers.

One of the key variables in this study was LFI. This study sought to come up with an index of loan flexibility with the realisation that loans terms differ in terms of how flexible they are. Thus, as described in Appendix I, the index was based on a weighted mean of all the five elements of flexible loans already presented and discussed above. In the end, each element was assigned the same weight as none was found to be more important than the rest. Thus, the index values in the final analysis were similar to the mean values. The results in Table 4.7 show that the mean LFI was 0.419 with a minimum score of 0.17 and maximum score of 1.0. The mean index shows that just about 42 per cent of the flexible loan elements were available in the loan contracts of each of the farmer in our sample. This suggest a moderate level of loan flexibility for the loan products offered to farmers in Ugenya sub-country.

In Figure 4.3, the study shows loan flexibility in terms of the number of farmers with a number of flexible loan items in their contracts from those with just one item to those with all the six items.



Source: Survey Data (2019)

Figure 4.3: Proportion of farmers with specific number of flexible loan items

As the results show, all the farmers had at least one flexible loan item in their loan contract and 99 per cent had at least two flexible loan items in their contracts. The results further show that only 37 per cent of the farmers had at least three flexible loan items in their contracts and just 12 per cent of the farmers noted that they had at least four flexible loan items present in their contracts. The study also shows that just 3 per cent of the farmers had at least four flexible loan items present in their loan contracts and a paltry 1 per cent had all the six items present. These results complement those of the LFI that show an average of 42% of the items present in loan contracts of farmers in our sample.

4.2.8 Credit Access

Access to credit was the dependent variable in the study. As discussed in section 3.7, access to credit was measured by the amount of credit received by the farmers. Table 4.8 summarises the results of the same.

Table 4.8: Descriptive results on the size of credit

Size of credit	Obs.	Per cent	Mean	Min	Max
Less than Sh. 10,000	103	5.83	8,333	8,000	9,000
Sh. 10,000 to Sh. 14,999	103	47.57	12,306	10,000	14,000
Sh. 15,000 to Sh. 19,999	103	33.01	16,588	15,000	19,000
Sh. 20,000 or more	103	13.59	21,786	20,000	28,000
Size of credit	103	-	14,777	8,000	28,000

Source: Survey Data (2019)

The results show that the average size of credit was KSh. 14,777. Farmers in the sample received loans ranging from KSh. 8,000 to 28,000. Only 6 per cent of the farmers received less than KSh. 10,000 with the majority (48 per cent) receiving between KSh. 10,000 and KSh. 15,000. A third of the farmers received between KSh. 15,000 and KSh. 20,000 while the remaining 14 per cent received more than KSh. 20,000. These loans were small because the farmers were mostly smallholders that were in need of small loans that would enable them plant in small pieces of land. From the discussions with the farmers, these short-term loans were repayable within a period of one year.

In summary, descriptive results showed that the mean age of heads of households in the sample was 49 years our sample was younger than the average age of a Kenyan farmer according to the national statistics. The results also showed that majority of heads of households in our sample were men (85 per cent), which was inconsistent with the county data. On education, the results showed that majority of the farmers had a secondary level of education and this was consistent with the sub-county data on the levels of education of farming households. The results also revealed that the average household size in our sample was six people. This was inconsistent with the available county statistics. The study also showed that the average wealth of households was four items owned. Majority of the farmers in our sample were enrolled in input credit programmes (91 per cent) while only a handful received cash credit. The results also showed that the average loan flexibility was 0.419 thus suggesting a moderate level of flexibility in loan products offered within the study site. Finally, the study found that the average size of credit was KSh. 14,777 with the minimum in the sample being KSh. 8,000 and the maximum being KSh. 28,000.

In section 4.3, we present and discuss the results of bivariate analysis to test whether access to credit differs by a number of predictors.

4.3 Bivariate Analysis Results

The study conducted bivariate analyses between access to credit – the dependent variable – and the predictors in the model in order to examine whether access to credit differs across the independent variables. As Odhiambo (2019) explains, conducting a bivariate analysis is an important process before a regression analysis is performed. Thus, the study conducted a chi-square analysis for all the independent variables and the results are summarised and presented in Table 4.8. The discussion begins with the predictors that showed significant differences in credit access.

Table 4.9: Bivariate relationships between size of credit and predictors

Group	Per cent	Mean Size of Credit	*p-value*
Sex of head of household			
Male	85	15,148	0.0197**
Female	15	12,600	
Age of head of household			
39 years or below	11	17,182	0.1524
40 - 49 years	49	14,680	
50 - 59 years	28	14,000	
60 years or above	13	14,846	
Education			
Primary schooling	13	12,308	0.0052***
Secondary schooling	73	14,747	
Post-secondary schooling	15	17,067	
Type of loan			
Cash credit	12	20,083	0.0000***
Input credit	88	14,077	
Size of household			
3 people or less	8	14,125	0.4763
4 to 6 people	62	14,516	
More than 6 people	30	15,484	
Household wealth			
3 items or less	49	13,040	0.0000***
4 to 6 items	47	15,813	
7 items or more	5	22,200	
Flexible loans			
No grace period	2	14,000	0.7796
Grace period offered	98	14,776	
No bullet payment	87	14,167	0.0000***
Bullet payment accepted	13	19,000	
No loan rescheduling	97	14,680	0.0151**
Loan rescheduling allowed	3	18,000	
No loan refinancing	65	13,567	0.0000***
Loan refinancing allowed	35	17,028	
No line of credit	97	14,760	0.8050
Line of credit offered	3	15,333	

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

The study found that of the 88 male-headed households, the average size of credit was KSh. 15,148 while the mean size of credit for the 15 female-headed households was KSh. 12,600. A two-sample t-test showed that the difference in mean credit received between male and female-headed households was statistically significant (p = 0.0197). This suggests that male-headed households received significantly more credit on average compared to the female-headed households. Therefore, the size of credit differed across the sex of heads of households in our sample.

The results showed that the mean amount of credit received rises by the levels of education with those with some primary education receiving the least amount (KSh. 12,308) and those with the highest education receiving the highest amount (KSh. 17,067). The analysis of variance (ANOVA) test to test whether the differences in mean amounts received by level of education showed that the differences were statistically significant ($p = 0.0001$). Since the size of credit differed by the level of education from the sample used in this study, this means that education an important factor for credit access in our sample.

The study further found that the average loan received by farmers being given cash (KSh. 20,083) was higher than those receiving inputs (KSh. 14,077) and the differences were statistically significant ($p < 0.001$). Thus, there is higher credit access among cash credit borrowers than among input credit borrowers. This suggests that the type of credit had a significant bearing on how much the farmers were able to borrow hence a useful factor for credit access.

The size of loan also differed across the wealth profile of farmers with poorer households receiving the least amounts on average (KSh. 13,040) while the richer ones receiving the largest loans on average (KSh. 22,200). These differences were statistically significant ($p < 0.001$). Credit access is therefore high among wealthier farmers than among poorer farmers. Thus, wealth has a significant bearing on the amounts of loans borrowed. Therefore, wealth is an important factor for credit access in our sample.

The bivariate analysis on differences in credit access by various elements of loan flexibility showed that those whose loans had options for bullet payments, loan rescheduling or refinancing showed significant differences in terms of the average loan sizes when compared with the farmers that did not have such options. Specifically, farmers whose loans had options for making bullet payments received KSh. 19,000 on average while those whose loans did not offer such options received KSh 14,167 on average. These differences in mean size of loan received were statistically significant ($p < 0.0001$). Farmers whose loans had an option for rescheduling received KSh. 18,000 on average while those who did not have such options received KSh. 14,680 on average and these differences were statistically significant ($p < 0.05$). For the farmers whose loans had an option for refinancing, they received KSh. 17,028 on average compared to KSh. 13,567 for farmers who did not have options for refinancing. These differences were also statistically significant ($p < 0.0001$).

For age and size of the household, the study found that the differences in credit access were not significant across the groups. For instance, the study found that younger farmers tended to borrow more on average (KSh. 17,182) than did older farmers (KSh. 14,846) but such differences were statistically insignificant ($p = 0.1524$). On the other hand, while smaller families tended to receive less credit on average (KSh. 14,125) than larger families (KSh. 15,484), such differences were not statistically significant ($p = 0.4763$). Thus, credit access does not differ across ages of heads of households or family sizes in our sample hence unimportant for credit access.

The study also found that while farmers whose loan offers included grace periods received more credit on average (KSh. 14,776) than those without such an option (KSh. 14,000), such differences were not statistically significant ($p = 0.7796$). This was the same for farmers who had lines of credit from credit institutions. While they received higher loan amounts on average (KSh. 15,333) as compared to those without such options (KSh. 1,760), the chi-square test showed that these differences were not statistically significant ($p = 0.805$).

In summary, this section has presented results of bivariate analysis conducted through running chi-square tests. The results have shown that access to credit differ across sex, education, type of credit, and wealth status of households. The results have also shown that access to credit differs by three elements of loan flexibility namely bullet payment, loan refinancing and loan rescheduling. The analysis for whether access to credit differed by repayment schedule was not performed. This is because, as presented and discussed in the previous section (see Table 4.7 and Figure 4.1), all the respondents agreed that their loan products allowed them to make repayments at their own time. Therefore, there was no variation in the data to warrant a chi-square analysis. The results have also shown that access to credit does not differ by age, size of household, grace period and lines of credit.

In section 4.4, we present and discuss the results of multiple regression analysis. This is done in two parts beginning with the regression results for each of the flexible loan item and then for the overall index of loan flexibility, which combines all the elements of flexible loans.

4.4 Regression Analysis Results

This section presents the results of the multiple regression analysis to test the hypotheses in presented in section 2.3. While the bivariate analysis in the preceding section shows that some of the predictors were did not differ in terms of access to credit and should

therefore be discarded in the regression analysis, the study made a decision to include all the variables in the models. This is because further analysis with reduced models (models without the insignificant predictors) found insignificant differences in the overall model fitness. The analysis assumed a linear relationship and, therefore, the regression analysis was performed using Ordinary Least Squares (OLS) technique. Prior to running the regression analyses, a multicollinearity test was run for all the predictors in all the models. The analysis showed that the Variance Inflation Factor (VIF) values were low (below 3) indicating no multicollinearity. The VIF results are shown alongside the regression results in the tables.

The study noted that loan amounts received as well as the age of heads of households were not normally distributed. Since this is a key assumption under an OLS regression, both variables were log-transformed in order to fit within the assumptions of OLS regression. The rest of the variables remained as they had been operationalised in section 3.7 (see Table 3.7 for the measurement of variables). These log-transformed versions of both loan amounts received and age of heads of households were used in all the regressions.

The presentation in this section is broken down into two parts with the first part covering the regression results on how each of the elements of flexible loans affect access to credit (see tables 4.10 to 4.14). However, as explained in the previous section, there was no variability in repayment schedule data. For this reason, no regression analysis was run but the results for the rest of the elements are presented and discussed. The second part covers the results on the overall effect of flexible loans (LFI) on access to credit (see Table 4.15). In both cases, significance of the predictors as well as the models is interpreted at 5% level.

4.4.1 Effect of elements of loan flexibility on access to farm credit

As described in section 3.7, access to credit was the dependent variable while various elements of loan flexibility were the independent variables together with the control factors. We begin the presentation of the results on the effects of various loan flexibility elements on access to credit by presenting the results of the effect of grace period on credit access in Table 4.10.

Table 4.10: Effect of grace period on access to farm credit

Variable	Coefficient	Std. Error	*p-value*	VIF
Grace period	-0.160	0.145	0.274	1.07
Age	-0.035	0.144	0.807	1.29
Sex	0.014	0.063	0.819	1.30
Asset-based loan	-0.247	0.025	0.000***	1.10
Education	0.061	0.024	0.014***	1.37
Size of household	0.031	0.076	0.684	1.29
Household wealth	0.074	0.015	0.000***	1.48
Constant	9.526	0.579	0.000	
Sum squared residuals	3.682	Root MSE		0.197
F (7,95)	12.7	P-value (F)		0.000
R-squared	0.483	Adjusted R-squared		0.445

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

The results show that the model explained 48.3 per cent of the variance in access to credit as shown by the R^2 value. The model was fit to explain the relationship between grace period and credit access as shown by the significance of F-statistic value of 12.7 ($p < 0.001$). This means that at least one of the predictors has a significant effect on credit access. The results showed that grace period does not have a significant effect on access to credit ($\beta = -0.160$, $p = 0.274$).

This means that farmers did not consider grace period as an important factor while accessing the credit. This is inconsistent with the findings of Fecke, et al. (2016) who found that borrowers that chose grace periods borrowed significantly larger amounts as compared to those who did not choose grace periods. As the chi-square results had shown (see Table 4.9 for the bivariate relationship between grace period and loan amounts received), access to credit did not differ across grace period options in loan contracts. This may explain why grace period did not have a significant effect on credit access. Further interviews with some farmers revealed that while grace period was offered in their loan contracts, they rarely took advantage of the same as they chose to start paying earlier. This may explain why grace period did not influence the amount of loan received hence the inconsistency with prior studies.

In this model, the results showed that the type of loan, education and household wealth had significant effects on access to credit ($p < .05$) while age, sex and size of household did not have a significant influence on credit access ($p > .05$). Specifically, the results showed that education and household wealth had positive effects on credit access. This means that higher levels of education were associated with higher access to credit and the wealthier the household the more credit they accessed. The results further showed that

asset-based credit had a negative effect on credit access. This means that those whose loans were given in terms of asset financing were more likely to receive lesser amounts than those whose loans were cash-based. It is important to underscore that the significance and the nature of the effect of education, wealth and asset-based loans on credit access was the same for all the models testing H_1.

Another element of loan flexibility examined in this study was bullet payment. Following H_1 presented in section 2.3, the study examined the effect of bullet payments on access to credit. Table 4.11 presents the results. .

Table 4.11: Effect of bullet payment on access to farm credit

Variable	Coefficient	Std. Error	*p-value*	VIF
Bullet payment	0.045	0.095	0.640	2.63
Age	-0.029	0.145	0.843	1.29
Sex	0.021	0.063	0.735	1.30
Asset-based loan	-0.212	0.099	0.034**	2.63
Education	0.059	0.025	0.019**	1.37
Size of household	0.030	0.076	0.695	1.29
Household wealth	0.073	0.016	0.000***	1.50
Constant	9.321	0.056	0.000***	
Sum squared residuals	3.720	Root MSE		0.198
F (7,95)	12.4	P-value (F)		0.000
R-squared	0.478	Adjusted R-squared		0.440

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

The results showed that the model explained 47.8 per cent of the variance in credit access ($R^2 = 0.478$). The model fitness test also showed that the independent variables had a significant effect on access to credit as shown by significance of F-statistic ($F = 12.4$, $p < 0.001$). This suggests that at least one of the predictors in the model had a significant effect on access to credit. The results showed that bullet payments had a positive but insignificant effect on access to credit ($\beta = 0.045$, $p = 0.640$). The results showed also that the type of loan, education and household wealth had significant effects on access to credit ($p < .05$) while age, sex and size of household did not have a significant influence on credit access ($p > .05$).

The results from the present study mean that loans with an offer for making bullet payments do not influence access to farm credit. This is inconsistent with Nini (2008) who concluded that the provision of institutional terms loans (which are loans with bullet payment terms) by non-banks increased credit supply and hence access. The results are also inconsistent with Fecke et al. (2016) who had found that bullet loans influenced access to credit. However, a number of reason explain why this relationship was insignificant and thus inconsistent with previous research.

First, while the chi-square test showed that access to credit differed by bullet payments, only a handful of farmers had bullet payments as an option in their loan contracts (see Table 4.9 for these results). Secondly, according to the interviews with some of the farmers, majority of them would not take the bullet payment offer even when it would be available. This is because it would render them dormant members of their farmer groups. This would affect their credit rating within the group and that of the entire group too. Thus, while some of the microfinance loan contracts offered an opportunity to make bullet payments, this would not influence the decision of farmers to access credit.

The interviews also revealed that while bullet payments would be useful as one would only pay after selling off the harvest, this would not be a smart move. This is because the price of produce would be very low around the harvest time and they would not be able to sell off the produce at a good price to enable them pay off the loan once and remain with some of the harvest for their consumption. Further, given the nature of their occupations, it would be a bad move to wait to pay the loan at the end of the term with one bullet payment because most of them are not formally employed. The incomes they receive from running informal businesses and the wages from such jobs only allow them to make small loan repayments over the period of the loan.

Other than bullet payments, another element of loan flexibility that was tested in this study was loan rescheduling. Consistent with H_1, the study examined the effect of loan rescheduling on access to credit. The results are summarised and presented in Table 4.12.

Table 4.12: Effect of loan rescheduling on access to farm credit

Variable	**Coefficient**	**Std. Error**	***p-value***	**VIF**
Loan rescheduling	-0.104	0.132	0.434	1.31
Age	-0.014	0.145	0.922	1.29
Sex	0.020	0.063	0.756	1.30
Asset-based loan	-0.274	0.072	0.000***	1.41
Education	0.057	0.024	0.021**	1.33
Size of household	0.025	0.076	0.749	1.30
Household wealth	0.070	0.015	0.000***	1.48
Constant	9.340	0.557	0.000	
Sum squared residuals	3.705	Root MSE		0.197
F (7,95)	12.5	P-value (F)		0.000
R-squared	0.480	Adjusted R-squared		0.442

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

The results show that the model explained 48 per cent of the variance in credit access (R^2 = 0.480). The model fitness test also showed that the independent variables had a significant effect on access to credit as shown by significance of F-statistic (F = 12.5, p <

0.001). This suggests that at least one of the predictors in the model had a significant effect on credit access. The results showed that loan rescheduling had an insignificant effect on access to credit (β = -0.104, p = 0.434).

This means that loans with rescheduling options do not influence access to credit. This is inconsistent with the results of Shoji (2012) who found that rescheduling loans increases access to formal credit. From the descriptive results, only about three per cent of the respondents cited loan rescheduling as being part of their loan contracts. This rarity may explain why loan rescheduling may not have influenced the decision by farmers to access credit as majority of them did not have it as part of their loan agreements. Thus, while farmers with options for rescheduling received significantly more credit than those without this option (see Table 4.9 for a chi-square analysis of this bivariate relationship), there were very few farmers who were offered this option. This may explain the lack of significant effect of loan rescheduling on credit access. Just like in the previous models, this model results showed that the type of loan, education and wealth of households influenced access to credit ($p < .05$) while age, sex and size of household did not have a significant influence on credit access ($p > .05$).

The study also examined the effect of loan refinancing on access to credit in line with H_1. The results of the analysis are presented in Table 4.13.

Table 4.13: Effect of loan refinancing on access to farm credit

Variable	Coefficient	Std. Error	*p-value*	VIF
Loan refinancing	0.021	0.050	0.676	1.51
Age	-0.038	0.148	0.800	1.34
Sex	0.019	0.063	0.760	1.30
Asset-based loan	-0.241	0.065	0.000***	1.15
Education	0.055	0.024	0.026**	1.35
Size of household	0.031	0.076	0.691	1.29
Household wealth	0.071	0.017	0.000***	1.78
Constant	9.398	0.572	0.000	
Sum squared residuals	3.722	Root MSE		0.198
F (7,95)	12.4	P-value (F)		0.000
R-squared	0.478	Adjusted R-squared		0.439

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

The study found that the model explained 47.8 per cent of the variance in credit access (R^2 = 0.478). The results of the model fitness test also showed that the independent variables had a significant effect on access to credit as shown by significance of F-statistic (F = 12.4, $p < 0.001$). The model fitness suggests that at least one of the predictors in the model had a significant effect on access to credit. As the results show, loan refinancing had a

positive but insignificant effect on access to credit (β = 0.021, p = 0.676). Other factors that influenced access to credit in this model were the type of loan, education level of the head of household and the wealth of households ($p < .05$) while sex, age and size of household did not have a significant effect on credit access ($p > .05$).

As the descriptive results showed, only a third of the respondents cited loan refinancing as being part of their loan contracts. Such refinancing only happens when crops fail. Since this was not a common phenomenon in the area, the institutions did not activate this loan clause most of the time hence this may explain why refinancing did not influence the decision by farmers to access credit. Therefore, while access to credit differed by presence of loan refinancing options, the smaller number of farmers with such options as well as the rarity of this option being activated by the firms explain the lack of significant effect on credit access.

Lastly, in conformity with H_1 in section 2.3, the study analysed the effect of access to line of credit on credit access. The results of the regression analysis are summarised and presented in Table 4.14.

Table 4.14: Effect of lines of credit on access to farm credit

Variable	Coefficient	Std. Error	*p-value*	VIF
Lines of credit	-0.186	0.123	0.136	1.16
Age	0.007	0.145	0.960	1.31
Sex	0.020	0.062	0.750	1.30
Asset-based loan	-0.276	0.057	0.000***	1.20
Education	0.153	0.024	0.031**	1.34
Size of household	0.031	0.076	0.683	1.29
Household wealth	0.077	0.015	0.000***	1.49
Constant	9.255	0.555	0.000	
Sum squared residuals	3.642	Root MSE		0.196
F (7,95)	13.0	P-value (F)		0.000
R-squared	0.489	Adjusted R-squared		0.451

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

The study found that the model explained 48.9 per cent of the variance in credit access (R^2 = 0.489). The model fitness test also showed that the independent variables had a significant effect on access to credit as shown by significance of F-statistic (F = 13.0, p < 0.001). Thus, at least one of the predictors in the model had a significant effect on credit access. The results showed that providing lines of credit to farmers had a negative and insignificant effect on access to credit (β = -0.186, p = 0.136). The results also showed that other factors within the model that explained access to farm credit were the type of loan,

education level of the head of household and the household wealth ($p < .05$) while sex, age and size of households did not have any significant influence on credit access ($p > .05$).

The results are inconsistent with those of prior studies such as Krishnaswamy (2015) who noted that the attractiveness of lines of credit leads to more loan uptakes. The descriptive results showed that only 3 per cent of the respondents cited lines of credit as being part of the options within their loan contracts. Thus, given the absence of this option for farmers borrowing from most of the institutions, it may explain why farmers did not consider it while accessing credit. Furthermore, the chi-square tests showed that credit access did not differ by lines of credit and this could explain why lines of credit did not have any significant effect on access to credit.

To summarise, this section has shown that none of the flexible loan elements had a significant influence on access to credit. The results have shown that only education, type of loan and wealth influence access to credit while sex, age and size of households do not. As was explained at the beginning of this section, the analysis for the effect of repayment schedule on credit access was not conducted because there was no variability in the data since all the respondents noted that their loans had flexible repayment schedules.

In the next section, we discuss the results of the effect of loan flexibility on access to credit.

4.4.2 Overall effect of loan flexibility on access to farm credit

In order to test H_2, the study ran a regression analysis with credit access as the dependent variable and LFI as the predictor variable together with other control variables as described in the conceptual framework in section 2.4. The results are summarised and presented in Table 4.15.

The results showed that the model had a good fit as indicated by the coefficient of determination ($R^2 = 0.48$) and the independent variables had a significant effect on access to credit as shown by the F-statistic value of 12.4 ($p < .001$). This confirms that at least one of the predictors in the model had a significant effect on credit access. The study found that loan flexibility did not have a significant effect on access to credit ($\beta = -0.091$, $p = 0.670$).

Table 4.15: Effect of loan flexibility on access to farm credit

Variable	Coefficient	Std. Error	*p-value*	VIF
Loan flexibility	-0.091	0.213	0.670	2.24
Age	-0.010	0.149	0.944	1.50
Sex	0.019	0.063	0.766	1.30
Asset-based loan	-0.270	0.083	0.002***	1.85
Education	0.057	0.024	0.021**	1.33
Size of household	0.028	0.077	0.716	1.29
Household wealth	0.077	0.017	0.000***	1.70
Constant	9.340	0.558	0.000	
Sum squared residuals	3.722	Root MSE		0.198
F (7,95)	12.4	P-value (F)		0.000
R-squared	0.478	Adjusted R-squared		0.439

** Significant at 5% level; *** Significant at 1% level.
Source: Survey Data (2019)

From these results, the level of flexibility of farm loan did not influence access to credit. This is consistent with the findings of McIntosh (2007) who found no significant relationship between flexible loans and loan volumes in Uganda. Given that majority of the respondents in this study were financed by microfinance institutions that had lower and upper limits within which the farmers could borrow, this could explain why flexibility does not matter when it comes to how much the farmers borrow – the measure of credit access in this study. From further interviews with the farmers with access to input credit, the maximum they could be allowed to borrow was KSh. 27,000. Most farmers tended to borrow within the lower band because of the need to afford repaying within the timelines given. This may explain why despite the flexibility in the loan terms, the effect on the amount of credit borrowed is at best negative.

The second explanation is that majority of farmers were smallholder farmers with an acre or less in terms of farm sizes. Since majority of them had enrolled for a microcredit programme that only provide farm inputs instead of cash, the inputs matched the farm sizes. This explains the likelihood to borrow smaller loans. Indeed, the results of the descriptive analysis showed that the average size of credit was KSh. 14,777 and confirms the tendency of farmers to borrow less amounts. The descriptive results showed that over half of the farmers (53 per cent) borrowed less than the mean size of credit.

The results also showed that type of loan had a negative and significant effect on credit access (β = -0.27, p = 0.002). These results are consistent with those of Fecke et al. (2016) who showed that the style of credit influenced credit access. This means that the farmers that were offered asset-based financing tended to borrow less amounts than those that were offered cash financing. This is because farmers that are provided with farm inputs

only will only borrow based on their farm needs (in terms of the size of their farms) and any extra inputs can only be wasted. On the other hand, those that are provided with a cash option may need more money beyond their farm needs for household consumption such as paying for school fees, health, or purchasing assets.

The study further showed that education had a positive and significant effect on credit access ($\beta = 0.057$, $p = 0.021$). This is consistent with prior studies such as Lamessa & Gamechu (2016) who also found that the level of education of the head of household influenced credit access. The bivariate results showed that farmers with higher levels of education were more likely to borrow more from the institutions as compared to those with lower levels of education. This explains why education had a significant influence on access to farm credit.

The study also revealed that household wealth had a positive and significant effect on access to credit ($\beta = 0.077$, $p < 0.001$). The results are consistent with Elias et al. (2015) who found that the value of assets determine access to credit. This means that farmers from wealthier households are more likely to borrow more from the credit institutions than those from poorer households. This wealth may signify their ability to pay as well as the size of farms. Thus, wealthier firms are more likely to be able to repay larger loans and may have larger farms that would require larger loans.

The results showed that sex of the head of household, age of the head of household and size of the household did not have any significant effect on access to credit. The study found that both sex and size of household had positive but insignificant effects on access to credit ($p > .05$) while age had a negative but insignificant effect on credit access. These confirm the results of the chi-square tests in section 4.2, which revealed that credit access did not differ by age, sex or the size of households.

In summary, the results presented in this section show that LFI does not have any significant effect on access to credit as had been hypothesized. Therefore, the null hypothesis of no significant effect of LFI on credit access cannot be rejected. The study notes that this is consistent with some of prior studies that find no significant relationship between flexible loans and access to credit and provides explanations on why this was the case. The study has also shown that of the other predictors, education, type of credit and wealth have significant effects on credit access while age, sex and size of household do not. Again, explanations on these outcomes are provided.

However, it is also important to understand that although not presented in this section, evidence from the analysis showed that LFI as well as some flexible loan elements had a significant effect on access to credit when the regression models did not include the other predictors (control variables). These significant effects disappeared once the control variables were introduced in the regression analyses. Thus, there are far more important determinants of access to farm credit than loan flexibility when all factors are considered. These results were robust to different model specifications. For instance, although not shown here, an analysis using the Propensity Score Matching (PSM) models confirmed the results of the OLS regressions as none of the flexible loan items as well as the general flexibility index had a significant influence on credit access.

The next section provides a summary of findings, conclusions of the study and recommendations for policy, practice and further research.

CHAPTER 5 : SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In the previous section, the study has presented the results of data analysis. This section is divided into four parts including this introduction. Section 5.2 presents the summary of findings followed by the conclusions of the study in section 5.3. The conclusions are presented in terms of the research questions that the study sought to answer. Section 5.4 presents the recommendations for practice, policy and further research.

5.2 Summary

This study's main objective was to assess whether flexible loans influence access to credit for smallholder farmers in Siaya County. This was motivated by the conflicting results in prior studies on the effect of flexible loans as well as the emergence of a number of credit institutions providing loans to farmers in the county with varying degrees of flexibility. Thus, the study hypothesised that the varying degree of flexibility would explain the differences in levels of credit access. The study was carried out in Ugenya sub-county –the site selected because it had several farmers who had taken up loans with these credit institutions. Thus, a cross-sectional survey was carried out on 103 farmers in the area. Using questionnaires and stylised facts from the interviews with farmers, local administration and secondary information, data was collected and analysed in order to test the hypotheses in the study. The study performed descriptive analysis, bivariate analysis and regression analysis in order to achieve the objectives of the study.

Descriptive analysis showed that the average age of heads of households in the sample was 49 years suggesting that our sample was younger than the average age of a Kenyan farmer according to the national statistics. The results also showed that majority of heads of households in our sample were men (85 per cent), which was inconsistent with the county data. On education, the results showed that majority of the farmers had a secondary level of education and this was consistent with the sub-county data on the levels of education of farming households. The results also revealed that the average household size in our sample was six people. This was inconsistent with the available county statistics. The study also showed that the average wealth of households in our sample, which was measured as the number of items owned, was four. Majority of the farmers in our sample were enrolled in input credit programmes while only a handful received cash credit. The results also showed that the average loan flexibility was 0.419 thus suggesting a moderate level of flexibility in loan products offered within the study site. The descriptive results also showed that the

average size of credit was KSh. 14,777 with the minimum in the sample being KSh. 8,000 and the maximum being KSh. 28,000.

The results of bivariate analysis conducted through chi-square tests showed that access to credit differed across sex, education, type of credit, and wealth status of households. The results also showed that access to credit differed across three elements of loan flexibility namely bullet payment, loan refinancing and loan rescheduling. The analysis for whether access to credit differed by repayment schedule was not performed due to lack of data variability. The results also showed that access to credit did not differ by age, size of household, grace period and lines of credit in our sample.

The regression analysis for the effect of each of the flexible loan elements on access to credit showed that none of the flexible loan elements had a significant influence on access to credit. The results also showed that only education, type of loan and wealth influenced access to credit while sex, age and size of households did not. The results for the overall effect of loan flexibility on credit access, the results showed that LFI did not have any significant effect on access to credit. The analysis showed that of the other predictors, education, type of credit and wealth had significant effects on credit access while age, sex and size of household did not. All the regression analysis results were interpreted at 5% confidence level.

In the next section, we discuss the conclusions of the study based on the research questions set in section 1.3 and the results presented in section 4.

5.3 Conclusions

This study sought to analyse the characteristics of smallholder farmers with access to credit in Siaya County. Based on the primary data gathered from Ugenya sub-county – the study site – a number of features of the farmers were investigated, analysed and presented. From the analysis, majority of the farming households are headed by men. These heads of households were aged 49 years on average and majority of them had at least a secondary level of education. The farming households in our sample were also generally larger households with an average of six people in each of the households. In terms of wealth, the households were moderately wealthy with each family owning four items on average. The farmers mostly engaged in subsistence crop and livestock production with very few farmers doing commercial production of dairy cattle, pigs and sorghum but in a small scale. These demographic features were largely consistent with those of the population from which the

farmers drawn as well as the national statistics. Thus, while the sample selected was farmers who had enrolled for a credit program hence biased towards farmers with credit facilities, the sample was largely representative of the characteristics of the population from which they were drawn.

Other than the demographic features of the farmers, the study also found that majority of the smallholder farmers were enrolled in credit institutions that offered input credit as opposed to giving them cash for farm production. Further, the farmers borrowed between KSh. 8,000 and KSh. 28,000 with each farmer borrowing on average KSh. 14,777. The type of credit that is mostly prevalent among the farmers – input credit – was largely reflective of the type of credit that is supplied in the area. The microfinance institutions operating in Ugenya largely provide input credit as opposed to cash credit hence the prevalence of input credit among the farmers. Further, the smaller loan amounts taken up by farmers are also reflective of the range of credit supply in the area as well as the size of farms for which the loans were taken.

This study also sought to determine the level of flexibility in loan products offered to smallholder farmers in Siaya County. Based on the analysis of data from the study site, the loans given to farmers in the area were largely inflexible. As the results showed, the LFI was 0.42 thus leaning on the side of loan inflexibility. Indeed, further analysis showed that of the six flexible loan features, just 2 per cent of the farmers had all the six elements present 3 per cent had at least 5 elements present and 12 per cent had at least four elements present. Majority of the farmers had just one or two flexible loan features present in their loan contracts. This suggests that the loans were largely inflexible.

On specific loan features, the results showed that repayment schedule was the most frequent feature as it was cited by all the farmers. This was followed by grace period, which was cited by 98 per cent of the farmers. The rest of the flexible loan features – refinancing, rescheduling and bullet payment and lines of credit were rare. This reinforces the conclusion that most of the loans given to farmers in Ugenya sub-county were largely inflexible with just two options open to most farmers. This portrays a picture of loan products that are not well diversified in terms of the flexibility options. This is consistent with literature on flexible loans, which mostly focus on the two features of flexible loans (Weber & Musshoff, 2013; Fecke, et al., 2016; Lamessa & Gemechu, 2016 and McIntosh, 2008). These studies show that grace period and flexible repayments are the two most common features of flexible loan products.

Lastly, the study sought to assess the effect of flexible loans on access to formal credit among smallholder farmers. The results of both individual effects of flexible loan terms as well as the overall flexibility index showed that flexible loans do not have a significant influence on access to credit among farmers. This is consistent with the strand of literature that has found no evidence of the effect of flexible loans on credit access. For instance, McIntosh (2007) found that flexible loans did not have an impact on loan volumes in an experimental study conducted in Uganda. The direction of the relationship suggests that highly flexible loans may result in lower amounts of loan received. In the context of this study, this negative association although insignificant may suggest that firms that design more flexible loan products are also less likely to advance large amounts of loans. This coincides with the findings of Weber & Musshoff (2013) who found that flexible loans lead to more volume rationing for borrowers. In other words, highly flexible loans may be associated with high levels of credit rationing as lending institutions become unwilling to lend higher amounts perhaps because the firms do not want to end up with higher default rates. This is consistent with studies that show that flexible loans increase default risks (Czura, 2015).

The next section presents the recommendations for practice, policy and further research.

5.4 Recommendations

This study makes a number of recommendations for practice, policy and further research based on the findings and conclusions of the study. First, the credit institutions should re-design their loan products by expanding the flexible loan options available within the products they offer to farmers. From the study, majority of them mostly offer grace periods and flexible repayment schedules as the only flexible loan options. Even so, these flexible options are never exercised. For instance, taking longer grace periods would be detrimental to the credit standing of the farmers given that they repay their loans in groups and this would affect the credit standing of the entire group. Thus, this 'informal credit rating' affects the ability of farmers to exercise their right to take convenient grace periods before they start repaying their loans. Further, since most of the groups have weekly meetings in which their loan books are read out, most of the farmers rarely exercise the flexible repayment schedule option as they are subconsciously forced to make regular weekly loan repayments.

Other flexible loan options such as bullet repayments, loan rescheduling, refinancing and lines of credit have barely been explored by the lending institutions especially the

microfinance institutions. While some farms offer these options, they are rarely exercised in reality. Thus, as the firms re-design the loan products to include more options, it is also important that the firms work towards eliminating these informal or subconscious barriers to exercising the right to activate these flexible loan elements especially grace periods, bullet or balloon payments, and flexible repayment schedules.

Secondly, in order to increase the volume of loans borrowed, credit institutions that lend to farmers should not only focus on providing flexible loan products as is currently the case but also pay more attention the levels of education of farmers as well as their wealth status. These are found to have more profound effect on the amount of credit borrowed that the flexibility of loan products. Other than wealth and education, the credit institutions should also offer more cash-based loans (providing cash instead of farm inputs) as these have more influence on the volume of credit borrowed. While this may create a problem where farmers would use the money for other expenditures other than the farm due to the fungible nature of finance, it would be beneficial for purposes of increasing farm credit access.

Thirdly, the study recommends that the government should encourage and incentivise financial institutions to offer farmers loans that take cognizance of the uniqueness of the agricultural sector. This includes encouraging more firms that offer flexible farm loans to offer more of such loans. This will help the government achieve its food security goal as more farmers enter into agricultural production. As the Government of Kenya seeks to achieve the goals in the Big Four Agenda and especially the one on food security, it will be important that more farmers be financed to enter into production. For smallholder farmers, initiatives that will enhance their ability to access credit would be welcome. These include, but are not limited to, having access to flexible loans. With the support of the government through targeted policy measures, credit institutions can be incentivised to offer these loans to smallholder farmers. This can be done by targeting the aspects of flexible loans that hinder farmers from fully utilising the flexible options within their loan contracts. Since financial institutions care more about the default rates hence lend much less to farmers when the loan products are highly flexible, initiatives such as credit guarantee schemes for smallholder farmers would help cushion financial institutions from any losses and as such encourage them to tailor their loan products to the needs of smallholder farmers.

Lastly, the study recommends that further research be carried out in this area to have a better understanding of the determinants of credit access in general and the link between

flexible loans and access to credit in particular. Given the uniqueness of agricultural sector especially the cash flows, there is need to carry out more research to in this area to examine the link between flexible loans and access to credit. While this study used an index variable consisting of six elements of flexible loans, more studies should expand this index by including other elements not examined in this study. This study also focused solely on farmers who had already borrowed from a financial institution. This limited the definition of credit access to loan volume. Further research should expand the sample and examine this link for farmers with loans as well as those who have not enrolled for any loan programme. This would not only enrich literature by expanding our understanding on how the varying degrees of loan flexibility affects credit access but would also expand our understanding on why some farmers opt out of these credit facilities.

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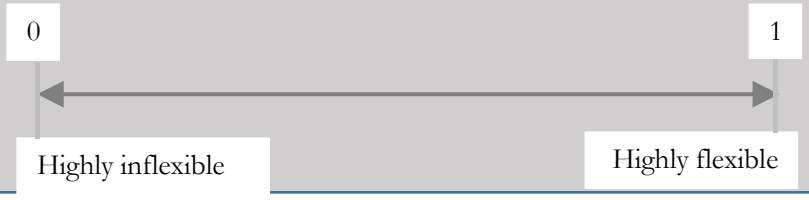
APPENDICES

Appendix I: Creating the Loan Flexibility Index

The Loan Flexibility Index (herein abbreviated as LFI) is the measure of the degree of loan flexibility. In other words, LFI is the extent to which a loan product is flexible. In order to create this index, the study uses literature to gather the six indicators of flexibility in a loan product offered to borrowers. These indicators are:

a. Grace period: is the period that a lending institution offers a borrower in which s/he is free not to make any repayment towards the loan. For example, a farmer might be given a one-year loan where, for the first three months, the lending institution expects the farmer not to make any repayment towards the loan.
b. Flexible repayment schedules: this refers to instances where the lending institution allows the farmer to make a repayment towards the loan at his own time but within the loan term. For instance, a farmer might decide to make a repayment towards a one-year loan any time within the year and in any amounts.
c. Bullet payment: this refers to situations where a farmer is given a loan and is expected to make one payment upon harvest, which also usually coincides with the term of the loan. For instance, a lending institution providing seasonal credit may allow the farmer to pay the loan only upon harvesting the maize. The farmer is not expected to make a repayment before the harvest.
d. Loan rescheduling: this refers to situations where a lending institution allows for a renegotiation of the loan repayment especially in cases where a farmer does not expect to honour the repayment due to an unforeseen event. For instance, a disease outbreak might wipe out a farmers livestock. In such cases, farmers can renegotiate to extending their loan terms.
e. Loan refinancing: this is also a situation where a lending institution renegotiates the loan contract with the farmer based on similar circumstances as discussed in (d) above. In this particular instance, the lender gives more loan in order to help the livestock farmer get back on track by restocking to enable the farmer repay the full loan.
f. Lines of credit: this refers to situations where a farmer is allowed to take more than one loan within a given credit ceiling. For instance, a farmer may have a credit line of Sh. 100,000. Thus, the farmer can decide to take several multiple loans as long as all the loans do not cumulatively exceed the ceiling of Sh. 100,000.

To come up with this index, the respondents are asked to answer Yes or No to the question: *recalling your last loan, did the loan contract have the following features?* The six features are then listed. The index is then a weighted sum of the responses to the six questions with the minimum value of zero (0) and a maximum value of one (1). Thus, a score of zero shows a highly inflexible loan (standard loan) while a score of one denotes a highly flexible loan as shown below.



Appendix II-A: Research Questionnaire (English Version)

ACCESS TO AGRICULTURAL CREDIT IN SIAYA COUNTY (2019)

HOUSEHOLD QUESTIONNAIRE

Section A-1: Household Identification

Respondent Number									**Enumerator Number**								
U	G	E	N	Y	A				U	G	E	N	Y	A			
[Official Use Only]																	

Select appropriate code for ward. Write names for sub-location and village/town in the boxes			
West Ugenya	100	Sub-location	
East Ugenya	101	Town/village	
North Ugenya	102		
Ukwala	103		

Section A-2: Demographics

1. Are you the head of this household? (h-1)	
No	0
Yes	1
Don't Know	99

2. How old is the head of household? (h-2)			
[Enter three-digit number. Don't know = 999]			

3. Sex of household head (i)	
Male	1
Female	2

4. What is the highest level of education of the head of household? (j)	
No formal education	0
Some primary schooling	1
Primary school completed	2
Some secondary school	3
Secondary school completed	4
Post-secondary qualifications	5
Some university	6
University completed	7
Post-graduate	8
Don't know	99

5. How many people live in this household? (k)			
[Enter three-digit number. Don't know = 999]			

6. Please recall the last loan you applied for and the institution you applied the loan from; in what form was the loan to be given? (l)	
Cash credit (money to purchase inputs)	1
Input credit (fertiliser, seeds, etc.)	2
Other (specify)	3

7. How many of these things do you or anyone in your household own? [Write a number] (m)	
A. Radio	
B. Television	
C. Motor vehicle	
D. A computer	
E. Bank account	
F. Mobile phone	

Section B: Flexible Loans and Access to Agricultural Credit

8. Please recall the most recent agricultural loan you applied for; how much had you applied for? (a-1)	
[Enter the amount in shillings in the box]	

9. Please recall the most recent agricultural credit you received, how much did you receive? (a-2)	
[Enter the amount in shillings in the box]	

10. Recalling your last loan, did the loan contract have the following features?	**No**	**Yes**
I was given some time after taking the loan within which I did not have to make the loan repayment [grace period (b)]	0	1
I would decide when to make a repayment towards the loan any time within the loan period [repayment schedule (c)]	0	1
The loan was to be repaid once after the harvest [bullet payment (d)]	0	1
In case I had problems repaying my loan, I had the option to renegotiate so that repayments could be extended for a later period beyond the original term of the loan [loan rescheduling (e)]	0	1
In case I had problems repaying my loan due to poor harvest or disaster, I had the option to renegotiate so that I could be given more credit to enable me continue farming and repay the newly renegotiated loan [loan refinancing (f)]	0	1

10. Recalling your last loan, did the loan contract have the following features?	**No**	**Yes**
I was given a line of credit where I could take another loan before I fully repay the previous one as long as my total loan remained within the given limits [lines of credit (g)]	0	1

Thank you for taking part in the survey

Appendix II-B: Research Questionnaire (Dholuo Version)

NENRO MAR GOWI MAR PUODHO E COUNTY MAR SIAYA (2019)

Section A-1: Household Identification

Respondent Number									**Enumerator Number**								
U	G	E	N	Y	A				U	G	E	N	Y	A			
[Official Use Only]																	

Select appropriate code for ward. Write names for sub-location and village/town in the boxes			
West Ugenya	100	Sub-location	
East Ugenya	101	Town/village	
North Ugenya	102		
Ukwala	103		

Section A-2: Demographics

11. Are you the head of this household? Be in e wuon od ni? (h-1)	
No	0
Yes	1
Don't Know	99

12. How old is the head of household? Wuon ot ni gi higni adi? (h-2)			
[Enter three-digit number. Don't know = 999]			

13. Sex of household head Wuon o en dichuo kose miyo? (i)	
Male	1
Female	2

14. What is the highest level of education of the head of household? Somo mari mogik ochopo kanye? (j)	
No formal education	0
Some primary schooling	1
Primary school completed	2
Some secondary school	3
Secondary school completed	4
Post-secondary qualifications	5
Some university	6
University completed	7
Post-graduate	8
Don't know	99

15. **How many people live in this household? Ji adi ma odak e odni? (k)**			
[Enter three-digit number. Don't know = 999]			

16. **Pesa ma yande iholo mogik kod kambi ma nene iholo pesa kuome. Nene kambi no omiyi pesa eyo mane? (l)**	
Cash credit (money to purchase inputs) / Pesa mar nyiewo mbolea kod kodhi	1
Input credit (fertiliser, seeds, etc.) / Mbolea kod kodhi	2
Other (specify) / Mamoko	3

17. **How many of these things do you or anyone in your household own? Gigi adi ma in kata ng'ato ang'ata e odi ni godo [Write a number] (m)**	
G. Radio	
H. Television	
I. Motor vehicle	
J. A computer	
K. Bank account	
L. Mobile phone	

Section B: Flexible Loans and Access to Agricultural Credit

18. **Temie paro gowi mar puodho ma yande ikawo mogik. Nene idwaro mondo omiyi pesa adi? (a-1)**	
[Enter the amount in shillings in the box]	

19. **Temie paro gowi mar puodho ma yande ikawo mogik. Nene gimiyi pesa adi? (a-2)**	
[Enter the amount in shillings in the box]	

20. **Temie paro pesa ma yande iholo mogik mar puodho. Adwaro somoni gik manyalo bedo ni nene nitiere e winjruok mari kod kambi manene ikawe pesa. Adwaro mondo inyisa ka bende gigi ni kare kose oken kamano.**	**No**	**Yes**
Nene omiya thuolo mar neno ni anyalo chako chulo gowino kuom odiechienge ma an ema ahero [grace period (b)]	0	1
Nene omiya thuolo mar neno awuon kaka anyalo chulo pesano [repayment schedule (c)]	0	1
Nene onego achul gowi mar ndalo dichiel bang' keyo [bullet payment (d)]	0	1
Ka opo ni an kod thagruok e chudo, gowi ni jogo nyalo chwalo odiechenge mag chule mokalo kaka nene wawinjore [loan rescheduling (e)]	0	1
Ka opo ni an kod thagruok mar chulo gowini to kambi nyalo meda	0	1

20. Temie paro pesa ma yande iholo mogik mar puodho. Adwaro somoni gik manyalo bedo ni nene nitiere e winjruok mari kod kambi manene ikawe pesa. Adwaro mondo inyisa ka bende gigi ni kare kose oken kamano.	**No**	**Yes**
pesa moko mondo amedgo puro aye to anyalo chulo duto bang'e [loan refinancing (f)]		
Kambi oyiena kawo pesa ma okokalo pesa mawawinjore saa asaya mahero tek ni gowi duto okokalo winjruok marwa [lines of credit (g)]	0	1

Erokamano kuom kawo thuolo mar duoko penjo e nonro ni

Appendix III: University's Introduction Letter

UNIVERSITY OF NAIROBI

INSTITUTE FOR DEVELOPMENT STUDIES

Website: ids.uonbi.ac.ke
Telephone: +254-020-4910000/2429997 ext.28177
Cellphone: 0772 114 655

P.O. Box 30197 - 00100 G.P.O
Nairobi, Kenya
Email: director-ids@uonbi.ac.ke

2/7/2019

Our Ref: T51/7978/2017

TO WHOM IT MAY CONCERN

RE: FREDRICK ODHIAMBO - T51/7978/2017

This is to confirm that **Mr. Fredrick Odhiambo** is a bona fide student of the University of Nairobi, Institute for Development Studies (IDS). He is currently pursuing studies leading to the award of the degree of Master of Arts in Development Studies.

Mr. Fredrick Odhiambo is collecting data on his MA research project titled: '*Flexible agricultural loans and access to credit for smallholder farmers in Siaya County, Kenya.*

Any assistance offered to him will be highly appreciated.

Yours sincerely,

Institute for Development Studies
-3 JUL 2019
University of Nairobi

Prof. Karuti Kanyinga
Director-IDS

Copy to: Student file

/wmn

Appendix IV: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **292974**

Date of Issue: **30/August/2019**

RESEARCH LICENSE

This is to Certify that Mr.. Fredrick Odhiambo of University of Nairobi, has been licensed to conduct research in Siaya on the topic: Flexible loans and access to credit for smallholder farmers in Siaya County, Kenya for the period ending : 30/August/2020.

License No: **NACOSTI/P/19/385**

292974

Applicant Identification Number

Director General
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