ANALYSIS OF FACTORS INFLUENCING DEMAND FOR AGRICULTURAL CREDIT AMONG FARMERS IN KAPENGURIA, WEST POKOT COUNTY, KENYA

BY

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Moi University

2020

DECLARATION

Declaration by the Candidate

This research is my original work and has not been presented for a degree in any other University. No part of this research may be reproduced without the prior written permission of the author and/or Moi University.

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DEDICATION

In memory of my father (the late Hezron Musebe Namboka) who passed on while I was in the process of conducting this study. He was an astute believer of academic excellence and application of knowledge in day to day life. This research is also dedicated to my wife (Trudea), daughters (Precious Pritie and Pearl), my son (Brillant) and my mother (Marseline) for their motivation, inspiration and support.

ABSTRACT

Farmers borrow loans from different sources; both formal and informal. Loan borrowing in different regions of the nation also differs significantly; in Kapenguria, the loan uptake is low. In spite of the expanding credit market, agricultural credit market is not growing as fast as the other sectors of the economy; therefore the need to investigate the factors influencing demand for agricultural credit. The variables were categorized into three: Farm and farmer characteristics, policy oriented factors and costs of direct production inputs. Three hypotheses were tested in line with the three categories of variables. A combination of stratified sampling and simple random sampling technique were used to obtain a sample size of 313 respondents. The study is based on the factor demand theory where credit was considered as a factor of production but it is not demanded directly; instead, demand for direct inputs of production lead to demand for agricultural credit. A log-log factor demand model for agricultural credit was specified with maize as the crop of reference and estimated by multiple linear regression technique. More than half (58%) of the respondents were male while 42% were female and men borrowed more amounts than women. Additionally, married farmers borrowed more than single farmers. Equity bank was the major lender in terms of clientele and total amount given out as agricultural loans followed by Kenya Commercial Bank (KCB). Financial intermediaries rationed loans by a mean of 18,717 shillings. Most (75%) of the respondents borrowed at interest rates higher than 10% with the highest being 24%. Women had higher mean expenditure on seeds and fertilizers than men while farmers in age group 40-49 had the highest mean expenditure on seeds and fertilizer. Significant farm and farmer characteristics were: access to extension, proximity to credit facility, household size and experience in farming with p values 0.000, 0.042, 0.002 and 0.000 respectively. The two policy oriented factors (value of collateral and interest rate) were significant with p values 0.000 and 0.003 respectively. Two production inputs were significant (cost of labor and cost of seed maize) with p values 0.000 and 0.018 respectively. The study recommended expansion of coverage of financial services through increased agency banking. It further recommended intensification of farmer advisory services, establishment of initiatives that would promote borrowing, development of suitable loan products for the small scale farmers and establishment of special programs that would avail credit for purchase of production inputs. To understand this topic further, a nationwide study could be done to bring out the factors influencing demand for agricultural credit. Other studies could focus on comparatively analyzing factors influencing demand for agricultural credit between small and large scale farms. The influence of government and NGO aided programs on demand for agricultural credit is another area that could be subjected to future studies.

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ACRONYMS AND ABBREVIATIONS

AFC	Agricultural Finance Corporation
ASAL	Arid and Semi-Arid Land
ASDS	Agriculture Sector Development Strategy
CAN	Calcium Ammonium Nitrate
CDF	Cumulative Distribution Function
CIDP	County Integrated Development Plan
DAP	Di-Ammonium Phosphate
GDP	Gross Domestic Product
GMR	Guaranteed Minimum Returns
GoK	Government of Kenya
KCB	Kenya Commercial Bank
KES	Kenya Shillings
Km	Kilometer
KWFT	Kenya Women Finance Trust
MFI	Micro-Finance Institutions
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Schemes
NCPB	National Cereals and Produce Board
NGO	Non-Governmental Organization
NIST	National Institute of Standards and Technology
OLS	Ordinary Least Squares
OSAMCA	Ogun State Agricultural and Multipurpose Credit Agency
ROSCA	Rotating Saving and Credit Association
SACCO	Savings and Credit Cooperative Society
SSA	Sub Saharan Africa
TB	Table Banking
TV	Tele Vision
US	United States
WEF	Women Enterprise Fund
YEDF	Youth Enterprise Development Fund

OPERATIONAL DEFINITION OF TERMS

Access to extension	Number of instances when the farmers received advisory service in the production year
Cost of fertilizer	Expenses incurred on fertilizers in the production year
Cost of labor	Labor expenses incurred for one production year in Kenya shillings
Cost of seed maize	Expenses incurred on seeds for the production year in Kenya shillings
Demand for agricultural credit	Amount of money in Kenya shillings (KES) borrowed and used for farming
Experience in farming	Number of years the farmer had practiced farming
Gross farm income	Gross annual income from sale of farm output for the preceding year in Kenya shillings
Interest rate	The cost of borrowing set as a percentage by the lender
Proximity to credit source	The distance from the farm to the lending institution in kilometers
Size of household	Number of people in the farm household
Value of collateral	Market price of the loan securities in Kenya shillings

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter contains the background of the study. The problem statement and the research objectives are also included. The chapter also gives the research hypotheses, justification for the study, and the scope of the study.

1.1 Background of the Study

Agricultural credit is generally defined as "a financing vehicle, such as a loan, banker's acceptance or letter of credit, that is designed specifically for agriculture producers" (Investopedia, 2018). Typically, this financing is used to fund operations, purchase equipment or acquire real estate. Most of the world's farmers have to borrow; agricultural credit is demanded by both large and small farms as well as in subsistence farming. This borrowing is done to raise agricultural production. It is essential to avail adequate amounts of credit to farmers and at appropriate costs (Desai, 2010).

Atieno (1997) observed that farmers' credit demands depend on many factors which broadly relate to the forms of production and the extent of market integration; in most cases, credit demand is not in line with the available financial products because farmers need short-term credit to finance seasonal production yet financial institutions mainly avail long-term credit; the farmers' need for agricultural credit is mostly not met for this reason. The long-term credit is required where there is need to acquire machinery and land. Atieno (1997) highlighted the importance of agricultural credit; it increases a farmers' working capital which enables the farmer to purchase productivity enhancing inputs such as seeds, fertilizers and chemicals.

Kibaara (2006) observed that the average production efficiency levels were higher among producers who had access to credit. Access to agricultural credit in Kenya is skewed towards the more productive high rainfall agro-ecological zones. In the same high rainfall zones, perennial crops such as sugar, coffee and tea are grown with a well-developed embedded credit component which further improves access to agricultural credit in the high rainfall zones. The medium and low rainfall zones do not have this kind of support.

Considering that agriculture plays a significant role in the economy by directly contributing 26 percent of the GDP and another 25 percent indirectly and supplying the manufacturing sector with raw materials as well as generating tax revenue and foreign exchange that helps to support the rest of the economy besides employing over 40 per cent of the total population and over 70 per cent of the rural population (GoK, 2010), credit demand and concomitant access by farmers in Kenya means improvement of the capital standing which will increase private investment in this important sector of the economy. Agriculture is linked to the off-farm sectors such that good performance of the agriculture sector leads to improvement of the off-farm businesses (GoK, 2010).

Farmers get credit mainly from cooperatives, NGOs and community-based lending institutions (GoK, 2010). The Cooperative movement through savings and credit societies (SACCOs) has helped mobilize savings and provide credit to producers for many years. Agricultural cooperatives form the largest proportion (46%) of cooperative societies in Kenya; they had 3 million members out of the 7 million members in the entire cooperative movement (GoK, 2010).

The contribution of commercial banks to agricultural credit is insignificant; the Micro-Finance Institutions (MFIs) contribute a mere 0.6% of credit to the rural households (Kibaara, 2006). Both commercial banks and MFIs focus on economically active entrepreneurs and play a pivotal role in helping the low-income earners access to non-agricultural loans. The formal financial institutions are engaged in vigorous campaigns to promote their credit products to the rural borrowers yet many of the borrowers observe that the lending terms are unfriendly; rural borrowers tend to shy away from the agricultural credit products of the formal financial institutions.

Nyikal (2007) acknowledged that agricultural credit market has not performed well in Kenya and several efforts to improve the situation have addressed the supply side. Kibaara (2006) noted that only 39% of the households in Kenya sought credit in 2004 which indicates the low proportion of credit seekers in the rural. If farmers were to use credit funds from the credit market, there would be need for effective demand for agricultural credit. The need to address apparent constraints on the demand side is existent.

Kodhek *et al.* (2004) highlighted the fact that agriculture sector stakeholders have not been engaged in the emerging debate about availing financial services to rural households. Farmers are at a disadvantage because advances were made in developing products for rural non-agricultural businesses, but not for agriculture. The government tried to respond by funding Agricultural Finance Corporation (AFC) as a means of availing credit to the farmers but this measure has not been successfully implemented consequently leaving the agricultural credit market lame and limping.

In Kapenguria specifically, we have both the formal and informal sources of agricultural credit. Formal sources of credit include the commercial banks, parastatals

and microfinance institutions; these are legally registered and regulated by the government regulatory framework. The informal sources include moneylenders and traders; they are not legally registered, consequently not regulated by the government. They provide short-term loans; usually for one production season.

Like in other parts of Kenya, farmers in Kapenguria have the tendency of organizing themselves into groups. Most of these groups are bound together by a common activity which in most cases is Table Banking (TB) or Rotating Savings and Credit Association (ROSCA). The groups avail small amounts of credit to their members based on their own internal lending conditions and capacity. The lending terms are usually friendly but the interest charged is usually higher than that of formal financial institutions. Some of the groups have the ability to lend to non-members usually under a different set of conditions.

According to the West Pokot County Integrated Development Plan - CIDP (2013), the formal financial intermediaries operating within the County include 3 commercial banks (Kenya Commercial Bank, Equity Bank and Barclays Bank), 4 Micro Finance Institutions and 6 Savings and Credit Cooperative Societies (SACCOs). Most of these financial institutions have their services concentrated in Makutano town which is located within Kapenguria Division. The percentage of citizens having active bank accounts is low in the County yet most of the financial service providers demand that borrowers be holders of active accounts for them to get credit. Loan uptake and repayment is also low and more effort is needed to reverse this trend. Agency banking is expected to play a key role in enhancing financial services penetration into rural areas and in mobilizing savings for investment.

Many scholars have made attempts to study the determinants of demand for agricultural credit while many others have concentrated on the factors important for farmers' access to credit but the results differ from one study to another. Significant factors in one study area turn out to be less important in another study area. Factors influencing demand for credit therefore deserve special examination and evaluation (Atieno, 1997). The discussion on determinants of demand for agricultural credit must go on through the means of research in order to come up with new empirical evidence that guides the policy makers in decision making for promotion of agricultural credit.

This study was conducted in a complex credit market environment comprising of both formal and informal lending institutions with varied lending terms. On the other hand, the borrowers are even more varied in terms of credit needs. This study sought to bring out the significant factors influencing demand for agricultural credit in Kapenguria Division.

1.2 Problem Statement

Farmers are important contributors to Kenya's economy. They contribute to the national objective of creating employment opportunities, generating income and providing a source of livelihood for the low-income households in rural Kenya (GoK, 2010). However, the farmers have been experiencing constraints that have inhibited their ability to demand and access agricultural credit thus making them unable to realize their full potential. The key challenges include limited access to financial services and poor access to produce markets (Atieno, 1997). Lack of tangible security is one of the factors that constrain farmers from demanding credit from formal credit institutions. The impact of credit demand and access challenges is confinement of farmers to subsistence farming with low productivity (Kodhek *et al.*, 2004).

Consequently, the farms suffer from low investment because they cannot afford the high yielding production technologies. This situation directly affects the food security status and incomes of the farmers.

Akudugu (2012) observed that credit demand and subsequent access can enable farmers overcome their liquidity constraints. It opens up numerous opportunities for farmers both in the short and long run. In the short run, farmers acquire expensive production inputs for one production season. In the long run farmers are able to procure capital assets like machinery and more land which otherwise would have been outside their ability to acquire.

In spite of the strong competition among the lenders in the credit market, where each institution is vigorously marketing their own tailor-made credit products that are targeting different needs of their clients (Omboi and Wangai, 2011), demand for credit by farmers has not grown as fast as it happened in the other sectors of the economy; demand for agricultural credit is low (Nyikal, 2007). It is therefore important to investigate the factors influencing farmers' demand for credit and address the knowledge gap that exists concerning the subject in Kapenguria, West Pokot County. There was no previous empirical study done to address this knowledge gap in the study area.

1.3 Research Objectives

The study was guided by an overall objective and three specific objectives as indicated hereunder:

1.3.1 General Objective

The main objective was to investigate factors influencing demand for agricultural credit among farmers in Kapenguria Division, Kenya.

1.3.2 Specific Objectives

The study sought to achieve the following specific objectives:

a) To establish the effect of selected farm and farmer characteristics (access to extension, proximity to credit facility, size of household, gross annual farm income and experience in farming) on farmers' demand for agricultural credit
b) To determine the effect of selected policy oriented factors (value of collateral and interest rate) influencing farmers' demand for agricultural credit
c) To investigate the effect of selected production inputs (cost of fertilizer, cost of seed maize and cost of labor) on farmers' demand for agricultural credit

1.4 Research Hypotheses

The study tested the following hypotheses:

Ho_1: There is no significant effect of access to extension services, proximity to credit facility, size of household, gross annual farm income and experience in farming on demand for agricultural credit.

Ho_2: Interest rate and value of collateral have no significant effect on demand for agricultural credit.

Ho_3: The costs of fertilizer, seed maize and labor have no significant effect on farmers' demand for agricultural credit.

1.5 Justification

Considering that demand and subsequent access to credit by farmers is important in improving productivity at farm level, it was necessary to understand the constraints that influence farmers' demand for agricultural credit. In fact, the agricultural credit market was the least developed compared to the other sectors in West Pokot County.

Understanding the demand factors for agricultural credit through this study would provide the basis for initiating the process of change in the agricultural credit markets. It would aid the government in rolling out programs aimed at improving credit access to farmers. The benefit of increased access to credit would be increased production which concomitantly yields higher employment in the economy.

This study provides empirical basis for decision making at policy level. Based on the empirical evidence, the study gives recommendations which can be factored in the county development plans as well as the national development plans. The study generated the required advice for policy makers and contributes to the body of knowledge about agricultural credit market in Kapenguria and Kenya as a country.

1.6 Scope of the Study

This study was carried out in Kapenguria which is composed of the following locations: Chemwochoi, Kaibos, Kaisakat, Kapenguria, Kapkoris, Keringet, Kishaunet, Mnagei and Talau. Kapenguria is an administrative unit in the West Pokot County. It is a high rainfall area where mixed farming is practiced with maize and dairy farming being the major farm enterprises. The study was limited to investigation of selected factors influencing demand for agricultural credit from both formal and informal financial institutions by farmers for the reason that in the study area, both categories of financial intermediaries provide substantial amounts of credit for investment in the agricultural enterprises. Credit can be in cash or in kind; this study was focused on both forms of agricultural credit.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter contains the citations from other related studies. It includes the theoretical framework of the study. The chapter also presents the conceptual framework of the study and the description of variables used in the study.

2.1 Theoretical Framework of the Study

This study was founded on a theoretical framework which provided the background for explanation of the findings in the study. The theoretical framework is presented hereunder:

2.2 The Concept of Factor Demand

This study was based on factor demand theory to study the factors influencing demand for agricultural credit in Kapenguria, West Pokot County. According to the Amos-WEB economics encyclopedia, “factor demand relates factor price and factor quantity, specifically; it is the range of factor quantities that are demanded at a range of factor prices.” The factors of production include the four scarce resources: Labor, capital, land, and entrepreneurship. Factor demand is a derived demand. This means that the demand for an input is derived from, or depends on, the demand for the output. If the output is more highly demanded, then the input used in production is also more highly demanded. If the output commands a high price, then the input used in production also commands a high price.”

Consumers primarily demand food commodities which triggers farmers’ demand for inputs of production for them to produce the agricultural commodities. However, the inputs are expensive so that for the farmers to acquire them, they need assistance in

form of agricultural credit. This study therefore viewed demand for agricultural credit as derived demand. Credit is viewed as an input that is demanded to facilitate acquisition of the other direct inputs in production (Doll and Orazem, 1981).

2.3 Derivation of Factor Demand Function

The production theory defines production as transformation of a set of inputs into a defined output. This process is expressed as:

$$\boldsymbol{Q = f(X_1,\ X_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots, X_k)}; \quad (2.1)$$

This is for *k* number of production inputs where Q is the output while X_is are the inputs used in production (Robinson, 1954). Introduction of prices of the inputs yield the cost function for the firm. "The fundamental principle of duality in production is; the cost function of a firm summarizes all of the economically relevant aspects of its technology" (Varian, 1992). In recognition of the duality between production and cost functions, this study opted for the cost function. The function can be expressed as:

$$\mathbf{C = f\ (Q\ , P)}; \quad (2.2)$$

Where C is the total cost, Q is the output and P is the vector for prices of the inputs. Partial differentiation of this cost function with respect to particular production inputs yields functional forms for factor demand for the inputs in question (Nyangweso *et al.*, 2007).

Considering $\emptyset(w, y)$ as a differentiable cost function satisfying the sufficient conditions for cost functions as follows:

1. $(tw, y) = t\emptyset(w, y)$ for all t ≥ 0;
2. $\emptyset(w, y) \geq 0$ for $w \geq 0$ and $y \geq 0$;
3. $\emptyset(w', y) \geq \emptyset(w, y)$ for $w' \geq w$;
4. $\emptyset(w, y)$ is concave in w

The objective of the firm is to minimize cost hence applying shephards lema (the derivative property) to the cost function yields identities representing factor demand functions: Let $x_i(w, y)$ be the firm's conditional factor demand for input i. Then if the cost function is differentiable at (w, y) and $w_i > 0$ for i = 1….. n then;

$$\boldsymbol{x_i(w,y) = \frac{\partial c(w,y)}{\partial w_i} \qquad i = 1 \ldots\ldots\ldots\ldots\ldots, n} \tag{2.3}$$

In the case of the translog cost function, we borrow from Varian (1992): The translog cost function takes the following form;

$$\boldsymbol{logc(w,y) = a_o + \sum_{i=1}^{k} a_i logw_i + \frac{1}{2}\sum_{i=1}^{k}\sum_{j=1}^{k} b_{ij} logw_i logw_j + logy.} \tag{2.4}$$

For this function we require that;

$$\sum_{i=1}^{k} a_i = 1$$

$$b_{ij} = b_{ji}$$

$$\sum_{j=1}^{k} b_{ij} = 0$$

Under these restrictions, the translog cost function is homogeneous in prices. The conditional factor demand functions are not linear in parameters, but the factor shares are linear in parameters and can be expressed as;

$$\boldsymbol{s_i(w,y) = w_i x_i(w,y)/c(w,y).} \tag{2.5}$$

The derived factor shares linear identities are therefore given by;

$$\boldsymbol{s_i(w,y) = a_i + \sum_{i=1}^{k} b_{ij} lnw_i.} \tag{2.6}$$

According to Subhash (1982), the constant returns to scale translog cost function for one output and factors of production is stated as:

$$\boldsymbol{lnC = \beta_0 + \alpha_1 lnQ + \sum \beta_i lnP_i + \frac{1}{2}\alpha_2 \ln(Q)^2 + \frac{1}{2}\sum \beta_i \ln(P)^2 + \sum\sum \beta_{ij}\, ln(P_i) \ln(P_j) + \sum \pi\, ln\, P_i\, l\, n(Q)} \quad (2.7)$$

Where *lnC* is the natural log of total cost, P_i are the costs of particular inputs while α, π, β_0 and β_{ij} are the parameters. Q is the total output of the farm produce. The translog cost function was partially differentiated to get the cost share equations which depict the demand functions for the inputs where the cost shares are defined as;

$$\boldsymbol{S_i = {P_i}/{C}}. \quad (2.8)$$

The cost share equations were derived using Shephard's lemma;

$$\{\mathbf{X_i}(\boldsymbol{P}, \boldsymbol{Q}) = \partial \mathbf{C}\,(\mathbf{P}, \mathbf{Q})/\partial \mathbf{P_i})\}. \quad (2.9)$$

The derived cost share equation for a specific input 'i' is;

$$\boldsymbol{S_i = \beta_i + \sum \beta_{ij} lnP_i + \beta_{iQ} lnQ} \quad (2.10)$$

To allow for the influence of farm characteristics and lending policies, vectors F and Z were added. The model to be estimated was of the following general form;

$$\boldsymbol{S_i = \beta_i + \sum \beta_{ij} lnP_i + \beta_{iQ} lnQ + \psi F + \gamma Z + \mu}. \quad (2.11)$$

Where F is the vector for farm characteristics and Z is the vector for the institutional lending policies while μ is a normally distributed random error term.

The derived model (2.11) has both dependent and independent variables log-transformed (log-log model). According to Benoit (2011), the interpretation of the coefficients of the log-log model is given as an expected percentage change in S_i when an explanatory variable increases by some percentage *ceteris paribus*. The coefficients of logs of the explanatory variables represent the elasticity of S*i* with respect to the corresponding variables. Benoit further stated that using the coefficients of a log-log model directly is not very useful since we cannot think directly in natural

log units. This can be confirmed mathematically following the approach by Guse (2012):

Consider a log-log regression specification of the following general form:

$$\log(Y) = \beta_0 + \beta_1 \log(X) + \mu \tag{2.12}$$

To calculate marginal effects we solve for *Y;*

$$\log(Y) = \beta_0 + \beta_1 \log(X) + \mu Y = e^{\beta_0 + \beta_1 \log(X) + \mu} \tag{2.13}$$

We then differentiate with respect to X where;

$$\frac{dY}{dX} = \frac{\beta_1}{X} e^{\beta_0 + \beta_1 \log(X) + \mu} = \beta_1 \frac{Y}{X} \tag{2.14}$$

The marginal effect is;

$$\frac{dY}{dX} = \beta_1 \frac{Y}{X} \tag{2.15}$$

Solving for β_1 we get that*;*

$$\beta_1 = \frac{dY}{dX} \frac{X}{Y} \tag{2.16}$$

Hence β_1 is a measure of elasticity.

2.4 Factors Influencing Demand for Agricultural Credit and Models used in Analyses

Numerous studies made attempts to bring out the determinants of demand for agricultural credit; the studies applied various models in analyses which yielded varying results as indicated hereunder:

2.4.1 Linear Regression Models used to Analyze Factors of Credit Demand

Olaoye, *et al.* (2011) while investigating determinants of demand for Ogun State Agricultural and Multipurpose Credit Agency (OSAMCA) loans among fish farmers in Ogun State, Nigeria, employed a multiple linear model. The variables of interest

were: Age, sex, educational level, fish farming experience, stock size, membership to cooperative society/farmer association and interest rate. Educational level and fish farming experience were the only significant variables in the study. The model attained explanatory power of 0.66. The study is relevant to the current study as it focuses on small scale rural farmers' demand for credit. However the study did not consider the effect of primary production inputs on demand for agricultural credit for fish production; it treats demand for credit as primary demand.

Musebe, *et al*., (1993) analyzed agricultural credit markets in Vihiga using multiple linear regression model and attained impressive R^2 value of 0.78. The significant variables under focus were value of marketed surplus, education level of the farmer and off-farm income. Farm size was not statistically significant. The study is significant to this study considering that it was done in a small scale production set up with many similar characteristics to the current study area. The authors can be commended for deeply explaining the key determinants for demand of agricultural credit in Vihiga. More so, the dependent variable is the quantity of credit and not just the decision to borrow; this complies with theory of factor demand.

Atieno (1997) opined that among the factors important in determining the borrowing behavior of farmers are the institutional lending terms and conditions, which apart from being used to ensure the continuity of credit programs, also influence farmers' access to credit and their borrowing decisions. Where the credit duration, terms of payment, required security and the provision of supplementary services do not fit the needs of the target group, potential borrowers will not apply for credit even where it exists, and when they do they will be denied access. The study used multiple linear regression to establish the significance of selected variables in demand for credit by

smallholder farmers. The variables in question were: farm income, non-farm income, land, interest rate, non interest credit cost, farming experience and Collateral value. Farm income, non-farm income and interest rates were not significant at any conventional level of significance. However, the R^2 was low (0.39), pointing to the fact that some variables may have been left out in the study. Additionally, credit was treated as the primary good being demanded by the smallholder farmers yet this is not the case in the real scenario.

Calza, *et al.* (2001) modeled the demand for loans to the private sector in the Euro area using a semi-log linear model. They restricted themselves to a small set of variables namely: Gross domestic product (GDP), short run interest rate and long run interest rate. They observed that GDP was positively related to demand for loans while both short run and long run interest rates were inversely related to demand for loans. The model achieved an impressive coefficient of determination (0.66). They can be commended for bringing out the different effects of interest rates in the short run and in the long run as they rightfully observed that interest rate affects demand for loans mostly in the long run. More so, studying the effect of interest rate on demand for loans in a time series set up was more appropriate than doing the same in a cross sectional study.

Nwaru, *et al.* (2011) examined the determinants of agricultural credit demand and supply in informal credit markets among food crop farmers in Akwa Ibom State of Nigeria by specifying linear credit demand and supply functions and estimated them using 2 stage least squares method. They observed that farm income, profit, education and interest were significant determinants of credit while gender, farm size and household size were not significant determinants of credit demand. The model

attained impressive predictive power (R^2) of 0.66. The study is significant to this study because it was set in the rural and conducted to a community engaged in small scale farming – these characteristics are similar to the study area of this study. It is however noted that the authors used some variables that could obviously exhibit high correlation coefficients, for instance farm income and farm profit as well as farm size and farm income. Another gap in the study is that the model expressed demand for credit as primary demand; this is not the case in real sense.

Diagne (1999) investigated determinants of household access to and participation in formal and informal credit markets in Malawi by specifying a system of linear equations to model credit limit, credit demand and credit supply. The system of linear simultaneous equations was then estimated using 2-stage least squares technique. The study showed that landholding size remains a significant determinant of access to informal credit and that formal and informal credit are not perfect substitutes as it was observed that majority of households in Malawi use both forms of credit but at various levels. The study brought in an interesting perspective – credit limits. It also estimated the specified models using simultaneous equation estimation technique. However, the study in its discussion of results was inclined towards access to credit rather than demand for credit.

Njuguna and Nyairo (2015) examined the formal conditions that influence farmers' demand for credit where the variables under focus were interest rate and collateral requirement. Using a multiple linear regression model, they observed that both interest rate and collateral requirement were significant factors affecting demand for credit. The two factors were inversely related to demand for credit. The study identified two key formal conditions but it also left out a number of variables that

could be of interest, for instance loan rationing and bureaucracy in application of the loans.

Maru and Chemjor (2013) used linear regression model to establish a causal relationship between the dependent variable (Empowerment of women entrepreneurs) and independent variables (Microcredit, Micro-savings and microfinance training). They established that the design of the micro saving/finance product is significant because the women entrepreneurs felt that the procedure for withdrawing the savings was difficult and took so long. Furthermore, training is a very important micro-finance factor for women entrepreneurs. The study points to the fact that bureaucracy and institutional lending terms are key determinants of credit demand and subsequent access. They achieved a good model predictive (R^2) value of 0.66 but the study did not consider the individual characteristics of the borrowers.

Nyangweso, *et al.* (2007) used translog cost function and shephard's lemma to derive the cost share equations which depict the factor demand equations. The cost share equations were estimated using the multiple linear regression analysis technique. The variables of interest were cost of production inputs, household characteristics, farm characteristics and environmental factors. They can be commended for treating demand for credit as derived demand.

Terry and Marsh (2000) studied derived demand for wheat in the United States (US) by deriving factor demand equations from normalized quadratic profit function. They opined that although economic theory dictates that consumer demand for wheat is primary demand, demand for raw wheat is derived demand. As a result, a factor demand system was conceptualized and specified for wheat as an input into flour production. This study agrees with this approach in studying input demand which in

real sense is derived demand. This approach can be used in studying demand for agricultural credit which is considered as an input for acquisition of other inputs in this study.

2.4.2 Probabilistic Models used to Analyze Factors of Credit Demand

Yegoh and Kimeli (2013) applied the binary logit model to study agricultural credit access by grain growers in Uasin-Gishu County, Kenya. They opined that education, land size, security, age, gender, land ownership, income, decision to apply loan, repayment, interest and maize yield, were significant predictors of accessibility to credit. More importantly, the study is relevant to this study because it recognizes the fact that, 'demand for credit' is the most important aspect of access to credit. The study however, does not bring out the relationship between the amount of credit borrowed and the factors that determine access to credit.

Ololade and Olagunju (2013) applied binomial logistic regression to study determinants of access to credit among rural farmers in Oyo state in Nigeria and revealed that not being married reduces the probability of having access to credit by 86.3%. The study further reveals that being a female reduces the probability of having access to credit by 71.3%. It further argued that farmers' access to credit is positively affected by availability of guarantors and a unit increase in interest rate leads to the probability of not having access to credit. According to the study, majority (73.3%) of the rural farmers acknowledged lack of collateral as a problem, while about 54.3% realized lack of guarantor as a problem. Others are in the following order; high interest rate 51.9%, mode of repayment 28.6% and lack of information about the credit availability 23.8%. The study is relevant to this study because it was done in a setting that is similar to the study area in this study – small scale farmers in a rural set-

up where farming is the predominant activity. The study falls short of bringing out the connection between the ‘demand for production inputs’ and the access to credit, in fact the study does not mention input demand as a trigger for demand and subsequent access to credit.

Hananu, *et al*. (2015) investigated factors affecting demand for agricultural credit in Northern Ghana using the logit model. The covariates were sex, age, education, farm size, household size, income, group membership and source of credit. The study observed that the decision to access credit was positively and significantly determined by age, education, group membership and source of credit. The study is relevant to this study as it investigates the factors influencing demand for agricultural credit in a developing country (Ghana) with many similar characteristics to the study area in this study. However, it is not easy to tell whether the study was focusing on access to credit or demand for credit because the two concepts are used interchangeably in the same study.

Wangai and Omboi, (2011) while studying factors that influence demand for credit among small scale investors in Meru Central, used multiple logistic regression analysis to estimate the effect of demographic and socioeconomic factors on demand for credit among the small scale investors. Demographic factors included: age, gender, marital status and number of dependents. Socio-economic variables were: net income, education level, business location, business activity, business age, market traded, interest rates, collaterals demanded, loan rationing. Educational level, household size and income were significant at 10% level of significance. The study is relevant to this study because it focused on small scale investors who exhibit financial characteristics similar to those of small scale farmers in this study. The prevalent

lacuna in the study is that the R^2 was 0.16 indicating that the explanatory power of the model was very low.

Ssonko and Nakayaga (2015) investigated credit demand among farmers in Mukono District, Uganda by employing the binary logit model estimation. They concluded that factors promoting credit demand include proximity to credit facility, application procedures, farm size, land tenure system, and membership to farmers' association. The model however attained very low value of predictive power (R^2 = 0.11). The study is significant to this study because it was conducted in a neighboring country with similar socio-economic characteristics to those in the study area of the current study and it attempts to identify the factors that promote the farmers' demand for agricultural credit. However the authors' view of demand for credit as being a matter of whether someone applied or not is moot. The model falls short of being able to predict amount of credit demanded given a specific level of the explanatory variables.

Wesa (2011) studied the determinants of micro credit access among rural women in Butere-Mumias District by application of the ordinal regression model. The study concluded that a significant proportion of the rural women entrepreneurs were least accessible to micro credit services and that the conditions set up by MFI as requirements greatly affect them and overall micro credit accessibility. Furthermore, education level of the respondents and asset control and property rights do have significant influence on micro credit accessibility. In addition, access to information has a significant influence on micro credit accessibility. The use of ordinal regression model to study access to credit is agreeable but the same model is not appropriate for study of demand for credit. The study is significant to the current study as it identifies

the credit access factors which are also the demand factors for agricultural credit among the rural women.

Yusuf, *et al*. (2014) investigated determinants of participation in credit market among the farmers in northern Nigeria. They used the logit model to measure the decision to participate in credit market where the variables of interest were: farmer age, marital status of the farmers, educational attainment of the farmer, years the farmer spent in farming business and the current occupation of the farmers. They opined that there was a positive relationship between educational qualification and participation in credit market and negative relation with off-farming commitment and business by the farmers. By identifying and discussing the factors that influence participation of small scale farmers, the study is relevant to the current study. The study attained predictive power (R^2) of 0.09; this was very low. Furthermore, the study does not show the influence of expenditure on primary production inputs on the decision of farmers to participate in credit market.

Sebatta, *et al*. (2014) studied determinants of smallholder farmers' access to agricultural finance in Zambia using probit model. They showed that significant determinants of credit access for small holder farmers were: Educational level of house hold head, number of meals per day, number of children in school and household size. They can be commended for bringing in some variables that other researchers had not associated with credit access (Number of meals per day and number of children in school). Some of the variables singled out in the study can also be investigated for possible influence on demand for credit apart from being significant determinants of credit access.

Amao (2013) employed the logit model to study determinants of credit demand among arable crop farmers in Odo-Otin local government area of Osun State in Nigeria where it was concluded that gender, household income, farming experience and farm size had direct relationship with credit demand while age, marital status, family size, years spent in school and membership of association had inverse relationship. He succeeded in singling out key determinants of demand for credit but the study stops at decision to apply or not. The model therefore does not enable us to estimate effective demand for credit at a given level of the explanatory variables.

Dereje, *et al.* (2013) used binary logistic regression model to study the determinants of trade credit use among traders in Ethiopia. To know the status of trade credit use by private traders, respondents were asked whether they had used trade credit or not in the form of *Yes* or *No* response question. Thus, dependent variable in the study was limited (discrete) for which the outcome could take only two values designated by "1" for private trader using trade credit and "0" if not. The predictive power of the model (R^2 value) was 0.67. Age of trader, education level of trader and age of business were significant determinants of credit use. The study provides information on the determinants of credit use but falls short of being able to forecast the quantities of credit that would be used at given levels of independent variables.

Akudugu (2012) estimated determinants of credit demand by farmers and supply by rural banks in Ghana by applying the logit model to the demand side and tobit model to the supply side. The study observed that significant determinants of credit demand from rural banks by farmers in the upper east region of Ghana are found to be the age of farmer, literacy, type of crop grown (cash or food crop), savings, farm size, gender, political affiliations, membership of social groups, and distance from residences of

famers to the rural banks. He can be commended for considering both demand and supply sides of the credit market and bringing in factors that had not been considered by other scholars – type of crop, savings and political affiliations. The study is also significant to the current study as it points out key determinants of credit demand. However, the model used in the study estimates only the probability of applying for credit. It falls short of estimating effective demand for credit based on the identified independent variables.

Bhatarai, *et al*. (2014) analyzed panel data using tobit censored regression model to study the impact of Mahatma Gandhi National Rural Employment Guarantee Schemes (MGNREGA) on Rural Credit Structure in Andhra Pradesh state of India. The variables under investigation were: Education, farm size, age, gender and occupation. The study observed that education and farm size were significant determinants of demand for credit by farmers in India. Successful application of panel data is the strength of the study. However, use of tobit model to study demand for credit is limiting considering that the model was giving the debt ratio as the dependent variable.

2.4.3 Agricultural Credit Demand Factors Analyzed in Descriptive Studies

GoK (2010) recorded in the agriculture sector development strategy (ASDS) that access to bank credit by farmers is still a major challenge despite the fact that Kenya has a relatively well developed banking system. Risks associated with agribusiness coupled with complicated land laws and tenure systems that limit the use of land as collateral make financing agriculture unattractive to the formal banking industry. Many banks charge their clients who include farmers, a prohibitively high interest rate to remain afloat. The cost of bank credit and the limited number of banks in the rural

areas are some of the factors that limit farmers' access to credit. The book is relevant to this study because it gives vital facts about agricultural credit in Kenya. However there was no empirical analysis about demand for agricultural credit to support the stated facts in the book.

Olwande and Mathenge (2011) opined that membership in farmer organizations/groups is positively associated with increased market participation in Kenya. Collective action is important in facilitating access to information and in some instances, credit. Both credit and information are critical in accessing market opportunities. Therefore, increasing social capital among the poor can be of great value in enhancing the households' access to credit markets. They succeeded in establishing the connection between social capital and participation in credit market.

Kibaara and Nyoro (2009) opined that demand for credit is viewed as the willingness by the borrowers to apply and subsequent application effort. They observed that in the year 2004, only 39% of the households in Kenya sought credit. They further stated that credit for farming purposes remains the most dominant need and had increased from 53.71% in 2000 to 71.15% in 2004. The fissure in this study is that it does not bring out the variables influencing demand for credit and possible policy solutions in order to expand the agricultural credit frontier.

Nyikal (2007) observed that small family farms are here to stay, they may not be efficient and they may not generate much income. He further stated that small holder agriculture characterized by subsistence agriculture does not exhibit effective demand for credit, and funding it therefore requires means other than the competitive market. This study supports the belief that scale of operation of a farm may determine demand for credit by the farmer.

Saleem (2011) observed that highly educated farmers got more benefits of using farm credit. They visited agriculture information centre to know better use of new farm technology only few times. The study pointed to the fact that education and access to extension services were main factors determining demand and subsequent access to agricultural credit.

2.4.4 Factor Analysis Method used to Analyze Factors of Agricultural Credit Demand

Ifelunini and Wosowei (2013) applied exploratory factor analysis procedure using the principal factor model with iteration and varimax rotation to study constraints to women entrepreneurs' access to microfinance in South-South Nigeria. The result showed that women entrepreneurs in South-South Nigeria were faced with some constraints in accessing microfinance services, such constraints include; Technical, management, economic, and social constraints. The study is relevant to this study as it broadly brought out the factors influencing access to rural credit then used factor analysis procedure to categorize the large number of variables into the four factors namely: Technical, management, economic, and social constraints. However, the use of factor loadings (beta weight) to determine the effect of the variables on women's access to micro-finance services is disputable. Furthermore, it is not easy to tell how effective the model is in forecasting given that there are no provided measures of predictive power of the model in the study.

2.5 Advantages and Disadvantages of the Models used in the Reviewed Studies

According to the National Institute of Standards and Technology (NIST) of the United States of America (USA) Department of Commerce (2015), the linear regression models have a number of advantages: First, in the short run, "even the non-linear

models can be estimated well by a linear model." Secondly, "the estimates of parameters obtained from linear least squares are optimal estimates from a broad class of possible parameter estimates under the usual assumptions of model building." The linear least squares make very efficient use of data and good results can be obtained with relatively small data sets. Thirdly, "the theory associated with linear regression is well understood and allows for construction of easily interpretable statistical intervals for predictions, calibrations and optimizations. These statistical intervals can then be used to give clear answers to scientific questions."

The disadvantages of the linear models are that they exhibit poor extrapolation properties and they have high sensitivity to outliers. First, "linear models with non-linear terms in the predictor variables curve relatively slowly, so for inherently non-linear processes it becomes increasingly difficult to find a linear model that fits the data well as the set of data increases" (NIST, 2015). Furthermore, "as the explanatory variable becomes extreme, the output of the linear model will also always be more extreme. This means that the linear models may not be effective for extrapolating results of a process for which data cannot be collected in the region of interest. Of course extrapolation is dangerous regardless of the model type." Secondly, "while the method of least squares gives optimal estimates of unknown parameters, it is very sensitive to the presence of unusual data points in the data used to fit the model. One or two outliers can sometimes skew the results of a least squares analysis. This makes model validation especially with respect to outliers critical to obtaining sound answers to the questions motivating construction of the model."

Introducing natural logarithms in the linear model forms the log-linear model and yields intriguing result; it generates the required linearity when the researcher

suspects non-linearity (Pedace, 2013). The coefficients represent the elasticity of the Y variable with respect to the X variable and they depict the percentage change of the Y variable when the X variable is changed by 1%. The natural logarithms reduce the effect of outliers and obtain residuals that are symmetrically distributed thus achieving homoskedasticity (Benoit, 2011).

The disadvantage of the log-linear models is that the intercept is not real; antilog has to be computed to locate the actual intercept of the model. Furthermore, there is limited flexibility in measurement of elasticity; elasticity changes with changes in income yet this model does not reveal that; it assumes constant elasticity (Pedace, 2013).

The probabilistic models (Logit, Probit and Tobit) are appropriate for measuring response variables. They predict the probability of the dependent variables given the stated levels of independent variables. Practical advantage of the probabilistic models is simplicity; the equations of their cumulative distribution functions (CDF) are very simple. More so, their interpretability is very simple where the inverse linearizing transformation is interpreted as a 'log of odds'. Furthermore, the logit, probit and tobit are symmetric around zero and unbounded both above and below making them very good candidates for measurement of response variables (Fox, 2010). The disadvantage of the probabilistic models is that they cannot measure quantities of the dependent variable; rather they measure the probability of occurrence of the phenomenon of interest.

Factor analysis is instrumental in measuring the effect of independent variables on specified dependent variable by means of factor loadings. This method however does not provide the measure of predictive power of the model thus limiting its use in

forecasting. It is therefore not possible to evaluate the appropriateness of the model in measuring economic parameters.

In light of the advantages and disadvantages of the models discussed above, this study opted for the log-linear model in order to reduce the effect of outliers and achieve homoskedasticity.

2.6 Summary of Literature Review

The reviewed studies identified and investigated a wide range of factors influencing demand for and subsequent access to agricultural credit. Interestingly, there is no single variable which has been universally accepted by all the studies as being significant in determining demand for agricultural credit. Majority of the studies pointed out education level, group membership; collateral and land size as key factors influencing demand for credit. A substantial number of studies found age of household head, farm income, interest on loan, farming experience and household size to be significant in influencing demand and access to agricultural credit. Other variables identified by very few studies include: Gender, land tenure, guarantors, marital status, non-interest credit cost, source of credit, distance to credit facility, non-farm income, number of meals per day, number of children in school, savings, access to extension services and political affiliations.

The studies used various empirical models in studying demand for agricultural credit; the models used include the probabilistic models like logit, probit and tobit. Others employed linear regression models while in a few of the studies, simultaneous equation models were used. Input demand was studied by deriving the factor demand functions from the cost function and estimating the resultant factor demand functions. This study agrees with the approach of deriving factor demand functions from the cost

function and subsequently applies it in studying demand for agricultural credit considering that credit is an input required for acquisition of the other inputs of production.

2.7 Conceptual Framework of the Study

Based on the reviewed literature, this study derived a conceptual framework that a number of farm and farmer characteristics, costs of production inputs and policy oriented factors play an important role in determining demand for agricultural credit. Consumers primarily demand food commodities which must be produced at the farm level. Production of these food commodities requires inputs like fertilizer, seeds and labor but farmers are usually financially constrained hence they demand for credit to acquire the primary inputs for production.

In deciding whether to apply or not, socio-economic factors come into play; usually the borrower does self-evaluation before deciding to borrow and when he/she applies for credit, the lender applies the same socio-economic factors to evaluate the borrower. Besides the socio-economic factors, the lenders have some policies which either encourage or discourage borrowers from demanding credit; these were classified as policy oriented factors.

Demand for food commodities is the cause of demand for the most production inputs (labor, fertilizer and seeds). As input requirements escalate, the farmers experiencing liquidity constraints seek for help by demanding for agricultural credit to finance the farm operations. The farm and farmer characteristics (access to extension, proximity to credit facility, size of household, gross annual farm income and experience in farming) were selected as the likely determinants of demand for agricultural credit. The interest rate and value of collateral demanded by the financial intermediaries

were identified as the policy oriented factors affecting demand for agricultural credit. This concept is expressed as a conceptual framework as shown in Figure 2.1:

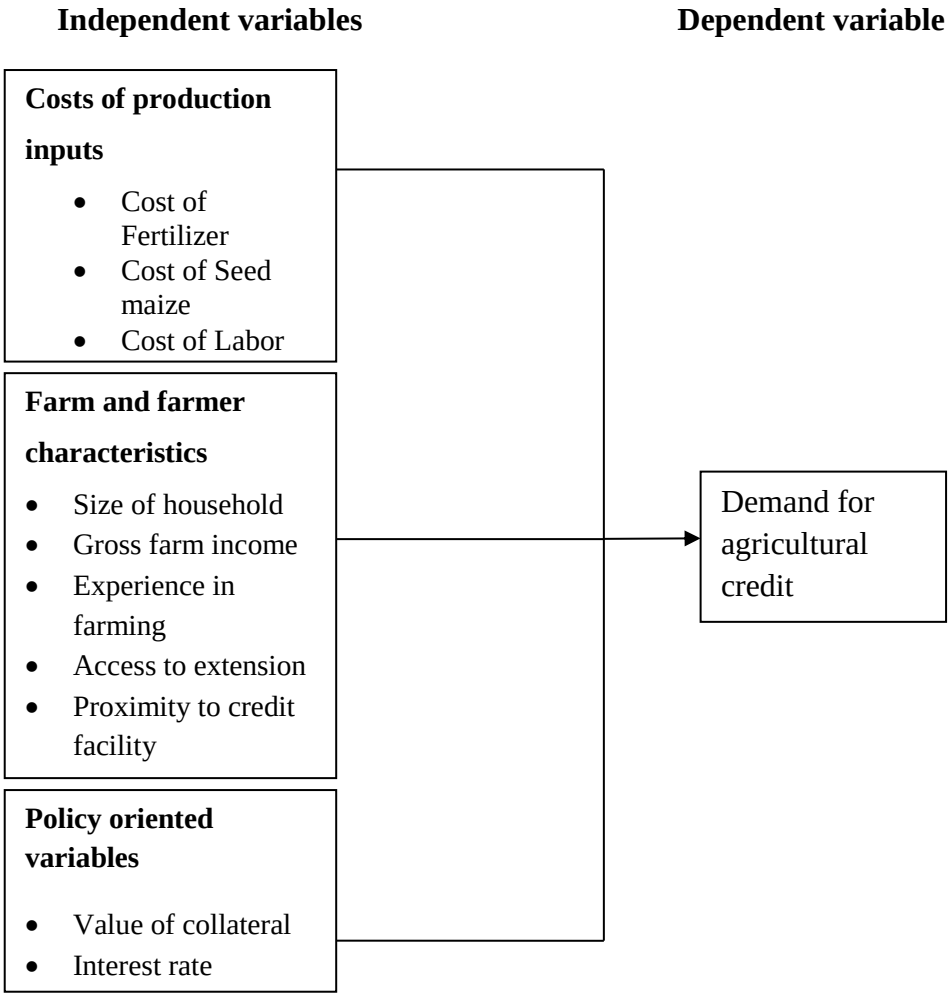

Figure 2.1: Conceptual Framework of the Study

Source: Author, 2016

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

This chapter details the approach used in conducting the study. It presents the methodology which includes the study area, research design, data types and sources. In the same chapter, there is the sampling design, data collection method, data analysis procedures and ethical consideration.

3.1 Study Area

The study focused on Kapenguria Division (Appendix 4) in West Pokot County (1°15'25"N, 35°06'25"E). The study area was chosen because it is a high rainfall area of West Pokot County and it is where all the formal financial institutions are located. The Division has a total area of 335.6 Km^2. The total population for the study area was 82,057 with a population density of 245 persons per Km^2. The area had a total number of 16,131 households. Table 3.1 shows the administrative units and demographic aspects in the study area.

Table 3.1: Administrative Locations in Kapenguria

Location	Male	Female	Total	Households	Persons per Household
Chemwochoi	1,913	2,104	4,017	775	5.2
Kaibos	1,910	1,898	3,808	732	5.2
Kaisakat	4,352	4,252	8,604	1,576	5.5
Kapenguria	7,138	7,231	14,369	3,179	4.5
Kapkoris	5,666	5,707	11,373	2,323	4.9
Keringet	1,634	1,654	3,288	674	4.9
Kishaunet	7,588	7,713	15,301	3,008	5.1
Mnagei	8,185	8,192	16,377	2,942	5.6
Talau	2,476	2,444	4,920	922	5.3
Total	**40,862**	**41,195**	**82,057**	**16,131**	

Source: National Population and Housing Census, 2009

The population of Kapenguria is mainly composed of the migrants from the Arid and Semi-Arid (ASAL) regions of the County who settled in the area due to its rich agricultural potential. The sex ratio of the study area is 99 males to 100 women meaning that there are slightly more women than men in the study area. With the high population growth rate (5.2%) and continual influx of more migrants from the ASAL areas, pressure on land has been increasing; land subdivision into smaller uneconomical size is witnessed every other day. Majority of the farmers (over 90%) in the study area practice mixed farming but the dominant crop is maize; grown both for cash and subsistence. Farming activities in this area rely heavily on the rainfall. Like many other parts of Kenya, unemployment rate is high in the study area coupled with high number of people living in poverty (50% of the populace); these two factors have condemned many of the residents to poor living conditions.

Kapenguria has similar gender dynamics to many other parts of Kenya where women play a bigger role in production of food on small scale basis and take care of the family; in doing this, they supplement household earnings. The women also raise livestock, particularly small stocks to augment family assets. Most households are de factor female headed meaning that most of the time the women (wives) take lead while the men (husbands) are away on other engagements. Men are interested in bigger farming engagements and in most cases they stay away from their families due to their being in formal employment. Most farmers are engaged in other economic activities like formal/informal employment or off-farm businesses.

The national economic policies have not assisted the study area; the government through the National Cereals and Produce Board (NCPB) buys maize from farmers at a predetermined price, usually lower than the market price. This coupled with delays

in payment for the farmers' produce results in farmers' preference for the middlemen. The private sector operates under a free market in supply of production inputs but sometimes they are not able to respond to market demands because of limited working capital.

3.2 Research Design

Explanatory research design was used in this study. The research design was used because this study sought to explain further the factors influencing demand for agricultural credit in the study area thus building on to the existing body of knowledge about the subject. This research design uses the ideas and thoughts of a researcher on a subject to explore further the existing theories; it seeks to explain unexplored aspects of a subject thus formulation of research questions must address this thrust. A sample survey was applied to collect data from farmers in the study area. This was in line with other previous research work that had successfully been done using the same design and proven appropriate.

3.3 Data Types and Sources

The study used mainly primary data collected from individual farmers in the study area. The collected data included: quantities and prices of inputs, farm characteristics; land size, employment income, age of the farmer, group membership, access to extension services, educational level, size of households, farm income, distance from markets, years of experience in farming and number of dairy cows as well as institutional lending policies; value of collaterals demanded by financiers and interest rate. However, reference was made to secondary data to augment the primary data.

3.4 Target Population, Sample Size Determination and Sampling Procedure

A list of 1445 maize farmers of Kapenguria Division was obtained from the County Department of Agriculture and subsequently used as the sampling frame. According to Gujarati (2004), a sample size of 30 if randomly selected is large enough to represent the characteristics of the whole population. A sample size of 313 respondents was used for this study. This sample size was determined using the following formula developed by Yamane (1967):

$$\boldsymbol{n = \frac{N}{1+Ne^2}} \qquad (3.1)$$

Where '*n*' is the desired sample size, 'N' is the population while 'e' is the level of precision (assumed to be 0.05).

A combination of stratified and simple random sampling method was used to select respondents to be included in the study. First, using stratified sampling technique, farmers were divided into subgroups depending on the locations in which they fell; secondly, simple random sampling method was used to pick respondents from each subgroup (location) for the study. The proportion of the sample sizes drawn from each strata was determined by the following formula: n/N ; where 'n' is the population in the particular strata while 'N' is the total population in the study area. The sample size for each stratum was determined by multiplying the proportion (P) by the number of farmers in the respective stratum (P*Population in the stratum). The total sample size for the study is the summation of all proportionate sample sizes from the respective strata. Table 3.2 shows the proportions that were sampled from the different strata in the study area:

Table 3.2: Proportions of Respondents from each Selected Area

Area (Strata)	Households	Proportion(P)	Sample size
Chemwochoi	113	0.08	25.04
Kaibos	74	0.05	15.65
Kaisakat	181	0.13	40.69
Kapenguria	350	0.24	75.12
Kapkoris	132	0.09	28.17
Keringet	152	0.11	34.43
Kishaunet	184	0.13	40.69
Mnagei	180	0.12	37.56
Talau	79	0.05	15.65
Total	**1445**	**1.00**	**313**

Source: Author, 2016

3.5 Data Collection Instrument and Method

Primary data was collected using researcher administered questionnaires. The researcher endeavored to explain the questions to the respondents to ensure that the respondents understood and gave accurate information. To minimize random errors and hence increase reliability of collected data, pretesting of the questionnaires was carried out and necessary improvements done. Pretesting was done by using the data collection tool (questionnaire) in a mock interview. Editing of the data collection instrument was carried out to spot any inconsistencies that might affect data collection; and to minimize errors that occur during data entry and analysis. Well trained and skilled persons were involved in data collection.

3.6 Tests for Reliability and Validity of the Data Collection Instrument

Tests for reliability were done to find out the reliability of the measuring instrument. Inter-observer reliability and test- retest reliability were carried out by administering the data collection tool to the same respondents but different enumerators doing it in different occasions. By correlating the results of different enumerators, inter-observer reliability of the measuring instrument was established to be 94%. A correlation

analysis of results obtained from different occasions when the tool was administered showed a test-retest reliability of 98%. The data collection instrument was thereafter considered reliable for use in this study.

Test for validity of measuring instrument was done by checking the consistency of how the respondents understood the questions and how they gave their responses. It was observed that the measuring instrument was actually testing the intended factors hence considered valid for this study. Valid generalizations could therefore be made from the results obtained using the tool.

3.7 Data Analysis Procedures

Data analysis procedures included specification of the econometric model to be estimated, fitting the econometric model to the collected data using statistical tools and further analysis of the data to draw summaries based on descriptive statistics.

3.7.1 Model Specification

A linear log-log model was specified as indicated:

$$\boldsymbol{ln(P_C) = \beta_0 + \pi_1\, ln(Q) + \beta_1\, ln(P_l) + \pi_2\, ln(P_s) + \pi_3\, ln(P_F) + F + Z + \mu} \quad (3.2)$$

Where *ln* (P_c) is the dependent variable representing the natural logarithm of the amount of agricultural credit borrowed by individual respondents while *ln* (P_l), *ln* (P_s) and *ln* (P_F) are natural logarithms of values of labor, seeds and fertilizer respectively; β_i, and π_i are coefficients in the model. The vectors F and Z were added to augment for the farm/farmer characteristics and the policy oriented factors respectively while μ is the stochastic error term assumed to be normally distributed ($\mu \sim N(0,\sigma^2)$).

Equation 3.2 denotes the factor demand function for agricultural credit by the farms in the study area. This was the equation of interest in this study as it measured the

demand for credit considering demand factors like costs of production inputs, policy factors and farm/farmer characteristics.

3.7.2 Different Tools and Methods of Data Analysis

Descriptive statistical techniques were applied to summarize the data and establish characteristics of the study population using frequency distribution tables and percentages; these were developed by use of Microsoft excel spreadsheet. Using Statistical Package for Social Scientists (SPSS) software version 20, multiple linear regression technique was applied to fit the model to the data. To establish whether the independent variables in the study predict the dependent variable and consequently test the study hypotheses, further analysis was done using inferential statistics. Multiple linear regression analysis was considered appropriate on the assumption that a linear relationship exists between demand for agricultural credit and the independent variables.

All the three objectives were met by use of the multiple linear regression analysis. The effect of costs of production inputs, farm and farmer characteristics and the policy oriented factors on demand for agricultural credit was determined by the outcome of the regression analysis; thereafter, each of the three hypotheses was tested with regard to each variable in the study.

3.8 Ethical Consideration

The data collected during this study was restricted to this study and treated as private and confidential; the anonymity of the respondents was ensured. The information generated was used only for academic purposes. The questionnaires were only administered after obtaining consent from the respondents. The respondents were assured of the confidentiality with which the collected information would be held.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

The purpose of this chapter is to provide findings of analysis of data and discussion of the findings. It is guided by objectives of the study. The chapter gives the descriptive and inferential statistics of all the variables in the study beginning with the socio-economic characteristics of the respondents followed by the selected factors influencing demand for agricultural credit and finally testing of the hypotheses. The figures and tables included in this chapter were developed from the analysis of data that was collected during this study.

4.1 Questionnaire Response Rate

Given that the questionnaires were administered by trained enumerators, all the questionnaires were duly filled and returned. A total of 340 respondents were interviewed and after inspection of the collected data, 313 questionnaires were included in the analysis in line with the desired sample size. The rest (27 questionnaires) were left out of the analysis for having errors and being incomplete in some sections.

4.2 Socio - Economic Characteristics of the Selected Respondents

To provide the background for discussion of the factors influencing demand for agricultural credit among agricultural producers in Kapenguria Division, the study presents the socio-economic characteristics of the selected respondents in the study area.

4.2.1 Gender and Marital Status of the Respondents in Relation to Amount Borrowed

Both male and female respondents participated in the agricultural credit market where it was observed that 58% of the respondents were male while 42% were female. Furthermore, majority of the respondents (95%) were married while only a small (5%) percentage were single. Interestingly, none of the borrowers who were single were female. This is a pointer to the patriarchal nature of the Pokot community where the wife's economic activities have to be backed by the husband; women do not make major decisions about borrowing in the community but the single males can make decisions about borrowing without interference.

Comparing the mean amount of agricultural credit borrowed between male and female borrowers; it emerged that on average, men borrowed more money than women. The mean amount borrowed by male borrowers was about 165,674 shillings while the female borrowers had a mean borrowing of about 98,744 shillings. This finding is consistent with the study done by Wesa (2011), Ololade and Olagunju (2013) who observed that male farmers borrowed higher amounts than female farmers. Apparently, men in Pokot community are in control of major assets which can be used as collateral thus allowing them to borrow higher amounts than women. Figure 4.1 displays the minimum, maximum and mean borrowing by gender:

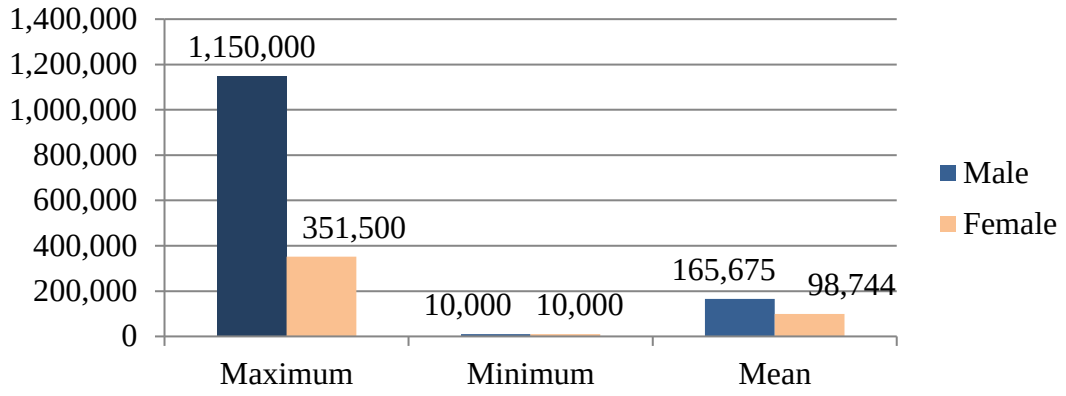

Figure 4.1: Minimum, Maximum and Mean Amount of Credit Borrowed by Gender

Source: Author, 2016

Married males borrowed higher amounts of credit than single males where the mean borrowing for married males was about 176,383 shillings while the mean borrowing for single males was about 48,928 shillings. This indicates that the married borrowers have higher need for credit to purchase inputs for production of food for their families while the single males who are usually young people have less need for credit because of the lesser family responsibilities.

4.2.2 Sources of Agricultural Credit in Kapenguria and Amounts Borrowed from the Sources

Credit was obtained from various sources in the study area. Equity bank was the main source of agricultural credit in the study area where 50% received credit from the Bank. The smallest lenders to the agricultural sector were Family Bank, Kenya Women Finance Trust (KWFT), Tantana women group, Kapenguria teachers SACCO and Bondeni Women group all providing credit to 2% of the respondents respectively (Table 4.1).

Table 4.1: Sources of Agricultural Credit

Financial Institution	Number of respondents	Percentage
AFC	16	5
Barclays Bank	6	2
Equity Bank	157	50
Family Bank	6	2
Faulu MFI	22	7
KCB	31	10
KWFT	57	18
Tantana Women Group	6	2
Teachers' SACCO	6	2
Bondeni Women Group	6	2
Total	**313**	**100**

Source: Author, 2016

In the category of formal financial intermediaries, Kenya commercial bank had given the largest loan amount to a single farmer (1,150,000 shillings) while Equity and KWFT had given the lowest loan amount to a single farmer (10,000 shillings). Equity bank had the highest number of borrowers among the selected respondents (about 52%). The same bank had the highest total amount given out as loans to the respondents (about 16.5 million shillings). The smallest lender was Bondeni Women group with a total of 48,000 shillings given to selected respondents. However the amounts advanced as agricultural loans by Bondeni women group, Kapenguria teachers SACCO and Tantana women group were insignificantly small conforming to the findings by Olaoye (2011) and Amao (2013) who observed that borrowing from small lenders is usually too small to be used for major on-farm investment. Figure 4.2 illustrates the total borrowing from financial intermediaries by the selected respondents:

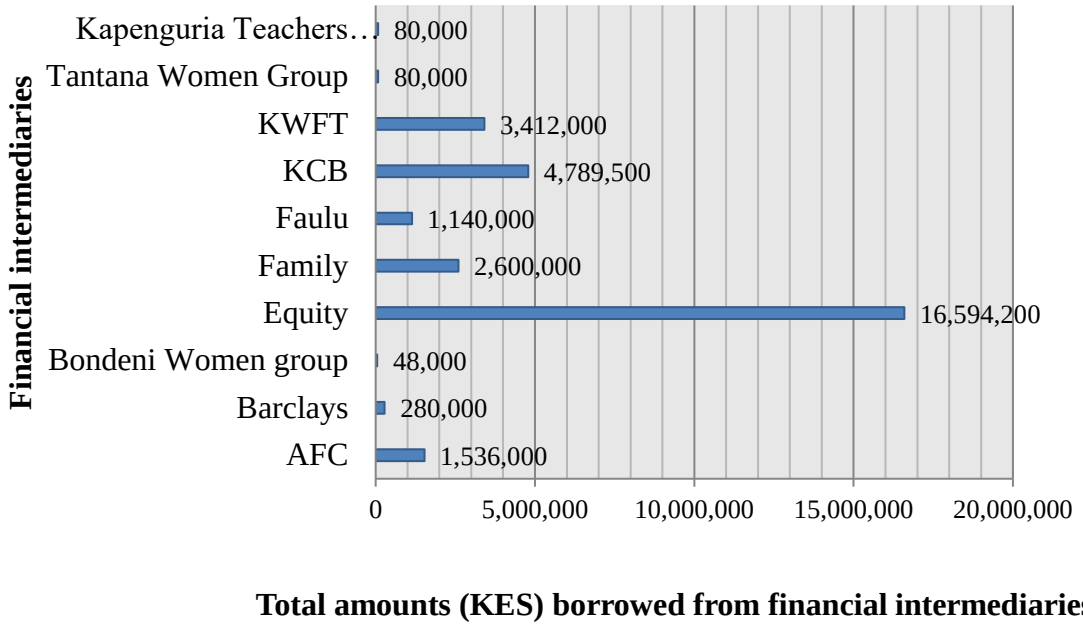

Figure 4.2: Total Borrowing from the Financial Intermediaries by the Selected Respondents

Source: Author, 2016

Equity bank's share of the total lending to the selected respondents was about 52% followed by KCB at 20%. These two banks had penetrated the grassroots through the agency banking model which enables them to reach more clients thus advance more loans to the farming community. Their vigorous marketing of the available agricultural credit facilities is seen as a contributing factor to their success in the credit market in Kapenguria. Figure 4.3 shows the percentage shares of total lending by financial intermediaries to the selected respondents.

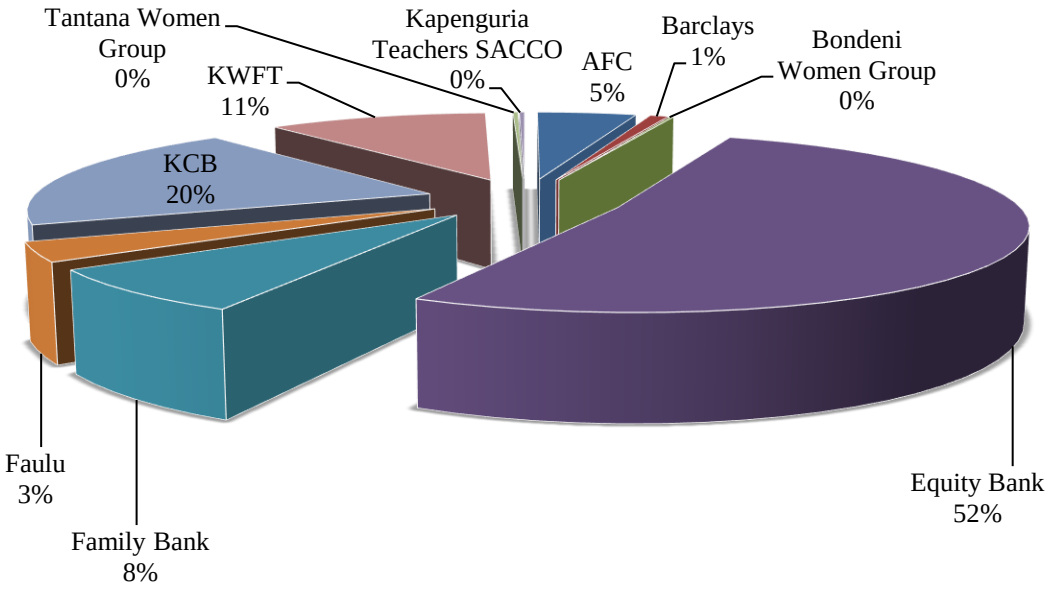

Figure 4.3: Percentage of Total Borrowing from Financial Intermediaries

Source: Author, 2016

Considering that majority of the credit users obtained credit from Equity bank followed by KWFT and KCB; and that these three intermediaries had higher total amounts disbursed, a policy to improve credit access should focus on these institutions; they have better grassroots coverage which enables the borrowers to access their services with ease.

The small lenders' share of the total lending to the selected respondents was too small. This indicates that although the small lenders are closer to the borrowers and with more flexible terms of lending, they are not being used by many borrowers in the study area; those who borrow from them only demand very small amounts of credit. A study to establish the limiting factors for access to agricultural credit from small lenders is proposed; through such a study, the contribution of informal lenders to the agricultural credit market could be established.

4.2.3 Number of Dairy Cows Owned by the Respondents

Dairy farming is the second largest farming activity in the study area after maize farming and credit obtained is not solely used in maize production but in dairy production as well. More so, decision to borrow could as well be influenced by the need to acquire the expensive inputs for dairy farming. The least number of cows owned by a single farmer was 1 while the highest number was 13. The mean number of cows was about 5. Half (50%) of the farmers had less than 4 cows while 75% had less than 6 cows. Only 5% had more than 10 dairy cows. This shows that dairy farming is done on small scale basis in the study area.

There was a notable difference in ownership of cows between male and female farmers where male farmers had a maximum of 13 cows, a minimum of 1 cow and a mean of about 5 cows. The female farmers on the other hand had a maximum of 11 cows, minimum of 1 cow and mean of about 4 cows (Figure 4.4). This makes sense in the study area considering that cattle keeping is male dominated due to the cultural orientation of the community where in most cases, cattle are actually a property of men. It also implies that male farmers are better placed when it comes to use of dairy cows as collateral for agricultural credit.

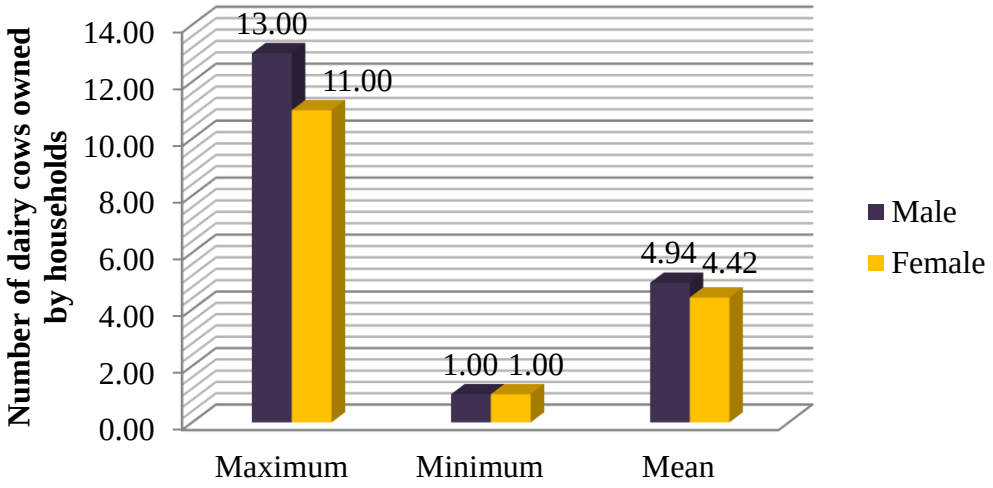

Figure 4.4: Minimum, Maximum and Mean Number of Dairy Cows owned by the Respondents

Source: Author, 2016

4.2.4 Non-farm Employment Income of the Selected Respondents

A significant number of farmers engage in non-farm employment. The farmers use non-farm income to finance farming operations. It was observed that slightly more than half of the farmers do other jobs besides farming; 52% of the farmers were receiving salary from their other employments. Those who reported being pure farmers were only 48%.

The salary ranged from 5000 to 110,000 Kenya shillings. Out of the total salaried farmers, half (50%) were earning less than 31,000 shillings per month while three quarters (75%) of them were earning less than 50,000 shillings per month. Only 5% of the farmers were earning more than 65,000 shillings. The mean salary per month was found to be 39,009 with standard deviation of 25,076.

Going by gender, a bigger proportion of male farmers were in non-farm employment than on-farm employment; 54% of the male farmers were found to be in salaried employment. For the female farmers, the proportion in non-farm employment was

smaller (48%). This makes sense in the study area where more women are found in the farms producing food for the families; as a result the proportion of women engaged in non-farm activities is smaller than those engaged in farming activities. The opposite is true for the men. Figure 4.5 shows the percentage of male and female respondents engaged in non-farm employment and on-farm employment:

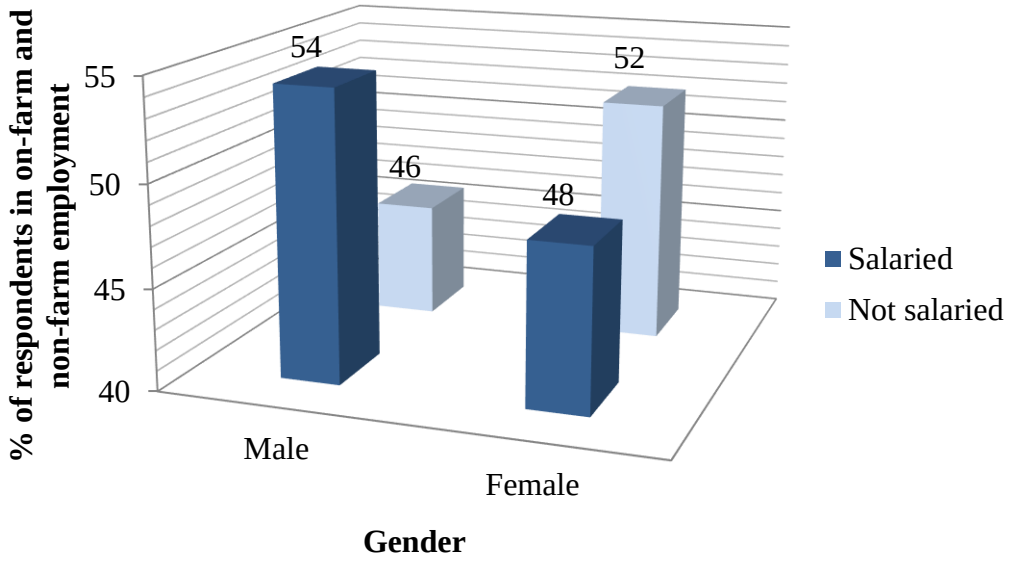

Figure 4.5: Comparison of Male and Female Farmers Receiving Salary from Non-farm Employment

Source: Author, 2016

4.2.5 Land Size under Production by the Respondents

Majority of the farms in the study area are medium scale (between 5 and 25 acres). Smallest land under production was 0.75 acres while the largest land under production was 29 acres. The mean land size under production was 6.52 acres with standard deviation of 5.95. Three quarters (75%) of the farmers had less than 10 acres of land while 25% had more than 10 acres. Only 5% of the respondents owned more than 20 acres of land. Comparing land under production by male and female respondents showed that female respondents had slightly bigger land portions under production than male respondents where the mean land area for female was about 7 acres while

for male was about 6 acres. The least land area for female was 1.10 acres while for male was 0.75 acres (Figure 4.6). This connects well with the finding in this study that women use more productivity enhancing inputs (fertilizers and certified maize seed) than men. However, patriarchal nature of Pokot community means that most women only conduct farming activities on these lands but major decisions about borrowing and development of the lands has to be backed by the men because they are the holders of land titles.

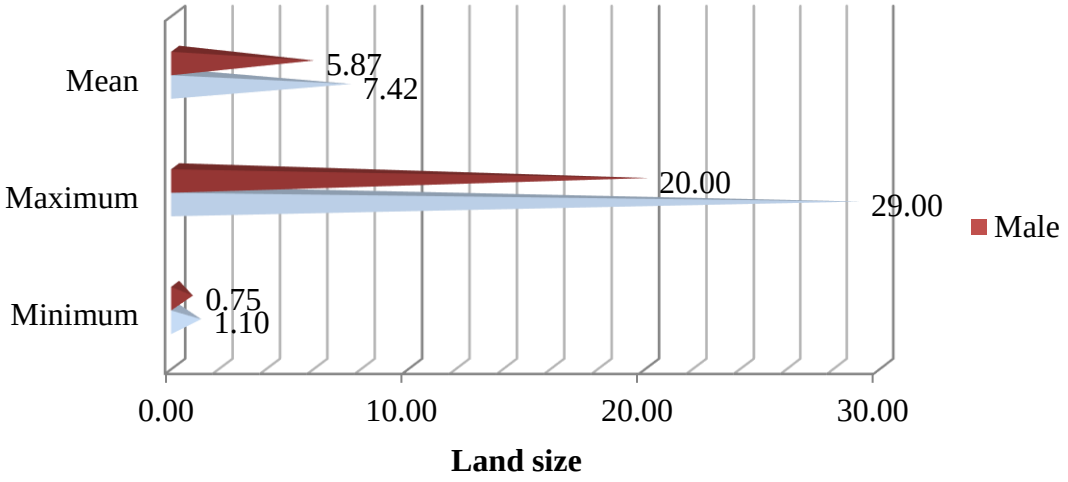

Figure 4.6: Minimum, Maximum and Mean Land Size under Farming by the Respondents

Source: Author, 2016

The financial intermediaries do not focus on the area under production while giving loans yet to expand production there is implicit need for credit; they simply ask for title deeds as collateral. This scenario has a policy implication where trying to increase borrowing basing on land under production will not improve the borrowing status especially for women who apparently work on larger pieces of land than men. More so, if financial intermediaries continue to ask for collateral in form of title deeds and disregard scale of operation, the men stand a better chance of obtaining

agricultural credit than women considering that in most cases men hold the land titles while women only manage the farm operations.

4.2.6 Age of the Farmers in the Study

The youngest farmer among the respondents had 22 years while the oldest farmer had 68 years. Half (50%) of the farmers had less than 37 years and 75% of the farmers were below 44 years. Only 10% of the farmers were aged above 50 years. The mean age of farmers was 38.35 with standard deviation of 11.11. However male and female farmers had different mean ages (about 36 years for male and 42 years for female). Within the first age bracket of 20 to 29 years, there were more male farmers than female, indicating that participation of female youths in farming was less than that of male youths. Within the age bracket of 30 to 39, the number of female farmers rose above that of men indicating that women are more active in farming after getting married. This is in line with the studies done by Olaoye (2011), Yusuf *et al.* (2014) and Bhatarai (2014). In the 40 to 49 years bracket, the male and female were at par in participating in farming activities while in the above 50 years bracket, the number of males was above that of females (Figure 4.7). It is worth noting that on average, Kapenguria has younger farmers compared to the national average age of farmers - 55 years (GoK, 2010). A policy that bases loaning on age of the farmers would affect mostly the 30 to 39 age bracket; it is the category where most borrowers fall; the same category has higher concentration of women and this agrees with the observation by GoK (2010) that women are more involved in food production to provide food and take care of the families than men.

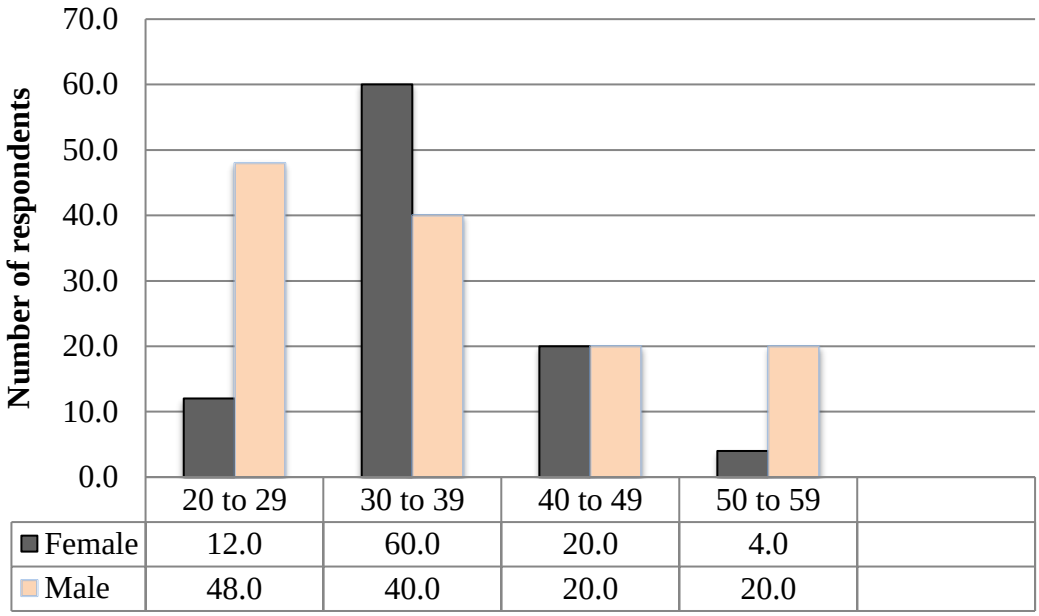

Figure 4.7: Distribution of Farmers by Age Group
Source: Author, 2016

Examination of the data suggests that as borrowers advance in age, they tend to borrow more; probably to finance expanded agricultural production to feed their growing household sizes. On the other hand, lending institutions view older borrowers as wiser in use of credit and less risky hence they advance larger loans to them. In practice, farmers of all age groups demand and access credit without being discriminated by the financial intermediaries on the basis of age but older farmers demanded higher amounts of credit than younger farmers. Policy focus should therefore be on the youthful farmers in order to improve their credit demand and subsequent access to agricultural credit.

4.2.7 Duration of Group Membership for the Selected Respondents

Farmers who participate in groups tend to get small scale credit from the groups' internal lending mechanisms thus their demand for loans from formal institutions declines (Amao, 2013). It was observed that 55% of the respondents were members of particular groups while 45% were not participating in any group. Those in groups

indicated that sometimes they operate the rotating savings and credit associations (ROSCA) as a way of assisting each other with credit; this is in line with the study done by Olaoye (2011) and Amao (2013).

Interestingly, more women were participating in groups than men where 80% of women were members of groups compared to only 37% of the males who belonged to groups. This pointed to the fact that about 63% of the men were not members of any group compared to only 20% of women who did not belong to any group (Figure 4.8). It is a pointer to the fact that demanding group membership in provision of agricultural credit is likely to give some advantage to the female farmers.

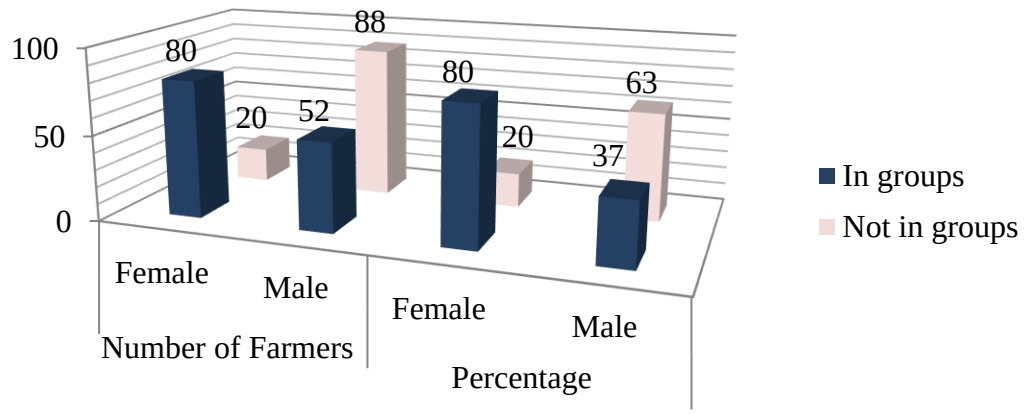

Figure 4.8: Comparison of Proportions of Male and Female Farmers' participating in Groups
Source: Author, 2016

Examining the duration for which members had participated in groups, the study found that 75% had been in groups for less than 24 months while only 10% had been in groups for 36 months and above. The mean duration of participation in groups was 13 months; this suggests that most of the groups were in nascent stages. The duration of participation in groups ranged between 1 month and 46 months (Figure 4.9). Female farmers had stayed in groups for longer periods than male farmers where the mean duration for females was about 17 months compared to about 11 months for

males. The maximum duration for females was 46 months compared to 38 months for males; this clearly reveals that females participated in groups for longer periods than males.

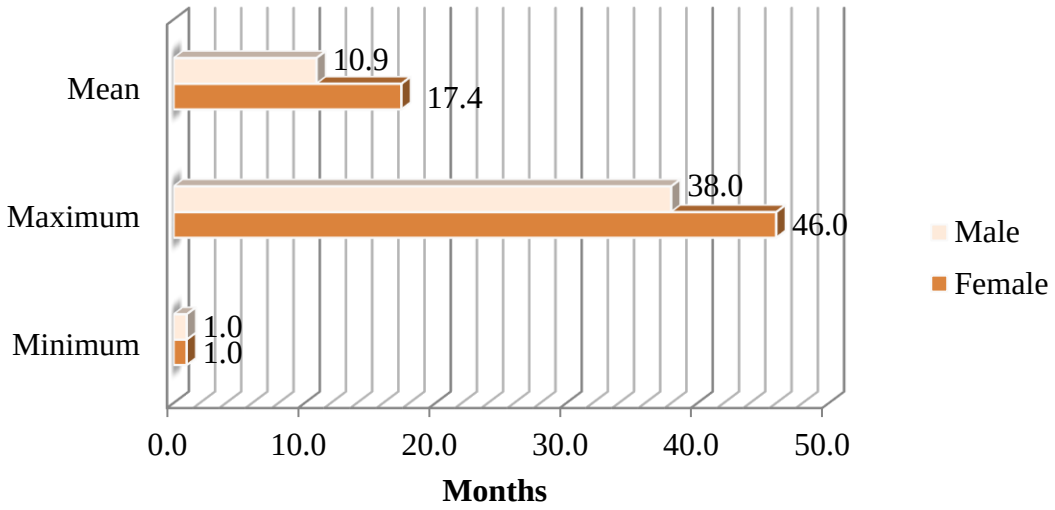

Figure 4.9: Minimum, Maximum and Mean Duration of Participation in Groups for Male and Female Farmers

Source: Author, 2016

Older women had stayed in groups for longer periods (about 18 months on average) compared to the younger women who had stayed in groups for about 17 months on average. Older men too had participated in groups for longer period (about 12 months on average) compared to younger men who had stayed in groups for about 10 months on average (Table 4.2).

Table 4.2: Male and Female Farmers' Months of Participation in Groups by Age

	Female		Male	
	35 years old and below	Above 35 years old	35 years old and below	Above 35 years old
Min	1.00	1.00	1.00	1.00
Max	44.00	46.00	38.00	38.00
Mean	16.70	17.87	9.81	11.58

Source: Author, 2016

It was observed that some financial intermediaries (KCB and Equity banks) had halted group lending schemes in light of poor loan repayment from the previously assisted groups – most of the intermediaries are no longer basing advancement of loans on group guarantee. This puts groups' access to credit at jeopardy.

4.2.8 Education Level of the Respondents

Well-educated farmers are better placed when it comes to use of information and planning for use of agricultural credit. They have lesser fear of the loans for the reason that they know how to put them into the best use. The more the farmers understand the loan products, the more they are likely to demand for the loans. This was supported by Kimeli (2013), Yusuf *et al.* (2014), Sebata *et al. (*2014) and Hananu *et al.* (2015). Education level was measured by proxy - number of years spent in school where 8 years meant complete primary, 12 years meant complete secondary and above 12 meant tertiary level of education. The years spent in school ranged from 1 to 19 years with half (50%) of the respondents having less than tertiary level education. A quarter (25%) of the farmers had achieved tertiary level of education. The mean level of education was about 12 years with standard deviation of 4 which meant that on average, farmers had achieved form four level of education.

There were notable differences between education level for male farmers and female farmers; males had spent more years in school indicating that they were more educated. The mean years spent in school for male was 13 years suggesting that on average, they had attained tertiary level of education while for female the mean duration of schooling was 11 years, suggesting that on average they had attained incomplete secondary education (Figure 4.10). Given the education status of the respondents, basing lending terms on education level for farmers may be disadvantageous to the females as they have lesser educational level compared to the males.

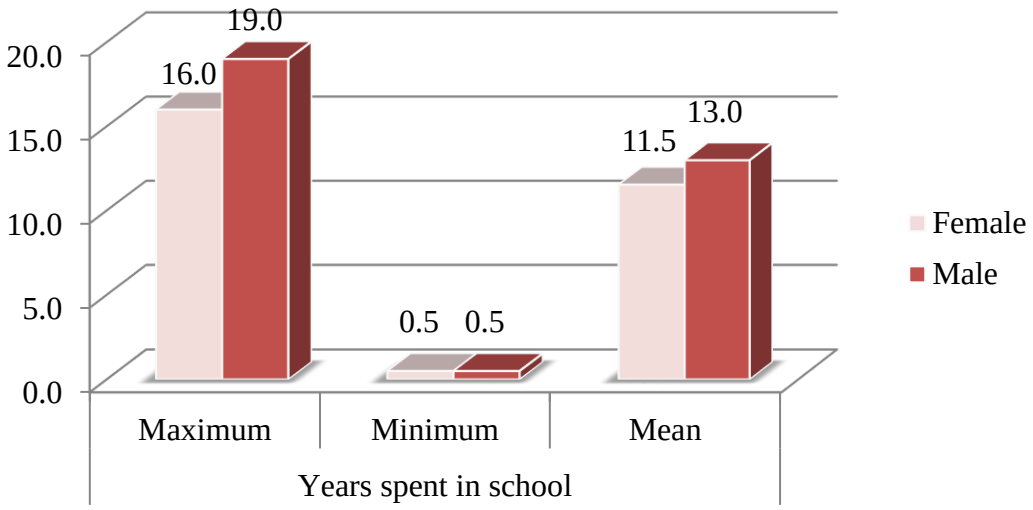

Figure 4.10: Years Spent in School for Male and Female Farmers
Source: Author, 2016

4.3 Loan Rationing by the Financial Intermediaries

Borrowers have to contend with a challenging borrowing environment mainly due to loan rationing and high interest rate set by the financial intermediaries as revealed by Wangai and Omboi (2011). Loan rationing was measured by the difference between the amount of loan applied for and the actual amount received. A small proportion (25%) of the farmers reported having received the full amount applied for, meaning

that their loans were not rationed while majority of the respondents (75%) reported loan rationing. The differences between loan applied for and loan received ranged from 5,000 to 150,000 shillings with the median being 27,500 shillings and the mean was 18,717 shillings. Family bank had the highest mean loan rationing (50,000 shillings) followed closely by KCB (49,000 shillings). Kapenguria teachers SACCO, AFC, Barclays bank and Bondeni Women Group did not ration their loans (Figure 4.11).

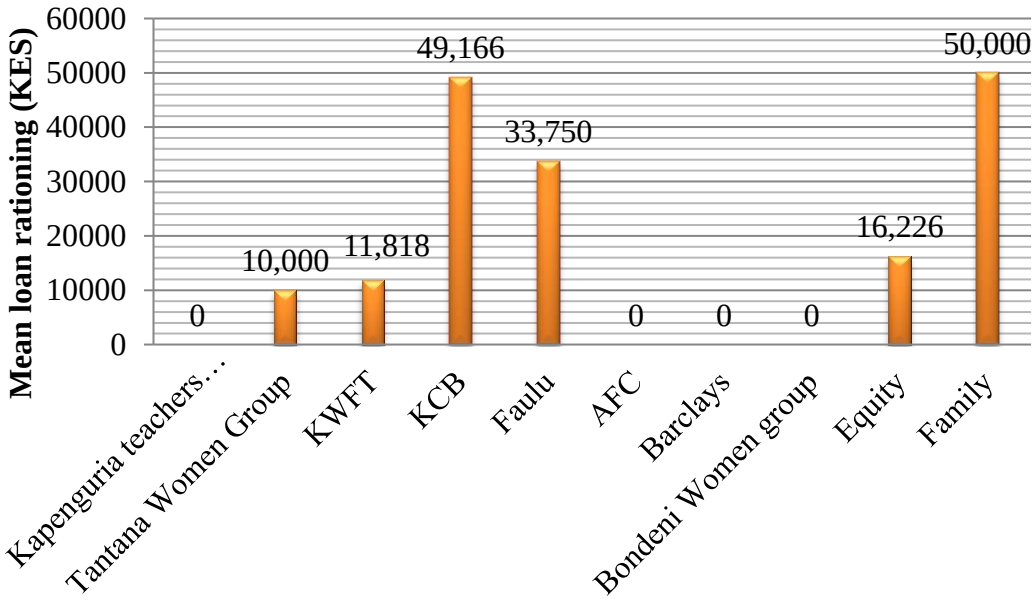

Figure 4.11: Mean Amount of Loan Rationing by the Financial Intermediaries
Source: Author, 2016

4.4 Farm and Farmer Characteristics Influencing Demand for Agricultural Credit

The selected factors influencing demand for agricultural credit were categorized into three; farm and farmer characteristics, Policy oriented factors and costs of production inputs. This section presents descriptive analysis of the selected factors influencing demand for agricultural credit in Kapenguria Division.

In order to partly achieve the first objective of this study; the selected farm and farmer characteristics (access to extension, proximity to credit facility; size of household, gross annual farm income and experience in farming) were analyzed descriptively and presented in this section.

4.4.1 Respondents' Access to Extension Services

Farmers who access extension services are likely to gain knowledge on how to choose and utilize credit in their farm operations. The study recorded the number of meetings with the agents of extension services; it was observed that on average, the farmers met the extension agents in 3 instances per year. The number of meetings per year ranged from 1 to 12 with 75% of the farmers reporting that they accessed the extension agents in 4 instances or less. Only 10% met extension service providers in more than 6 instances. Majority of the respondents (75%) indicated that the extension packages did not include information on use of credit in financing agriculture. This brings out the gap that exists in training of farmers on financial resource mobilization to finance farm operations.

Figure 4.12 below shows the trend between mean amounts of credit and number of meetings with the extension agents:

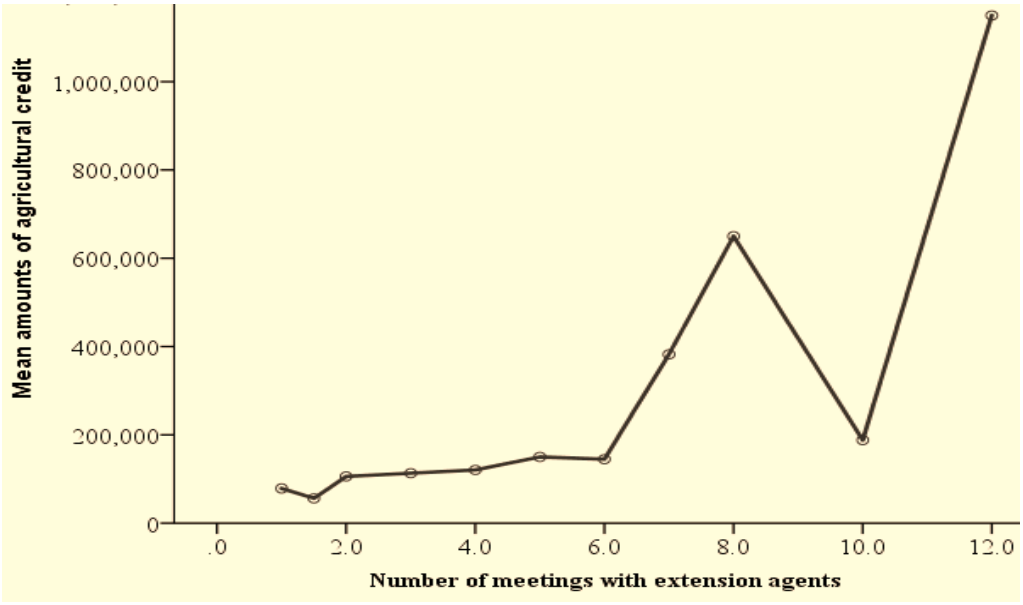

Figure 4.12: The Trend between Mean Amounts of Credit and Number of Meetings with Extension Agents

Source: Author, 2016

From Figure 4.12 above, the mean amount of agricultural credit appears to be generally increasing with the number of meetings with the agents of extension service. More so, the mean amount of agricultural credit increases sharply when farmers meet extension agents in 6 or more instances. This indicates that the more the farmers access extension service, the more they are likely to borrow from financial intermediaries. Increasing the number of instances when the farmers meet with extension agents is likely to increase the uptake of agricultural credit in Kapengruia Division.

4.4.2 Respondents' Proximity to Credit Facility

Farmers who are closer to the source of credit are likely to be aware of the credit services offered and may demand for credit from that source. The study recorded the distance from the farm to the credit facility in kilometers. It was observed that the shortest distance was 0.5 kilometers while the longest distance was 30 kilometers. The mean distance to source of credit was 7.9 kilometers and the standard deviation was

7.5. Amount of credit borrowed did not correlate with proximity to the credit source as the farmers within the range of 6 to 10 kilometers borrowed more (average of 162,933 shillings) than the farmers within the range of less than 1 kilometer (average of 76,666 shillings). More so, farmers within the range of 16 to 20 kilometers borrowed far much more than those within the range of 11 to 15 kilometers. It was observed that the mean borrowing for the farmers who were more than 20 kilometers away (average of 82,500 shillings) was greater than the mean borrowing for those who were within the range of less than 1 kilometer.

Figure 4.13 is a demonstration of the respondents' distance to the nearest source of credit and corresponding mean amounts borrowed:

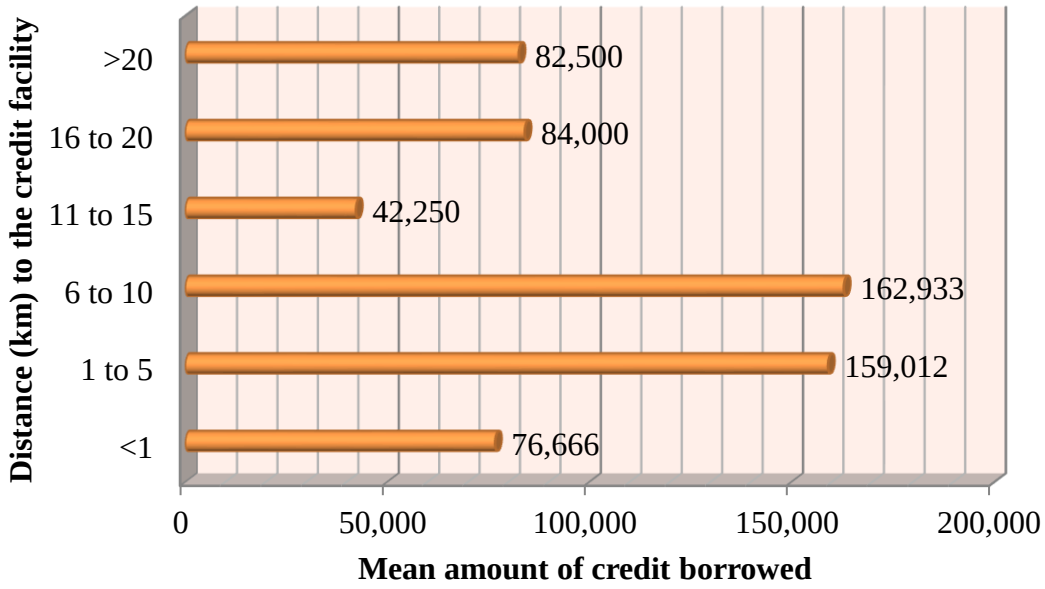

Figure 4.13: Amounts of Credit Borrowed in Relation to Distance to the Credit Facility
Source: Author, 2016

From Figure 4.13, the farmers who are within 1 km borrowed less on average, those within 1 to 5 kilometers borrowed higher amounts, the mean amount borrowed was much higher for those in 6 to 10 kilometers but it plummeted for those within 11 to 15

kilometers. This phenomenon is attributed to the settlement pattern in Kapenguria Division. Those farmers who are closer to urban centers where financial intermediaries are located have very small land parcels and they are not full time farmers; their demand for credit is therefore low. As one moves outside the urban areas, land sizes increase and so does the commercial agricultural production thus necessitating higher levels of borrowing. Further on, the amounts borrowed reduce due to other factors like limited awareness of financial products as well as the increased costs of accessing the credit sources.

4.4.3 Size of Households of the Respondents

The number of people in the farm household who were living and depending on the farm was recorded as a measure of size of the farming household. The smallest household had 2 members while the largest household had 17 members. Half (50%) of the households had 6 members or less. The mean number of household members was about 7 with standard deviation of 5. Majority of the household sizes ranged from 4 to 10 members; only in rare cases did the household size go beyond 10 people. Those households with more than 10 people were living with other relatives (extended family). Figure 4.14 indicates the trend of mean amounts of agricultural credit with respect to the household sizes:

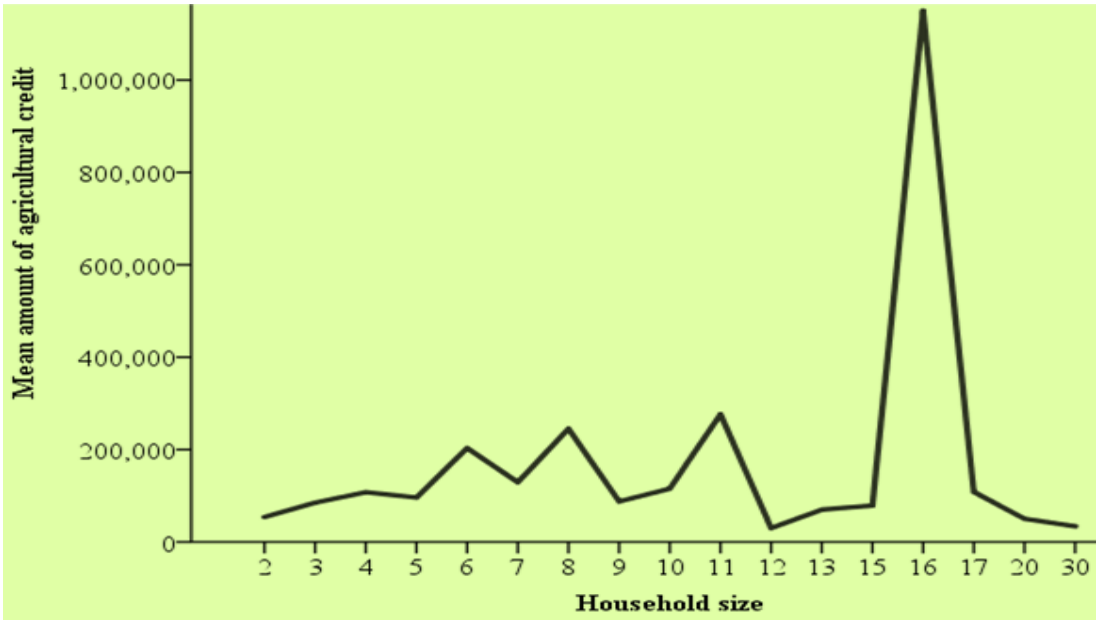

Figure 4.14: Mean Amount of Agricultural Credit in Relation to Size of Household

Source: Author, 2016

From figure 4.14, there is no clear trend of the mean amount of agricultural credit in relation to the size of household. However, the highest mean for the amount of agricultural credit escalates abnormally at household size 16 and plummets as the household size increases. This suggests that descriptively, there is no defined relationship between the two variables.

4.4.4 Gross Annual Farm Income of the Respondents

The minimum gross annual farm income was 36,000 while the maximum was 2,808,500 shillings. The highest income was earned by medium and large-scale farmers engaged in maize and dairy production; the enterprises earned them substantial income due to the economies of scale. The mean gross annual farm income was 369,266.20 shillings. At the 2nd quartile, the farm income was 221,750 shillings while at the 3rd quartile the farm income was 385,950 shillings. This means that three quarters (75%) of the farmers get less than 385,950 shillings per year which translates

to about 32,162 shillings per month. Comparing farm income for male and female farmers revealed that female farmers were getting less income from the farms than men. The mean annual gross farm income for female farmers was 345,022 shillings while that for male farmers was 386,583 shillings; a difference of about 41,500 shillings. This indicates that basing lending terms on the gross farm income would give male farmers an edge over female farmers.

Figure 4.15 indicates the trend of mean amount of agricultural credit in relation to farm income. The mean amount of agricultural credit appears to be increasing with gross annual farm income but plummets when the farm income goes beyond 1 million shillings. This is attributed to the fact that farmers with very high farm income can use internal funds in production thus reducing the need for borrowed funds. Amount of credit borrowed therefore increases with farm income for the small scale but the opposite is true for the large scale farmers.

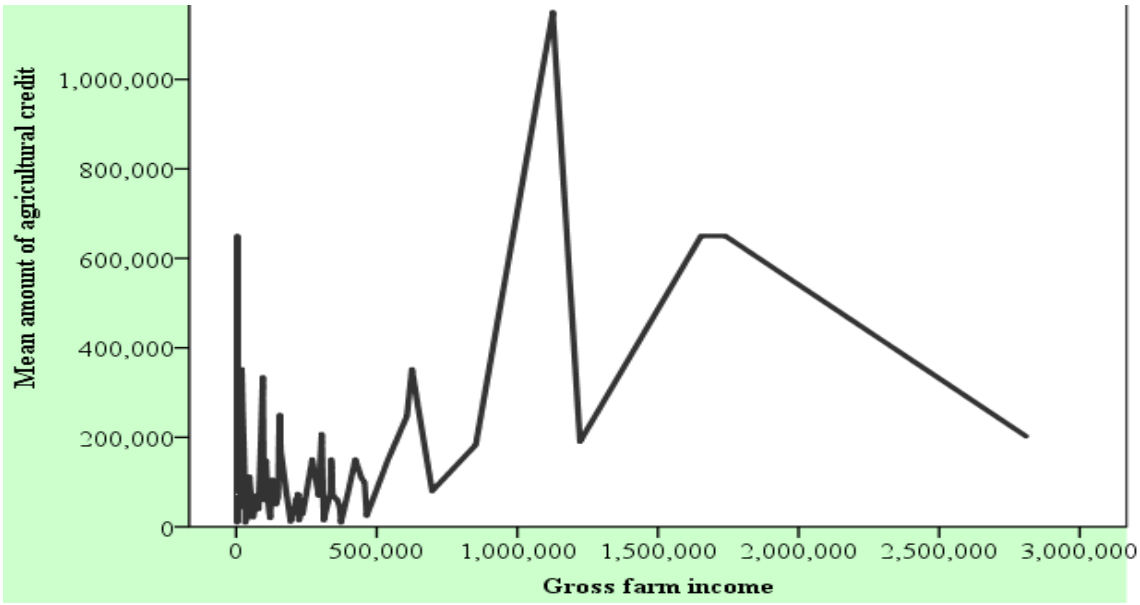

Figure 4.15: Mean Amount of Agricultural Credit in Relation to Farm Income
Source: Author, 2016

4.4.5 Experience of the Selected Respondents in Farming

Experience in farming was measured by the number of years that a farmer had been practicing farming. This ranged from 2 to 23 years with the median being 5 years. Majority (75%) of the farmers had practiced farming for less than 6½ years. Only 10% had practiced farming for more than 10 years. The mean number of years in farming was 5.9 with standard deviation of 4.1. There was very minimal difference between farming experience for male and female farmers as both of them had a mean of about 6 years. Both male and female had practiced farming for a minimum of 2 years while men had a maximum of 23 years as opposed to women who had a maximum of 20 years. Figure 4.16 shows the trend of mean amount of agricultural credit in relation to the experience of the respondents in farming:

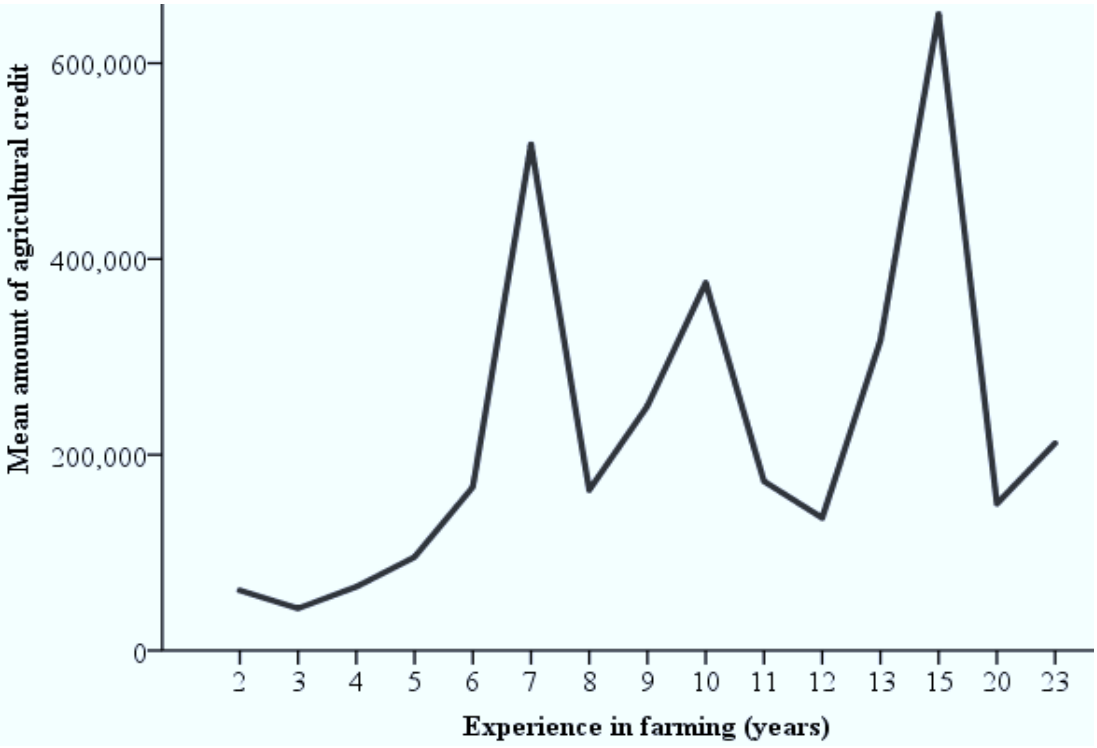

Figure 4.16: The Trend of Mean Amount of Agricultural Credit in Relation to Experience in Farming

Source: Author, 2016

From the Figure 4.16, there is no clear trend between mean amounts of agricultural credit and experience in farming. This suggests no clear relationship between the two variables. It makes sense in the study area given that the Division has relatively younger farmers; on average 38 years compared to the national average of 55 years. The younger farmers were able to borrow varied amounts of agricultural credit regardless of their years of experience in farming leading to the undefined trend between the two variables.

4.6 Policy Oriented Factors Influencing demand for Agricultural Credit

In order to partially achieve the second objective of the study, the policy oriented factors (Value of collateral demanded by the financial intermediaries and interest rate) were analyzed descriptively and presented under this section.

4.6.1 Value of Collateral Provided by the Borrowers

Value of collateral referred to the monetary value of assets offered as security for the loans as provided by the borrowers. The collaterals included: Title deeds, logbooks, pay slips, livestock and statements of bank accounts. The value of collateral ranged from 25,000 shillings to 1.2 million with the median of 200,000 shillings. The mean value of collateral was 221,350 shillings with 75% of the borrowers having presented collaterals of less than 300,000 shillings.

Although the minimum value of collateral for both male and female farmers was 25,000 shillings, males had a maximum of 1.2 million shillings offered as collateral while females had a maximum of 0.36 million shillings (Figure 4.17). It emerged that men had offered higher value of collaterals (mean = 266,157 shillings) compared to women who had a mean of 166,167 shillings – the difference between the two means is about 100,000 shillings.

Comparing the mean amount of credit borrowed (133,650) and the mean value of collateral offered to the financial intermediaries (221,350) revealed that the borrowers offered collateral valued at almost twice the amount of credit demanded. This serves as a limiting factor for those borrowers who are not able to reach the high threshold of collateral requirement consequently affecting their demand and subsequent access to agricultural credit.

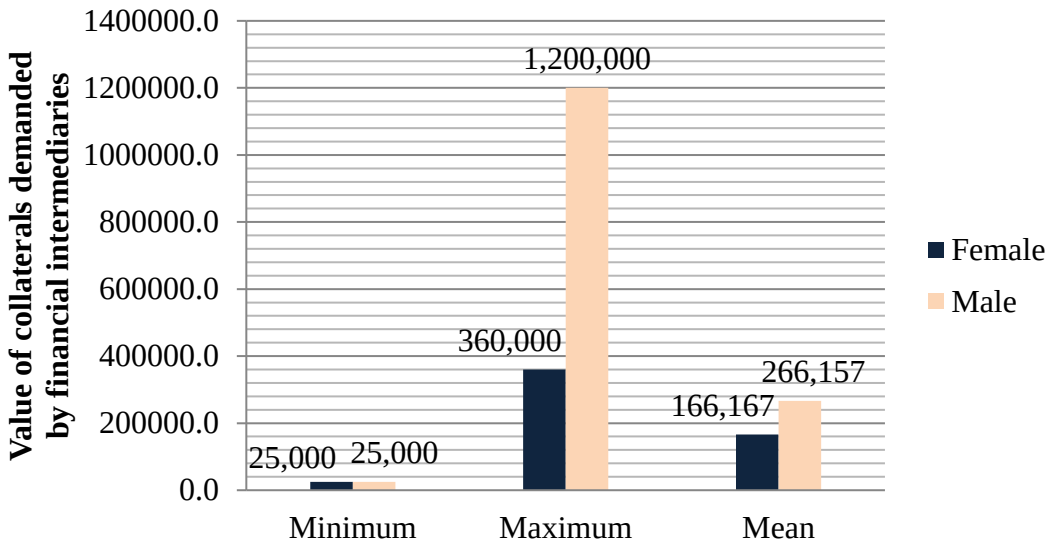

Figure 4.17: Minimum, Maximum and Mean Value of Collaterals Provided by Male and Female Farmers

Source: Author, 2016

Figure 4.18, indicates the trend of mean amounts of agricultural credit in relation to the value of collateral offered by the borrowers. The mean amounts of agricultural credit appear to be generally increasing with the value of collateral provided by the borrowers up to the point where value of collateral is 0.7 million. It points to the fact that those who are able to provide high value collateral can borrow larger sums of money while the resource poor can only get small amounts of money. Beyond the 0.7 mark, the mean amounts borrowed begins to drop indicating that the well-off farmers who can raise high value collateral demand less agricultural credit because they are

able to conduct farm operations using funds from other sources. Collateral requirement is therefore a serious limiting factor for the small scale farmers; this explains why most of the small scale farmers have not accessed loans from financial intermediaries despite numerous efforts by the government and financial intermediaries to promote agricultural credit.

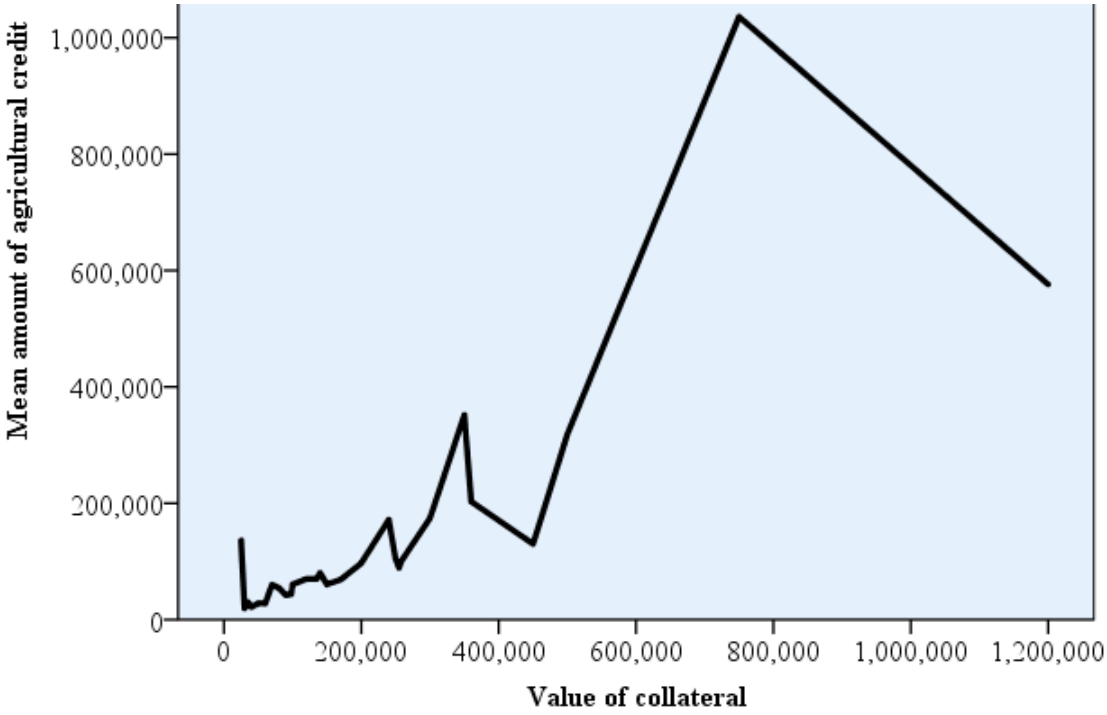

Figure 4.18: The Trend of Mean Amount of Agricultural Credit in Relation to Value of Collateral

Source: Author, 2016

4.6.2 Interest Rates of the Financial Intermediaries

The cheapest loan had been obtained at 8% interest rate per annum while the most expensive loan had been obtained at 24% interest rate. The modal interest rate was 16%; the median was 15% while the mean was 14.28%. Only a quarter (25%) of the respondents had accessed loans at interest rates that were less than 10% while the remaining 75% had loans at interest rates higher than 10% per annum. Family bank had most expensive loans (mean 18%) followed by KCB, Faulu and Barclays (mean 16%). Cheapest loans were obtained from Kapenguria teachers SACCO (mean 10%)

followed by Tantana women group at a mean of 11% per annum (Figure 4.19). The high interest rates in the agricultural credit market vindicate the Kenya government's initiative to cap the interest rates through section 33B1 (a) of the recently enacted banking (amendment) act 2016.

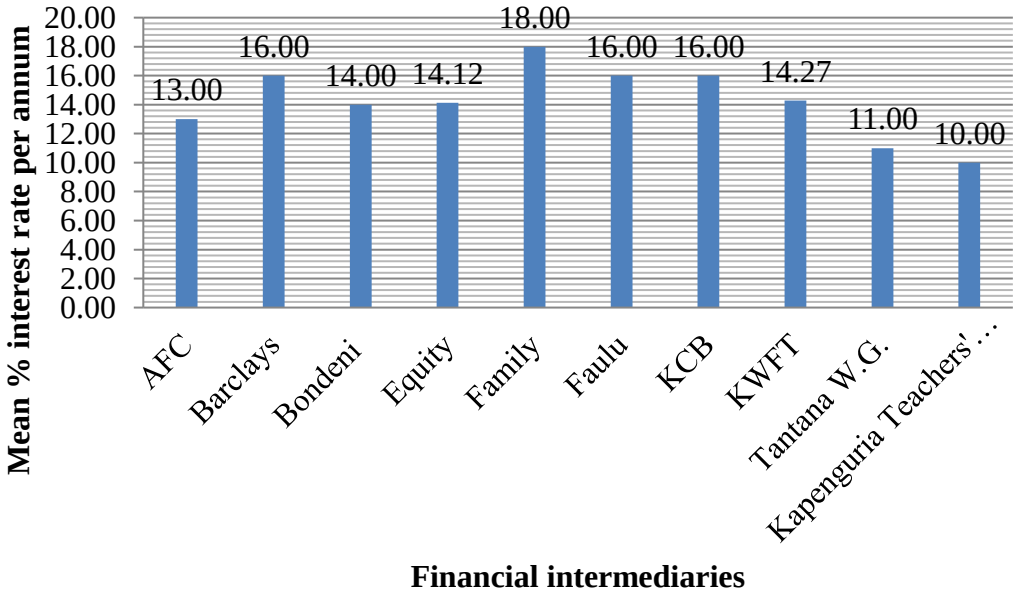

Figure 4.19: Mean % Interest Rates by Various Financial Intermediaries
Source: Author, 2016

Figure 4.20 shows the trend of mean amount of agricultural credit in relation to the interest rate. The graph shows that there is no clear trend of the mean amounts borrowed in relation to the interest rate. However the highest mean amount was achieved at 18% interest rate and plummets when interest rate goes beyond 18%. This rate is higher than the recommended interest rate (14%) as set by the recently enacted banking (amendment) act 2016. Probably, setting the rate lower than 18% could result in higher borrowing but will affect the financial intermediaries' profitability. The stakeholders need to set an optimal interest rate to encourage borrowing while maintaining profitability of the financial intermediaries.

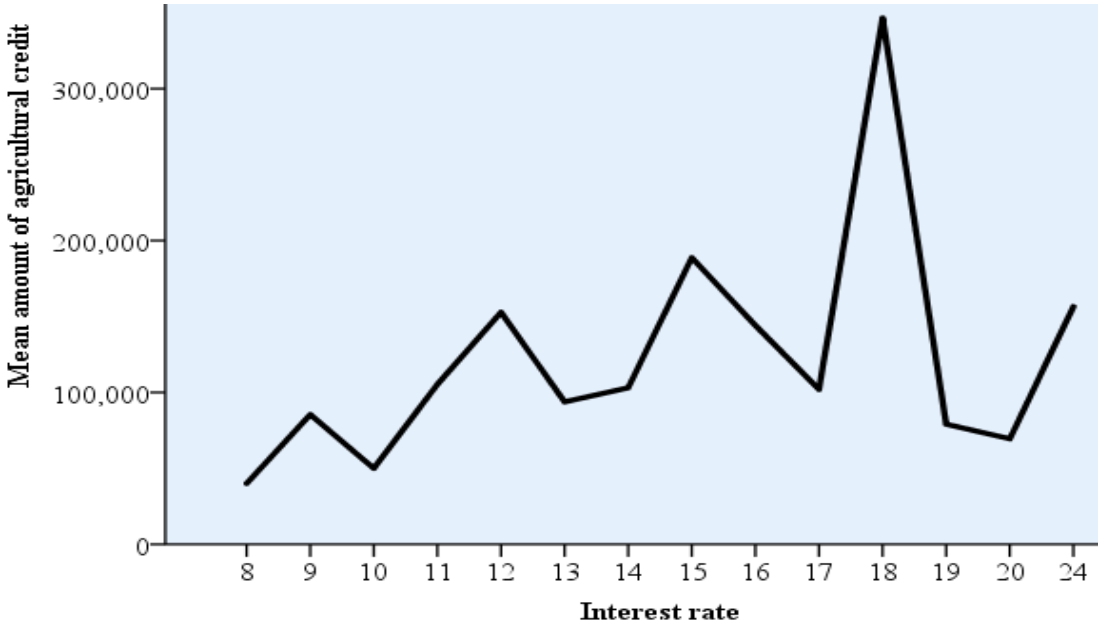

Figure 4.20: The Trend of Mean Amount of Agricultural Credit in Relation to Interest Rate

Source: Author, 2017

4.6.3 Production Inputs Influencing Demand for Agricultural Credit

In order to partly achieve the third objective of the study, the selected maize production inputs (Cost of labor, cost of fertilizer and cost of seed maize) were analyzed descriptively and presented in this section.

4.6.4 Costs of Labor Incurred by the Selected Respondents

Labor is the most costly input during the agricultural production process on a small scale farm taking up about 58% of the total on-farm production costs – this is consistent with the study done by Nyangweso (2010). Labor is required to carry out all the farm activities like land preparation, planting, weeding, harvesting and transportation as well as post-harvest handling of the produce. In the small scale farming set up, the level of mechanization is very low hence hand labor is highly demanded and it is generally expensive. It was measured by the amount of cash spent on labor in the farms and it was considered because it takes the largest share of total production costs at the farm. This ranged from a minimum of 2,800 shillings to a

maximum of 323,000 shillings. The median was 30,250 shillings while the mean value of labor used in the farms was about 59,954 shillings. It was found that 75% of farms spent more than 10,000 shillings on labor alone meaning that only 25% spent less than 10,000 shillings. Furthermore, 50% of the farms spent more than 30,000 shillings on labor alone. It emerged that on average, males spent more on the on-farm labor (mean = 64,165) compared to females who spent an average of about 53,048 shillings on farm labor – a difference of about 11,000 shillings between male and female (figure 4.21 below). The maximum value of labor used by male (323,000 shillings) was far much higher than that used by female (195,000 shillings). Women ostensibly spend less on labor because they use more family labor (which is seldom valued in subsistence farming); majority of them do not have other non-farm employments or jobs other than managing the farm operations. Men on the other hand are involved in more non-farm activities; they have to employ external labor leading to the high cost of labor used by men.

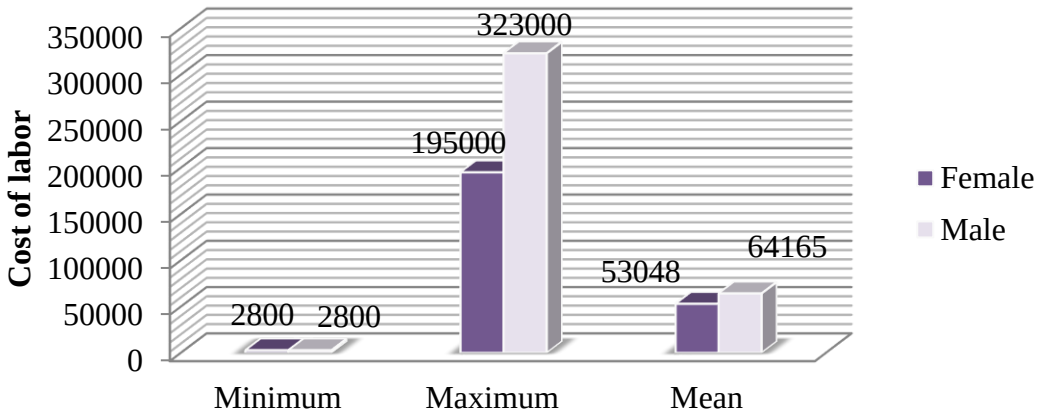

Figure 4.21: Minimum, Maximum and Mean Cost of Labor by Male and Female Farmers

Source: Author, 2016

Examining on-farm labor use by different age groups revealed that the farmers of age 40 to 49 years had higher on farm labor costs (mean = 125,287 shillings) followed by those of age 60 to 69 years (mean = 94,475 shillings). This connects well to the finding that those in 40 to 49 years were having the larger farms which required more labor and more seeds and fertilizer. Those farmers in age 60 to 69 years required external labor back-up because of their advanced age. The age group of 30 to 39 years used the least of hired labor mainly attributed to their being young and able to work on their own farms thus avoiding expenditure on labor (Table 4.3).

Table 4.3: Minimum, Maximum and Mean Cost of Labor

	Cost of labor		
Age group	Minimum	Maximum	Mean
20 to 29 years	2,800.0	104,000.0	39,676.7
30 to 39 years	2,800.0	159,500.0	37,510.0
40 to 49 years	7,000.0	323,000.0	125,287.4
50 to 59 years	6,950.0	200,000.0	72,258.3
60 to 69 years	11,000.0	183,000.0	94,475.0

Source: Author, 2016

Figure 4.22 shows the trend of mean amount of agricultural credit in relation to the cost of labor where the mean amounts of credit appear to increase with increase in cost of labor. Farmers with high labor costs borrowed more than those with lower labor costs. This suggests that farmers with higher labor costs need more credit to finance the farm operations that require more labor force thus increasing the need for agricultural credit. Labor costs therefore seem to have a strong influence on the amount of credit borrowed.

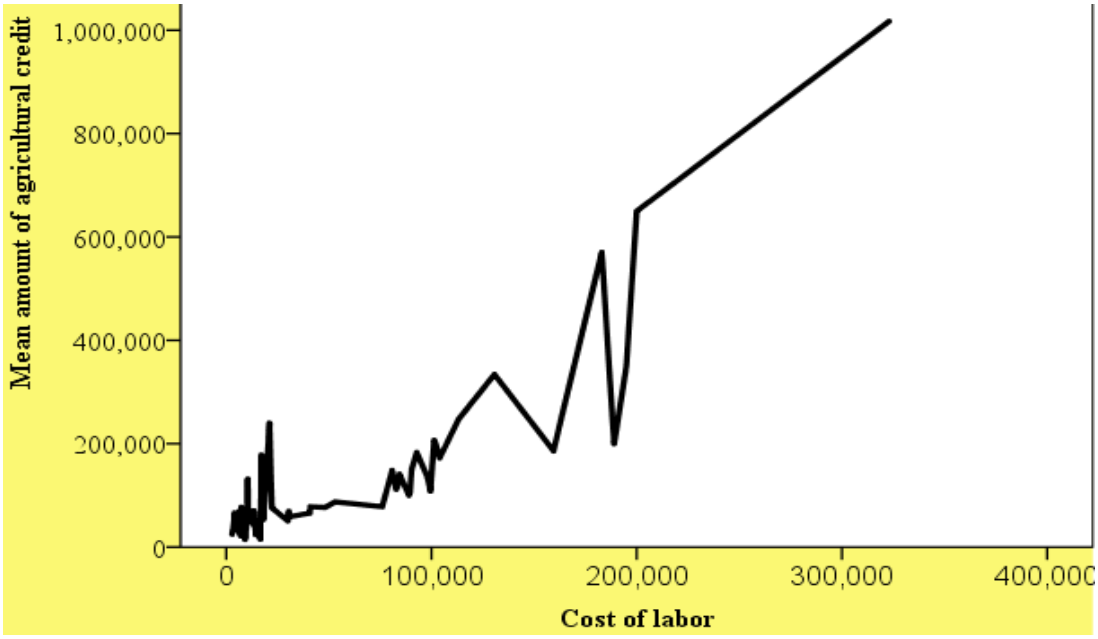

Figure 4.22: The Trend of Mean Amount of Agricultural Credit in Relation to Cost of Labor

Source: Author, 2016

4.6.5 Cost of Seed Maize Incurred by the Selected Respondents

The lowest cost for seed maize was 260 shillings while the highest value was 45,000 shillings. The median was 4,500 shillings while the mean was 8,697 shillings. It was observed that over 50% of the farmers used more than 4,500 shillings on seeds while only 25% used less than 4,500 shillings.

Comparing use of seed maize among different age brackets revealed that the middle aged farmers (age bracket 40-49) used more certified seed maize than the other age brackets (Figure 4.23). The reason for youths using less of these inputs compared to the older farmers can be explained that the older farmers have acquired more land hence have higher demand for the inputs and probably have more income sources which gives them the wherewithal to buy and use more of these productivity enhancing inputs.

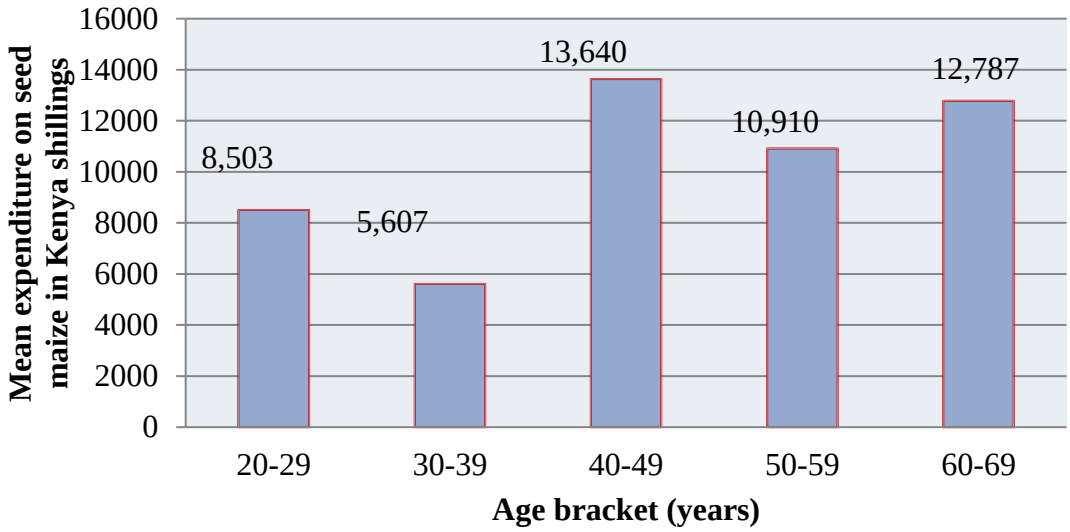

Figure 4.23: Mean Expenditure on Seed Maize in Relation to Age of the Respondents

Source: Author, 2016

Comparing use of seed maize between male and female farmers yielded interesting results where the female farmers generally used slightly more certified seeds (mean of 9,835) than male farmers who had mean of 7884 shillings for seed maize. This makes sense in the study area considering that women spend most of their time on the farms working to produce food for the families and connects well with the finding that women work on larger land areas than the men. It means that any effort to improve access to productivity enhancing inputs by the women was going to effectively improve food security in Kapenguria.

Figure 4.24 shows the trend of amount of agricultural credit in relation to the cost of seed maize where the mean amount of agricultural credit appears to increase with the cost of seed until the cost of seed maize goes beyond 20,000 shillings. Beyond the 20,000 shillings mark, the mean amount of agricultural credit appears to drop. This can be explained that farmers who buy seed maize of 20,000 and above are large scale farmers who are able to use their internal funds thus reducing the need for agricultural

credit. The small scale farmers on the other hand need credit to buy seed maize thus for them, the mean amount of credit increases with cost of seed maize.

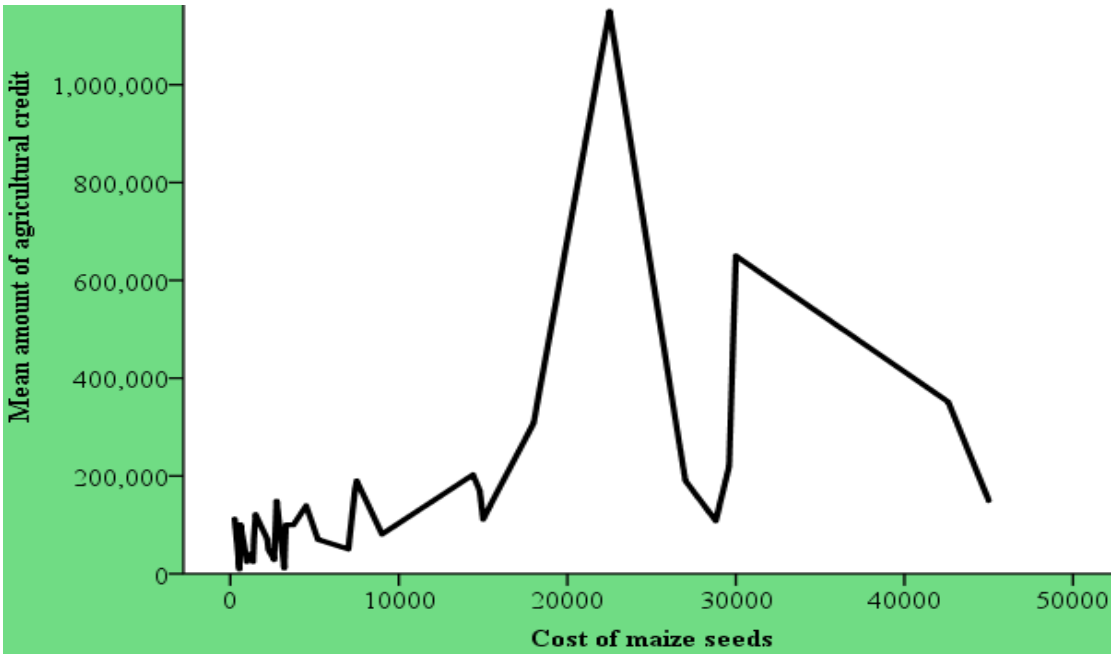

Figure 4.24: The Trend of Amount of Agricultural Credit in Relation to Cost of Seed Maize

Source: Author, 2016

4.6.6 Costs of Fertilizer Incurred by the Selected Respondents

The lowest cost of fertilizer used was 500 shillings while the highest cost used was 187,500 shillings. It was found that 75% of the respondents spend more than 5,000 shillings on fertilizer. The median was 20,700 while the mean cost of fertilizer used on the farms was 33,556 shillings per year.

Comparing use of fertilizer among different age brackets revealed that the middle aged farmers (age bracket 40-49) used more fertilizer than the other age brackets basing on the highest value for mean expenditure on fertilizer (Figure 4.25). Generally the older farmers were using more fertilizer than the youthful farmers as they had averages higher than 45,000 shillings. The youthful farmers' use of fertilizer was

lower as depicted by the mean cost of expenditure on fertilizers (less than 27,000 shillings)

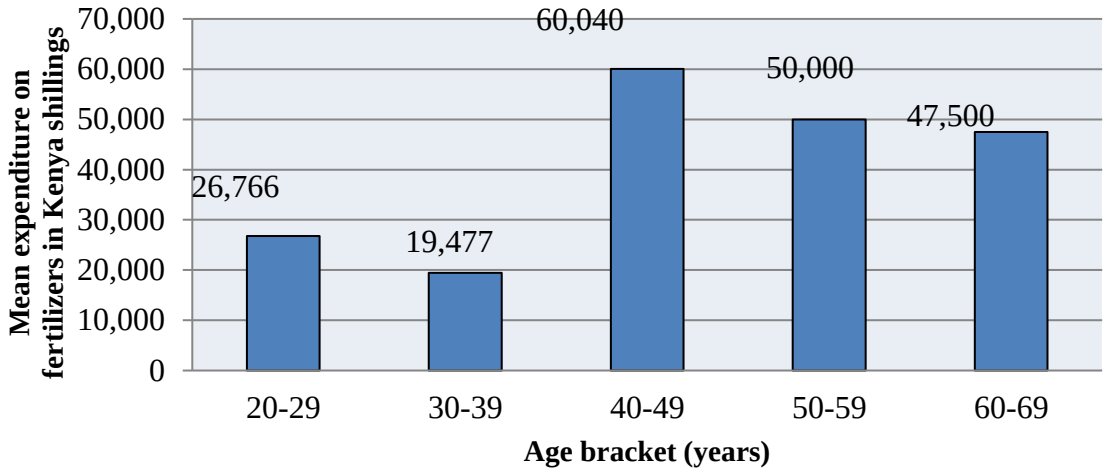

Figure 4.25: Mean Expenditure on Fertilizer in Relation to Age of the Respondents

Source: Author, 2016

Comparing fertilizer use between male and female farmers yielded intriguing results where the female farmers generally used slightly more fertilizer (mean of 36,620) than male farmers who had mean of 31,368 shillings. This makes sense in the study area considering that women spend most of their time on the farms working to produce food for the families and connects well with the finding that women work on larger land areas than the men.

Error! Reference source not found.4.26 indicates the trend of amount of agricultural credit in relation to the cost of fertilizer where the mean amount of agricultural credit appears to be increasing with the cost of fertilizers until the cost of fertilizers hits the 120,000 shillings mark. Beyond this point, the mean amount of credit drops continuously suggesting that borrowing starts reducing at that point. The farmers with ability to buy fertilizer valued beyond 120,000 shillings are wealthy medium and large scale farmers who have other sources of income and have savings

from the previous years' farm income which is used to buy fertilizer for the current production season. This therefore reduces their need for agricultural credit. The small scale farmers however need credit to buy fertilizer thus the mean amount of credit increases with the cost of fertilizer for farmers operating below the 120,000 shillings mark.

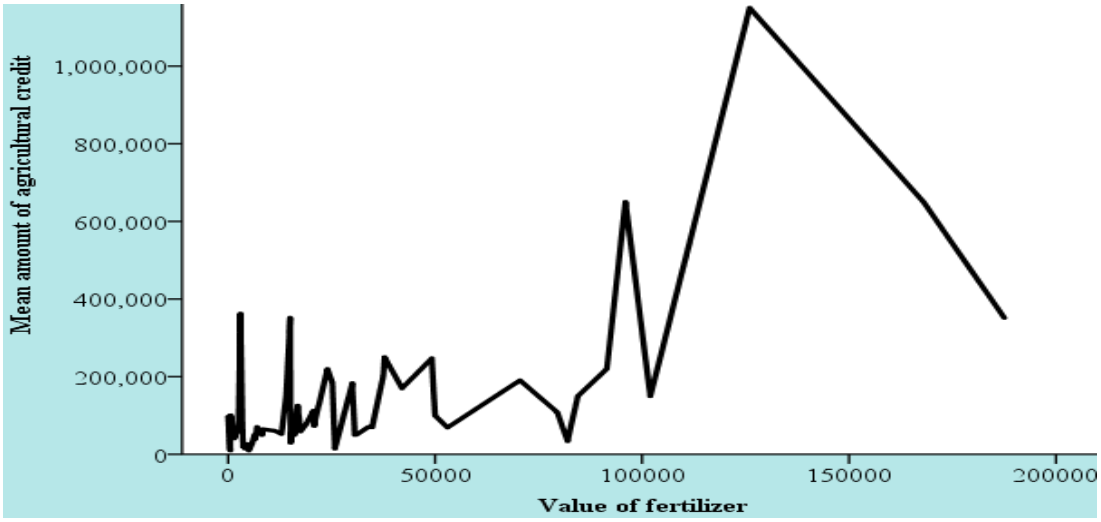

Figure 4.26: The Trend of Mean Amount of Agricultural Credit in Relation to Cost of Fertilizer

Source: Author, 2016

4.7 Tests for Multicollinearity in the Fitted Model

To detect multicollinearity in the model, pairwise correlation analysis was done; furthermore, the variance inflation factors were computed. The results of the two analyses are presented hereunder:

4.7.1 Correlation Analysis for the Variables in the Study

Pairwise correlation analysis (appendix 3) revealed that the variables had very low correlation coefficients indicating low linear relationships between the explanatory variables. All the correlation coefficients of the correlation analysis were below 0.6. This is a pointer to statistically insignificant multicollinearity problem in the model.

4.7.2 Variance Inflation Factors for the Variables in the Study

Variance inflation factors (VIF) >10 indicate statistically significant levels of multicollinearity in the fitted model (Jeeshim, 2002). In order to compute the VIFs, each of the independent variables was regressed against the rest of the independent variables. The resultant R^2 values were used to compute the tolerance values for each variable ($1-R^2$). The VIF for each variable was then computed as the reciprocal of the tolerance values ($1/1-R^2$). Table 4.4 indicates the variance inflation factors for the independent variables in the study:

Table 4.4: Variance Inflation Factors for Independent Variables in the Study

Variables	R^2	$1-R^2$	$1/1-R^2$
Interest rate	0.276	0.724	1.381215
Value of collateral	0.534	0.466	2.145923
Household size	0.365	0.635	1.574803
Gross annual farm income	0.557	0.443	2.257336
Proximity to credit source	0.302	0.698	1.432665
Experience in farming	0.458	0.542	1.845018
Access to extension service	0.407	0.593	1.686341
Cost of fertilizer	0.517	0.483	2.070393
Cost of seed maize	0.565	0.435	2.298851
Cost of labor	0.604	0.396	2.525253

Source: Author, 2016

From Table 4.4, all the VIFs are <10; in fact all of them are below 5 indicating that multicollinearity is statistically insignificant in the fitted model. Additionally, the R^2 values for each of the variables are less than the R^2 value for the fitted model. This confirms insignificant multicollinearity based on the Klein criterion.

4.8 Results of the Regression Analysis

Linear regression technique was used to fit the log-log model to the data using statistical package for social scientists (SPSS) software. Results of the regression analysis are presented hereunder:

4.8.1 The Fitted Model

Table 4.5 indicates the results of multiple linear regression analysis performed on selected 10 variables believed to influence farmers' demand for agricultural credit. From the table, all the coefficients have the expected signs.

Table 4.5: The Fitted Model for Agricultural Credit Demand

Explanatory Variables	Regression coefficients	Z	P>|Z|
Constant	4.962	6.653	.000
Household size	-.137*	-3.117	.002
Proximity to credit facility	.092*	2.042	.042
Experience in farming	.291*	5.874	.000
Access to extension service	.163*	3.583	.000
Gross annual farm income	-.019	-.307	.759
Interest rate	-.136*	-3.018	.003
Value of collateral	.257*	4.913	.000
Cost of fertilizer	.012	.212	.832
Cost of seed Maize	.142*	2.372	.018
Cost of labor	.252*	4.728	.000

*Significant at 5%

Source: Author, 2016

4.8.2 The Intercept of the Fitted Model

The intercept for the fitted model had a positive sign (4.962). However, the intercept of a log-log model is not real hence an antilog has to be computed to locate the real intercept (Pedace, 2013). The real intercept was found to be 142.88 meaning that holding all the variables constant, farmers would borrow about 143 shillings. The intercept is statistically significant at 1% (p value = 0.000) indicating that there is the

tendency of farmers borrowing irrespective of the prevailing socio-economic and policy conditions as well as cost of inputs. This conforms to *a priori* expectation considering that in practice every farmer borrows either in kind or on cash basis. It makes sense owing to the borrowing behavior of farmers where sometimes borrowed inputs like labor and fertilizer are used then payments made later or in kind or sometimes no repayment is done; this is the most common form of borrowing in small scale and subsistence production systems. It is seldom documented in farm records and does not appear in most research publications. It can therefore be stated with 99% level of confidence that the intercept of the agricultural credit demand function is not 0.

4.8.3 Coefficient of Determination (R^2) of the Fitted Model

The model attained the coefficient of determination (R^2) of 0.608, pointing to the fact that about 60.8% of the variations in the data were explained by the model, leaving about 39.2% unexplained. It is therefore suspected that the 39.2% are embodied in the stochastic error term (μ). The model therefore explains the bigger portion of the variations in the data thus leaving the smaller portion unexplained.

4.9 Elasticity of Demand for Agricultural Credit

The coefficients of the fitted log-log model represent the percentage change in demand for agricultural credit when the corresponding variable is changed by 1% (Benoit, 2011). The coefficients also stand for elasticity of amount of agricultural credit with respect to the corresponding variables (Pedace, 2013). From the micro-economic perspective, values less than 1 denote inelasticity of the variables of interest while values greater than 1 indicate elasticity. The elasticity of agricultural credit with respect to the explanatory variables is discussed and presented under this section.

4.9.1 Elasticity of Demand for Agricultural Credit with Respect to Access to Extension Services

Consistent with *a priori* expectation, the coefficient of access to extension services was positive (0.163) indicating a direct relationship between demand for agricultural credit and access to extension services. The results of regression analysis indicate that holding other factors constant, 1% increase in the number of meetings with the extension agents leads to 0.16% increase in quantity of agricultural credit demanded. The positive sign of the coefficient points to the fact that extension services and agricultural credit are not substitutable. The coefficient was statistically significant (P value = 0.000) indicating that access to extension is an important determinant of demand for agricultural credit. This is in line with studies done by Saleem (2011), Yego and Kimeli (2013) who observed significant relationship between agricultural credit demand and access to extension services. Apparently, advisories given to farmers by the extension agents boost their understanding of the credit services thus increasing demand for agricultural credit. This suggests that intensifying extension programs is likely to improve uptake of agricultural credit.

4.9.2 Elasticity of Demand for Agricultural Credit with Respect to Proximity to Credit Facility

The connection between proximity to credit source and demand for agricultural credit is rather unusual as depicted by the positive sign of the coefficient (0.092); statistically significant (P value = 0.042). It was expected that the farmers closer to the credit source would borrow more than those far off but the finding suggests the opposite; that those who were far away borrowed more than those who were closer. This scenario can be explained by the settlement pattern of Kapenguria where those who are close to urban centers have very minute farms thus exhibiting low demand

for agricultural credit; further away from the urban zones, we get the larger farms that need more financial assistance in form of credit. The value of the coefficient indicates that 1% increase in the distance to the source of credit leads to 0.09% increase in quantity of credit demanded *ceteris paribus*. This finding agrees with the study done by Ssonko and Nakayaga (2013) who observed that distance to the credit source influenced the quantity of credit borrowed.

4.9.3 Elasticity of Demand for Agricultural Credit with Respect to Size of Households

The size of household was inversely related to demand for agricultural credit and this was in conformity to *a priori* expectation; the elasticity of demand for agricultural credit with respect to household size was -0.137. This indicates that holding other factors constant, increasing household size by 1% would reduce amount of credit borrowed by about 0.137% *ceteris paribus*. The elasticity value <1 indicates that demand for agricultural credit is inelastic. The coefficient was statistically significant (p value = 0.002). This is consistent with studies done by Nwaru, *et al*. (2011), Amao (2013) and Hananu, *et al*. (2015). The negative sign of the elasticity of demand for agricultural credit with respect to household size suggests that the two are substitutable to some extent. The bigger the household the lesser the credit needed to conduct farming activities. Apparently, large households have ready labor which frees the money for hire of labor to be used for purchase of other inputs thus reducing demand for agricultural credit. Furthermore, the financial intermediaries have very little regard for household size when advancing agricultural credit to the farming community in Kapenguria. Encouraging larger households to borrow would enable them to have more cash for farm operations hence they can increase their scale of

operation by investing in more production; borrowing for expansion in agricultural production should therefore be encouraged.

4.9.4 Elasticity of Demand for Agricultural Credit with Respect to Gross Annual Farm Income

Consistent with *a priori* expectation, regression analysis revealed an indirect relationship between gross annual farm income and demand for agricultural credit where the elasticity of demand for credit with respect to gross farm income was -0.019. This suggests that *ceteris paribus*, 1% increase in gross annual farm income results in 0.019% decrease in amount of credit demanded by the farmers. This agrees with studies done by Musebe (1993), Wangai and Omboi (2011), Yego and Kimeli (2013) but contradicts the study done by Nwaru *et al.* (2011) who observed that farm income was a significant determinant of demand for credit. The non-significance of gross annual farm income reflects the pecking order theory which states that firms will first use internal equity financing, followed by external debt financing and finally external equity financing. Apparently, farms with substantial income can save their earnings for the current year and use it for production in the subsequent year thus reducing the need for borrowed funds consequently reducing the demand for agricultural credit.

4.9.5 Elasticity of Demand for Agricultural Credit with Respect to Experience of the Selected Respondents in Farming

Experience of the respondents in farming exhibited a direct relationship with demand for agricultural credit and was in conformity to *a priori* expectation. The elasticity of demand for credit with respect to experience in farming was 0.291; clearly showing that demand for agricultural credit is inelastic. The farming experience and demand

for agricultural credit are not substitutable. This indicates that the more the farmers gain experience in farming, the more they are likely to borrow more. Holding other factors constant, an increase of 1% in years of experience in farming leads to increased amount borrowed by about 0.291%. The coefficient was statistically significant at 1% (p value = 0.000) indicating that experience in farming was a key factor influencing demand for agricultural credit in Kapenguria. This corroborates the finding by Yusuf, *et al*. (2014) who observed a significant positive relationship between demand for credit and experience in farming. This finding makes sense considering that the more the farmer is involved in production, the more he gains buoyancy and learns risk reduction mechanisms; such farmers can therefore borrow more from the formal financial intermediaries. Additionally, the financial intermediaries tend to favor those farmers who have been practicing for some time and have established cordial borrowing relationships with the intermediaries. This connects well with the finding in this study that on average, the older farmers borrowed more credit than the younger farmers.

4.9.6 Elasticity of Demand for Agricultural Credit with Respect to Value of Collateral

Regression analysis revealed that the value of collateral was directly related to the demand for agricultural credit and was in line with *a priori* expectation. The elasticity of demand for agricultural credit with respect to value of collateral was 0.257 and shows that demand for agricultural credit is inelastic and the two variables are not substitutable. This shows that the borrowers who were able to provide higher value of collateral were able to borrow larger amounts of credit thus when a farmer is able to raise 1% extra value of collateral, he/she can increase his/her borrowing by 0.257% *ceteris paribus*. The statistical significance of this coefficient at 1% (p value = 0.000)

corroborates findings of other studies done by Atieno (1997), Wesa (2011), Yego and Kimeli (2013) as well as Ololade and Olagunju (2013); and indicates that the ability of a farmer to raise collateral is an important factor influencing demand for agricultural credit in Kapenguria. This finding suggests that enhancing farmers' (especially women) access to assets that can be used as collateral will actually increase borrowing hence improving the agricultural credit situation in the study area. This relates with the finding in this study that women borrowed lower amount of credit compared to men which can be attributed to the limited access to the collateral.

4.9.7 Elasticity of Demand for Agricultural Credit with Respect to Interest Rate

From the macro-economic perspective, interest rate is the cost of credit. The regression analysis revealed an inverse relationship between demand for agricultural credit and interest rate as depicted by the negative sign of the coefficient (-0.136). The negative sign of the coefficient of interest rate was in line with *a priori* expectation and it shows that increasing interest rate by 1% leads to reduction in demand for agricultural credit by 0.136% *ceteris paribus*. The coefficient was significant at 1% (P value = 0.003) indicating that interest rate is a key determinant of demand for agricultural credit. Interest rate acts like the price of agricultural credit where its increase discourages the borrowers from demanding huge amounts while its reduction encourages the borrowers to take up more credit. In this way it influences the amount of agricultural credit demanded by the farmers. This finding agrees with the study done by Ifelunini and Wosowei (2013) who observed that interest rate was a key determinant of demand for credit.

4.9.8 Elasticity of Demand for Agricultural Credit with Respect to Cost of Labor

Labor is usually the most costly input and its high cost pushes the farmers to seek for assistance in form of agricultural credit. Consistent with *a priori* expectation, regression analysis disclosed a direct relationship between the cost of labor and demand for agricultural credit justified by the positive sign of the coefficient. Elasticity of demand for agricultural credit with respect to cost of labor was 0.252 indicating that the two variables are not substitutable. This suggests that *ceteris paribus*, when cost of labor increases by 1%, the farmer will borrow 0.252% more; credit demand therefore increases with the cost of labor. The coefficient was statistically significant at 1% (p value = 0.000) and consistent with the study done by Akudugu (2012). The finding indicates that labor is a very important factor influencing demand for agricultural credit in Kapenguria. This finding supports the avowal that cost of labor is the most protuberant component of farm production costs and therefore pushes farmers into seeking more agricultural credit. Farm labor requirement can therefore be used as a basis for advancing agricultural loans in Kapenguria but care must be taken to avoid locking out women and youths who tend to use more of family labor which is rarely valued at subsistence level of farming.

4.9.9 Elasticity of Demand for Agricultural Credit with Respect to Cost of Seed Maize

Regression analysis revealed a direct relationship between demand for agricultural credit and cost of seed maize. The coefficient had a positive sign (0.142) and it was significant at 5% pointing to the fact that it is a substantial determinant of demand for agricultural credit. The positive elasticity shows that the two variables are not substitutable and 1% increase in cost of seed maize leads to 0.142% increase in amount of agricultural credit demanded *ceteris paribus*. The demand for agricultural

credit with respect to cost of seed maize is inelastic. The significance of cost of seed maize is attributed to the fact that for the farmers to grow maize it is mandatory for them to acquire seeds and where funds for purchase of this input are limited, the farmers seek for assistance in form of agricultural credit. The previous studies had not brought out the relationship between these two variables; there is no similar finding identified in the reviewed studies.

4.9.10 Elasticity of Demand for Agricultural Credit with Respect to Cost of Fertilizer

Regression analysis revealed a positive relationship between demand for agricultural credit and the cost of fertilizer. The elasticity of demand for agricultural credit with respect to fertilizer is positive (0.012). The positive sign of the coefficient was in line with *a priori* expectation; it indicates that the two variables are not substitutable and 1% increase in the cost of fertilizer leads to 0.012% increase in demand for agricultural credit *ceteris paribus*. The non-significance of the coefficient explains the behavior of small scale farmers who can go ahead and plant without fertilizer especially when they are limited by funds thus their demand for credit does not depend on the cost of fertilizer. In practice, about half of the small scale maize farmers plant without fertilizers especially when they are constrained by funds for purchase of fertilizer and they have not accessed agricultural credit schemes. To improve productivity, credit must be demanded by farmers in order for them to buy the productivity enhancing inputs like the fertilizers.

4.10 Hypothesis Testing

The study tested three hypotheses; the first hypothesis (**H_{o1}**) was**:** There is no significant effect of selected farm and farmer characteristics (access to extension services, proximity to credit facility, size of household, gross annual farm income and

experience in farming) on demand for agricultural credit. All the farm and farmer characteristics influencing demand for agricultural credit were statistically significant (P value < 0.05) except the gross annual farm income (P value > 0.05). The null hypothesis was therefore rejected with respect to access to extension services, proximity to credit facility, household size, and experience in farming but it was accepted with respect to the gross annual farm income.

The second hypothesis (**H_{o2}**) for the study was**:** The policy oriented factors (interest rate and value of collateral) have no significant effect on demand for agricultural credit. The two policy oriented factors were statistically significant (P value < 0.05). The null hypothesis was therefore rejected with respect to the two variables.

The third hypothesis **(H_{o3})** for the study was**:** The costs of production inputs (fertilizer, seed maize and labor) have no significant effect on demand for agricultural credit. The costs of labor and seed maize were statistically significant (P value < 0.05) while the cost of fertilizer was not statistically significant (P value > 0.05). The null hypothesis was therefore rejected with respect to costs of labor and seed maize but it was accepted with respect to cost of fertilizer.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter contains the summary of the findings, conclusion of the study and the recommendation as given by the researcher. It suggests the policy interventions for the elimination of the problems as stated in the problem statement.

5.1 Summary of Findings

Kapenguria exhibits interesting socio-economic characteristics with mean amounts borrowed for males being 165,674 and 98,744 for females. Married male farmers borrowed more amounts (Mean 176,383 shillings) than single males (mean 48,928 shillings). Equity bank was the major lender (52% of the total amount disbursed as agricultural loans) followed by KCB (20% of the total amount) and KWFT (11% of the total lending). The lending institutions rationed their loans by 18,717 shillings on average. Family bank had the most expensive loans (mean of 18% interest rate) while Kapenguria Teachers SACCO had the cheapest loans (mean of 10% interest rate). Farmers also practiced dairy farming; they owned 5 cows on average with majority having less than 4 cows, 75% had less than 6 cows. Only 48% of the respondents were pure farmers while 52% were involved in other employments besides farming; those involved in other employments had a mean gross salary of 39,009 shillings. Land size ranged from 0.75 acres to 29 acres with a mean of 6.52 acres. In terms of age, 75% of the respondents were below 44 years and the mean age was 38.35 years – this was below the national average (55 years). A significant number of the respondents (55%) were members of groups as opposed to 45% who were not in groups. A bigger proportion of women (80%) were members of groups as opposed to 37% of men who were members of groups. Mean duration of membership to groups

was 13 months. Majority of the farmers had completed form four where the mean number of years spent in school was 12 years.

Regression analysis revealed that the model had a positive intercept (4.962), the antilog of the intercept is the real intercept (142.88) and it represents the autonomous borrowing. The coefficient of determination (R^2) was 0.608.

The analysis on farm and farmer characteristics influencing demand for agricultural credit revealed that the coefficient of access to extension services (0.163) was significant at 1%. The coefficient of proximity to credit sources (0.092) was significant at 5%. Majority of the households had less than 10 members and mean household size 7. The coefficient of household size (-0.137) was significant at 1%. Majority of the respondents earned gross farm income less than 385,950 shillings per year and the mean gross farm income was 369,266.20 shillings. Majority (75%) of the farmers had practiced farming for less than 6½ years and the mean experience in farming was 5.9 years. The coefficient of experience in farming (0.291) was significant at 1%.

Examining the policy oriented factors; the mean value of collateral provided by the respondents was 221,350 shillings. Majority (75%) of the respondents presented collaterals worth less than 300,000 shillings. It emerged that financial intermediaries were asking for collaterals whose value was more or less twice the amount of credit demanded by the farmers. The coefficient of value of collateral (0.257) was statistically significant at 1%. The modal interest rate was 16% while its coefficient (-0.136) was significant at 1%.

Analysis of the production inputs revealed that labor stood out as the most costly input used in on-farm production taking up 58% of the total production costs. The

mean cost of labor was 59,954 shillings per year with majority (75%) of the respondents spending more than 10,000 shillings on labor. Men used more labor (mean=64,165 shillings) compared to women (mean=53,048 shillings). Age bracket 40-49 had the highest mean expenditure on labor (mean = 125,287 shillings). The coefficient of labor (0.252) was significant at 1%. The mean cost of seed maize was 8,697 shillings. The coefficient for seed maize (0.142) was significant at 1%. The mean cost of fertilizer was 33,556 shillings while its coefficient (0.012) was not significant at any conventional level.

5.2 Conclusions

The purpose of this study was to analyze the factors influencing demand for agricultural credit in Kapenguria Division of West Pokot County. The factors were categorized into three: Farm and farmer characteristics, policy oriented factors and production inputs.

From the findings of the study, financial intermediaries with agency banking network (Equity and KCB) had reached more clients and had given more loans to the farming community compared to the others who had no agents in the grass roots. Going by gender, women were more involved in farming where they worked on larger land portions and used more fertilizer and certified seeds than men but when it came to demand for credit they lagged behind. This could be the deadlock on the food security system in Kapenguria where the people who are directly involved in food production have limited demand for agricultural credit yet demand and subsequent access would have improved the use of productivity enhancing inputs thus improving food security.

The intercept of the model which indicates the level of autonomous borrowing is positive and it shows the tendency of the farmers to borrow regardless of all the other

factors. The statistical significance of the intercept reflects the scenario where every farmer borrows in some way; some borrowing is done in non-monetary terms where inputs like labor and seeds are obtained from neighbors and friends but they are not repaid directly or in most cases no repayment is done.

The significant farm and farmer characteristics influencing demand for agricultural credit were: Access to extension services, proximity to credit facility, household size, and experience in farming. Demand for agricultural credit with respect to all the farm and farmer characteristics was inelastic; it means that large changes in these variables yield small changes in demand for agricultural credit.

It is noted that the advisories given to farmers by the extension agents provide useful information about use of credit on the farms. The informed farmers seek for credit in turn; this makes amount of credit demanded to increase with access to extension services. The direct relationship between demand for agricultural credit and proximity to credit facility is unusual because it indicates that the longer the distance, the more the amount borrowed; but it reflects the settlement pattern where large farms that require more credit are located far away from the trading centers; the credit facilities are found in trading centers. The inverse relationship between demand for agricultural credit and household size shows that households with more members have readily available labor thus the funds that would otherwise be used for hire of labor are saved and probably used in other farm operations thus reducing the need for agricultural credit. The inverse relationship between demand for agricultural credit and gross annual farm income shows that the higher the farm income the less the demand for credit. Probably, the farms with high income are able to use retained earnings for subsequent production thus reducing the need for borrowed funds. This is

a vivid reflection of the pecking order theory which states that firms will first use internal equity financing, followed by external debt financing and finally external equity financing. The direct relationship between demand for agricultural credit and experience in farming shows that more experienced farmers borrowed more than the less experienced farmers. Ostensibly more experienced farmers had gained confidence in their practice and had established cordial borrowing relationships with the financial intermediaries thus enabling them to borrow more.

The selected policy oriented factors (value of collateral and interest rate) were significant in influencing demand for agricultural credit and the demand for agricultural credit with respect to these variables was inelastic. The direct relationship between demand for agricultural credit and value of collateral shows that farmers who were able to provide high value collateral borrowed more than those who provided low value collateral. Farmers with strong asset backup borrowed more given that they could provide high value assets as security. These farmers could easily meet the stringent loan security requirements of the lenders compared to those who had low asset base. This is a pointer to the fact that collateral requirement is a serious determinant of demand for agricultural credit. The inverse relationship between demand for agricultural credit and interest rate reflects the demand theory where the interest rate acts as the price of credit; the increase of the price of credit leads to reduction of the amount of credit demanded. Interest rate is therefore a key determinant of demand for agricultural credit.

The selected costs of production inputs (cost of labor, cost of seed maize and cost of fertilizer) had direct relationship with the demand for agricultural credit but the outstanding direct input in production was cost of labor. The two production inputs

(cost of labor and cost of seed maize) were very important factors influencing demand for agricultural credit in the study area while the cost of fertilizer was not an important determinant of demand for agricultural credit.

Statistical significance of cost of labor shows that the high labor requirement on the farms leads to liquidity constraints and pushes farmers to seek for more financing options thus demanding for more agricultural credit. As demand for food commodities increases, more labor is directly demanded for production of the food commodities; the increased labor demand derives increased demand for agricultural credit. The statistical significance of cost of seed maize shows that at the point of planting, it is mandatory for the farmers to obtain the seeds but due the liquidity constraints, they are pushed to seek for assistance in form of agricultural credit thus making the cost of seed maize an important determinant of farmers' demand for agricultural credit. The non-significance of the cost of fertilizer indicates that the variable is not an important determinant of demand for agricultural credit. This is attributed to the behavior of small scale farmers who go ahead to plant maize without fertilizer when they are constrained by funds. This act of planting without productivity enhancing inputs has a direct effect on the food security in the study area.

5.3 Recommendations

Based on the findings of the study, both policy recommendations and the recommendations for further studies are presented hereunder:

5.3.1 Policy Recommendations

Considering that agency banking had enabled higher borrowing from those institutions with agency banking (Equity and KCB), it should be up-scaled by those financial intermediaries that have them and those who do not have should introduce

the agency banking system. This is going to improve coverage of financial services in the grassroots. Laws and policies to support this worthy move should be enacted by the national and county governments.

Intensification of farmer advisory services is imperative. The financial intermediaries should join the other agencies like the government departments of agriculture and livestock development as well as Non-governmental organizations (NGOs) in advising farmers about agricultural credit. The extension messages should be packaged in such a way that they improve the financial literacy of the farmers. This is going to improve the farmers' understanding of the financial services and in turn improve uptake of agricultural credit.

The government should support specific initiatives like the women enterprise fund (WEF) and the youth enterprise development fund (YEDF). These initiatives focus on the women and the youth who are more constrained financially and cannot raise the required collateral for them to borrow from the mainstream financiers. Such initiatives should be up-scaled in terms coverage and intensity in order to improve uptake of credit from the women and youthful farmers.

In order to encourage small scale farmers to borrow, financial intermediaries must develop loan products that are suitable to the needs of the small scale farmers. This should be done in consideration of the collateral requirement, loan amounts and repayment mechanism; these three aspects should be tailored to fit the situation of the small scale farmers.

Instead of relying on family labor alone to produce in very small land portions, larger households are encouraged to borrow for the purpose of expanding production. This is

going to guarantee food security especially for the large farm households that obviously have a higher demand for food.

It is important for the financial intermediaries to expand the range of assets acceptable as collateral in order to allow resource poor farmers to borrow more. On the other hand, interest rate should be set at an optimal level where it is going to encourage borrowing without adversely affecting the profitability of the financial intermediaries. The central bank and the commercial financial intermediaries must therefore come to an agreement concerning the optimal interest rate.

In light of the strong influence of the cost of production inputs on demand for agricultural credit, the government ministry of agriculture, financial intermediaries and the NGOs leaning towards agricultural production should establish special programs aimed at providing credit for the farmers to purchase the production inputs. Approaches employed by organizations like the One Acre Fund could be introduced in Kapenguria to support the small scale producers. This is going to ease the burden of expensive inputs and improve productivity thus improving food security.

5.3.2 Recommendation for Further Studies

This study covered only a small area of the Country; a nationwide study to bring out the factors influencing demand for agricultural credit is therefore proposed. Additionally, having observed that farmers use more formal credit than informal credit in financing their farming operations, it is suggested that studies on limiting factors of farmers' demand and access to credit from informal lenders be conducted.

Comparative study of demand for agricultural credit between the large and small scale farms was beyond the scope of this study and it is therefore identified as an area that requires further study. Moreover, the influence of government and NGO aided

programs on demand for agricultural credit was not addressed in this study and could therefore be studied in future studies.

In the spirit of promoting gender equity in agriculture, there is need for understanding why women cultivate larger land areas, use more seeds and fertilizers yet their uptake of agricultural credit was much lower than that of men.

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APPENDICES

Appendix 1: Questionnaire

INTRODUCTION

My name is Victor Musebe Namboka; Msc. Student in the department of Agricultural Economics and resource Management of Moi University. I am conducting a study on Agricultural credit for my thesis. I kindly request you to volunteer the information requested in this questionnaire. I also take this opportunity to assure you that the information will be used solely for this study and that it will not be shared with any other persons or institutions. The interview is expected to take 45 minutes at most. Your cooperation will be highly appreciated.

Survey Questionnaire for Farmers

Questionnaire ID: …….. Name of Enumerator: .....

Date: ..... Respondent's Phone number: .....

Section 1: Farm location détails

Village: …….

Sub location: ……..…..……

Location: ……...…

Section 2: Demand for credit

1. How much loan did you apply for? ……...……..

   (Shillings)

2. How much did you receive?

   ……..……

3. How much of the received funds were used for farming?

   ……..……..

4. From which institution did you

   borrow?……

5. What was the interest rate for the loan?

   ……(Percentage)

6. What was demanded as collateral?

   …….....

7. What was the value of that collateral?

   ……(Shillings)

8. Did you acquire inputs on credit? If yes specify in the table below:

Type of input	Quantity used	Unit of measurement	Price per unit	Total

9. Did you receive assistance from friends or any organization? If yes, indicate in the table below:

Type of assistance	Quantity received	Unit of measurement	Price per unit	Total

Section 3: Farm characteristics

10. Age of the farmer: …… (Years) Gender:

    ……..…… (M or F) Marital status: ……..……..…

    (Married or Single)

11. What is the size of your land?

    ……..……..... (Acres)

12. Highest level of education (No of years in school)……..……..……

    (Specify if different)……..

13. Are you a salaried employee?

……..(Yes or No)

14. If yes, what is the range of your salary per month? (Shillings)

Range	Tick where applicable
Less than 10,000	
10,001 – 30,000	
30,001 – 50,000	
50,001- 70,000	
70,001 – 90,000	
90,001 – 110,000	
Above 110,000	

15. No. of household members: ……..…… (Number of people living in that household and depending on the farm)

16. Are you a member of a group? …….. (Yes or No); if yes, for how long have you been a member of the group?

……

17. How many times did you receive extension service? …… (Count the number of episodes when extension messages were received)

What are the messages you received from extension agents?

……

……

……

18. How much did you harvest from the farm in all your farm enterprises?

Enterprise	Quantity harvested	Unit of measurement	Price per unit	Total

19. What is the distance from your farm to Makutano market?

……(KMs)

20. How many years have you been practicing farming?

……(Years)

21. How many cows do you have? ……..……(Count the herd)

Section 4: Demand for inputs

22. Please specify the inputs you used in production of maize in the following tables

Fertilizer:

Type of fertilizer	Quantity used	Unit of measurement	Price per unit	Total

Seeds:

Type of seed	Quantity used	Unit of measurement	Price per unit	Total

Labor:

Farm operation	No of workers used	No of days	Cost per day	Total

Appendix 2: Results of Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.788[a]	.620	.608	.655

a. Predictors: (Constant), Years in farming, Distance to market, Value of fertilizer, Interest rate, Household members, Extension service, Value of collateral, Value of seeds, Value of labor, Farm income

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	211.978	10	21.198	49.358	.000[b]
	Residual	129.700	302	.429		
	Total	341.678	312			

a. Dependent Variable: dd for agricredit

b. Predictors: (Constant), Years in farming, Distance to market, Value of fertilizer, Interest rate, Household members, Extension service, Value of collateral, Value of seeds, Value of labor, Farm income

Coefficients[a]

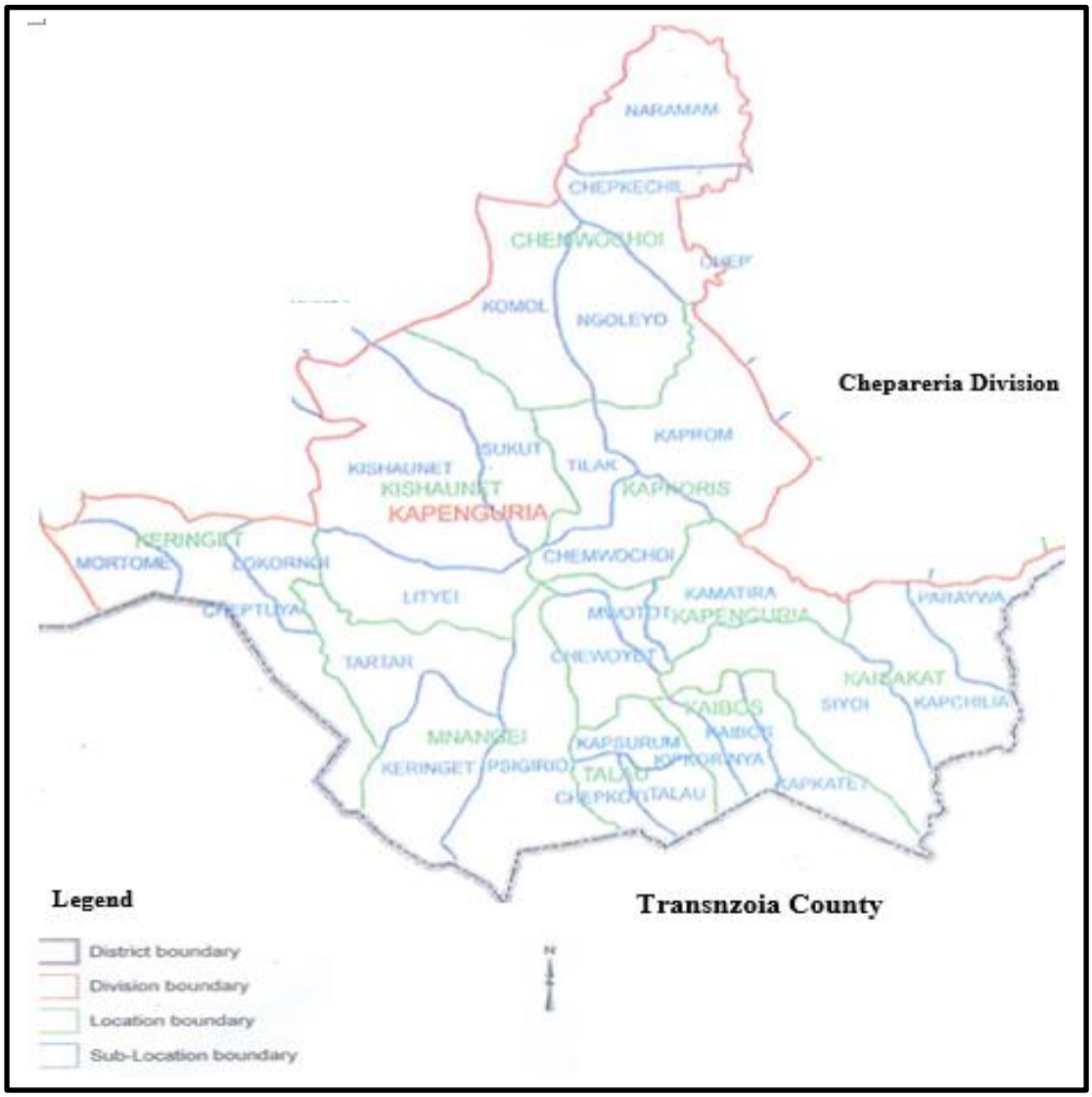
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.962	.746		6.653	.000
	Interest rate	-.298	.099	-.136	-3.018	.003
	Value of collateral	.291	.059	.257	4.913	.000
	Access to extension service	.262	.073	.163	3.583	.000
	Gross farm income	-.012	.039	-.019	-.307	.759
	Cost of fertilizer	.004	.021	.012	.212	.832
	Cost of seeds	.109	.046	.142	2.372	.018
	Cost of labor	.201	.042	.252	4.728	.000
	Household size	-.235	.075	-.137	-3.117	.002
	Distance to credit source	.092	.045	.092	2.042	.042
	Experience in farming	.495	.084	.291	5.874	.000

a. Dependent Variable: dd for agricredit

Appendix 3: Results of Correlation Analysis

	Interest rate	Value of collateral	Size of land	Salary per month	Household members	Farm income	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
Interest rate	1.000										
Value of collateral	.281	1.000									
Size of land	-.104	-.135	1.000								
Salary per month	.064	.069	.045	1.000							
Household members	-.188	-.029	.272	-.076	1.000						
Farm income	.126	.035	.257	.019	.102	1.000					
Years in farming	.238	.164	.077	.130	.187	.054	1.000				
No of cattle	.156	.250	.237	.125	.117	.623	.113	1.000			
Value of fertilizer	-.008	.029	.251	.074	.169	.662	-.011	.507	1.000		
Value of seeds	.035	.005	.515	.097	.178	.596	.131	.481	.573	1.000	
Value of labor	.210	.307	.076	.131	.114	.219	.296	.312	.174	.233	1.000

Appendix 4: Map of Kapenguria Division



Source: County statistics office – West Pokot, 2016

Appendix 5: Data Tables

Log Transformed Data

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
11.2464	7.6009	9.4138	11.2898	3.2958	1.6094	2.6391	10.2400	1.6094	2.0794	0.0000	12.7249	1.7918	1.6094	1.0986	9.9523	8.9092	10.7821
12.2180	0.0000	10.2519	12.4292	3.5553	1.9459	2.6391	11.0021	1.3863	3.4012	0.6931	14.8482	1.3863	1.9459	2.0794	10.5321	9.5750	11.5308
12.4180	0.0000	10.3777	12.6115	3.9703	2.4849	2.4849	11.6082	1.9459	3.2581	1.0986	13.3166	1.7918	3.1355	2.3026	10.8036	9.7981	11.6369
10.9853	0.0000	8.8650	11.9184	3.6376	0.6931	2.6391	0.0000	1.6094	0.0000	0.0000	12.3545	1.3863	1.0986	1.0986	9.7700	8.9227	10.3401
12.1172	0.0000	10.6901	12.3884	3.6109	1.9459	1.9459	0.0000	2.3979	3.2581	1.3863	13.6553	1.3863	2.4849	1.6094	10.3090	9.7981	11.4382
11.5598	9.6158	9.8991	12.2061	3.3673	1.0986	2.4849	0.0000	1.0986	2.4849	0.4055	11.7708	1.3863	1.3863	1.6094	10.0858	8.9092	11.4020
10.8297	8.0064	9.1690	11.9184	3.3673	1.7918	2.6391	0.0000	1.6094	2.0794	1.0986	11.8622	1.3863	1.6094	1.0986	10.3417	8.8537	10.3090
11.1419	8.0064	9.0216	12.0436	3.2958	1.6094	2.6391	0.0000	1.9459	0.0000	1.0986	12.3009	1.3863	1.0986	1.3863	10.8780	9.1050	10.3255
11.5936	8.2940	9.6965	12.2061	4.2195	3.3673	1.6094	0.0000	2.8332	2.0794	1.0986	13.0087	1.3863	2.5649	1.6094	11.2835	10.2681	11.5079
12.7187	9.2103	10.5985	12.6115	3.6889	0.9163	2.7726	10.5713	1.3863	0.0000	0.0000	11.4616	1.3863	1.7918	2.3026	10.0858	8.9092	11.7807
12.7700	9.4727	10.6497	12.7657	3.7612	3.2189	2.4849	0.0000	2.0794	2.0794	1.7918	13.3457	1.3863	2.3026	2.3979	12.1415	10.6596	12.1808
12.3014	0.0000	10.4043	12.4292	3.4657	2.4849	2.7726	11.6082	1.9459	0.0000	1.7918	11.9382	1.7918	1.3863	1.9459	11.4241	10.2955	11.9798
12.1574	0.0000	10.2603	12.3884	3.2189	2.7081	2.7726	11.0821	1.3863	0.0000	1.0986	14.0168	1.9459	0.6931	2.0794	11.1634	10.2036	11.5521
12.0436	9.2103	10.2110	12.2061	3.8712	2.3026	2.7726	11.2898	2.1972	2.4849	2.3026	11.9729	2.3026	2.9957	2.0794	10.6454	9.6024	11.4113
11.2023	0.0000	9.1621	11.5129	3.8712	1.6094	2.4849	9.6158	1.9459	0.0000	0.0000	12.3014	1.7918	1.6094	1.0986	9.9427	9.6158	10.6137
11.2898	0.0000	9.0825	11.5129	3.5835	1.3863	2.7726	10.7144	1.7918	0.0000	0.4055	13.4545	1.3863	1.3863	1.3863	9.0119	7.1701	10.6213
9.9035	0.0000	7.6009	10.1266	3.1781	1.3863	2.7081	10.1266	2.0794	0.0000	0.0000	11.7035	1.6094	1.0986	1.0986	9.0119	7.8633	9.5750
9.9035	0.0000	7.6009	10.8198	3.1781	1.0986	2.7081	0.0000	1.0986	0.0000	0.4055	10.5713	1.6094	1.3863	0.6931	8.1887	7.1701	9.2873
10.1266	0.0000	8.5172	10.8198	3.5264	0.0953	2.0794	0.0000	1.6094	3.6376	0.4055	13.0485	1.3863	0.6931	0.6931	8.3664	6.8876	8.7160
9.3927	0.0000	7.4265	10.3090	3.6376	1.7918	2.0794	0.0000	1.7918	2.6391	0.4055	12.1730	1.6094	1.0986	1.0986	8.4118	8.0709	9.9570
9.6158	0.0000	7.3132	10.1266	3.4657	1.0986	1.6094	0.0000	2.0794	2.6391	0.4055	12.6492	1.6094	1.3863	0.6931	8.3187	7.1701	9.7172
10.1266	0.0000	8.0864	12.2061	4.1897	2.3026	2.6391	0.0000	2.3026	0.0000	0.6931	12.3393	1.6094	1.3863	1.0986	8.6482	7.2079	9.3057

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
11.0021	0.0000	9.1050	12.4490	3.9120	1.0986	2.3026	0.0000	2.1972	2.6391	0.0000	12.7939	1.3863	1.6094	1.3863	9.3414	8.5564	9.7527
9.2103	0.0000	7.1701	12.6115	3.2189	0.0000	2.0794	8.5172	1.3863	0.0000	0.0000	10.4043	1.3863	0.6931	0.6931	6.2146	6.2916	7.9374
9.2103	0.0000	6.9078	11.0021	3.5835	1.0986	0.6931	0.0000	1.9459	0.0000	0.6931	12.8291	1.3863	0.6931	0.6931	8.5172	7.1701	7.9374
9.9035	9.2103	7.6962	10.4631	3.3322	1.0986	2.4849	9.2103	1.0986	0.0000	0.0000	11.9184	1.3863	1.3863	0.0000	8.2940	7.1701	8.3187
11.2898	0.0000	9.0825	12.4292	3.2581	1.7918	2.7081	0.0000	1.3863	0.0000	0.4055	12.8967	1.6094	1.6094	1.3863	9.8522	8.5564	11.2385
11.1563	0.0000	9.4415	11.9184	3.2958	1.3863	2.7081	10.3090	2.0794	0.0000	0.4055	12.1007	1.3863	1.7918	1.0986	8.8537	7.2442	10.0078
11.6245	0.0000	9.5042	12.6115	3.9890	-0.2877	2.4849	10.8198	1.9459	3.1781	0.6931	10.7536	1.3863	2.4849	1.6094	9.9330	5.5607	11.3242
9.9804	0.0000	7.6779	10.5966	3.6889	1.0986	1.6094	0.0000	2.3026	3.1781	0.6931	11.0021	1.3863	1.3863	0.6931	8.4118	7.8633	8.8537
11.9184	9.9035	10.1464	12.6115	3.3322	1.5041	2.7081	10.2449	1.3863	3.4012	0.6931	12.7293	2.9957	1.6094	1.7918	11.3445	10.7144	9.2591
10.3090	8.5172	7.9010	11.4076	3.6636	2.3979	2.7726	9.6803	2.4849	3.6376	1.7918	12.3758	2.7726	1.3863	0.6931	9.6225	8.0064	9.1695
11.0021	9.2103	9.3927	11.1563	3.4012	1.3863	2.4849	0.0000	1.7918	3.1781	0.4055	10.3859	2.8904	0.6931	1.0986	8.1605	7.3132	9.3501
11.9050	9.2103	10.1902	12.2061	3.4657	0.9163	2.7726	10.3417	1.7918	3.5835	0.6931	11.5712	2.7726	1.7918	1.7918	9.5468	7.9194	11.2997
11.9184	9.9035	9.6158	12.2061	3.8918	2.3026	2.4849	0.0000	2.7081	2.4849	1.0986	13.1993	3.4012	2.0794	1.7918	11.5327	9.6158	11.4927
9.6158	8.5172	7.3132	10.8198	3.6376	2.3026	2.7726	9.6158	2.7081	3.1781	1.3863	12.3172	2.5649	1.0986	0.6931	10.1581	8.4118	9.1215
10.8198	0.0000	8.5172	11.5129	3.8067	1.6094	2.7726	9.9035	2.9957	3.5835	1.3863	8.1887	2.9957	1.6094	1.0986	10.3288	8.4118	9.6709
10.8198	8.5172	8.4118	11.4076	4.0254	2.6391	2.7726	0.0000	2.1972	3.5835	0.4055	12.2577	2.7081	1.3863	1.0986	9.6803	8.0064	8.8465
11.5129	10.8198	9.2103	12.4607	3.4012	1.0986	2.7726	9.9523	1.9459	3.7842	0.4055	11.7722	2.8332	1.9459	1.6094	9.9523	8.1017	11.3314
11.1563	8.9872	9.0360	11.8494	3.6636	1.0986	2.7726	9.9035	2.0794	3.1781	1.3863	11.2332	3.0445	1.3863	1.3863	7.8240	7.6962	8.9092
10.4341	9.2103	8.1315	11.4927	3.6636	2.9957	2.7726	10.3090	3.4012	3.7377	1.0986	11.6742	2.7081	1.0986	0.6931	11.3145	9.7981	8.4446
11.1563	10.3090	9.3843	11.8494	3.6109	0.9163	2.7726	10.3136	1.3863	3.5553	0.6931	11.6307	3.4012	1.3863	1.3863	10.4282	8.0064	8.7948
10.5966	8.5172	8.0709	11.2898	3.6109	2.1972	2.7726	0.0000	1.3863	0.0000	0.6931	11.2922	3.4012	1.3863	1.0986	8.7948	7.8633	8.1747
11.1563	0.0000	9.3237	11.6952	3.9512	2.3026	2.9444	10.8198	1.9459	0.0000	0.0000	12.7468	2.7081	1.6094	1.3863	10.4574	9.1050	9.5030
10.8198	10.3090	9.1050	11.5129	3.6376	1.6094	2.0794	0.0000	1.3863	3.1781	1.0986	11.1591	2.9957	1.0986	1.6094	8.7641	7.7187	9.2686
13.9553	11.9184	12.2405	13.5278	3.7612	2.7081	2.4849	0.0000	2.7726	0.0000	2.4849	13.9342	1.2528	1.9459	1.6094	11.7440	10.0213	12.6854
12.2061	11.5129	10.4913	12.7939	3.7612	1.0986	2.6391	10.5966	1.7918	3.8286	2.3026	12.6281	1.3863	2.3979	2.0794	10.1346	8.4118	12.1495
12.2381	11.1563	10.5233	13.1224	3.4012	1.0986	2.6391	10.4913	1.0986	0.0000	1.0986	12.6256	0.6931	2.3026	1.9459	10.1346	8.4118	11.5258

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
13.3847	10.8198	11.6699	13.1224	4.0073	2.9957	1.0986	10.7144	1.7918	0.0000	2.0794	14.3694	0.4055	2.3026	2.5649	12.0317	10.3090	12.2061
11.5129	10.8198	9.6803	13.1224	3.3673	1.7918	2.7726	10.9151	1.0986	0.0000	0.6931	13.0316	0.6931	1.7918	1.6094	10.8198	9.1050	11.3964
11.1563	10.3090	9.3237	12.2061	3.5835	0.0000	2.0794	0.0000	2.3026	0.0000	1.9459	11.1900	1.0986	1.3863	1.3863	9.0360	7.3132	9.2873
12.4292	11.5129	10.5966	12.6115	3.8712	1.4183	0.6931	0.0000	2.3026	0.0000	1.3863	11.9608	1.3863	2.1972	2.3026	10.5401	8.9227	12.0033
11.1563	10.8198	9.3237	11.8130	3.4340	0.6931	2.0794	0.0000	1.9459	2.4849	1.0986	12.5908	0.6931	1.6094	1.3863	9.6550	8.0064	9.2350
11.5129	10.8198	9.6803	12.6115	3.0910	0.6931	2.7726	10.4631	1.6094	0.0000	1.3863	11.9184	0.6931	1.6094	1.6094	9.7291	8.0064	10.8780
11.9184	10.8198	10.0858	13.0170	4.0943	0.6931	2.0794	0.0000	1.6094	0.0000	1.7918	12.9569	1.2528	1.6094	1.7918	9.7291	8.0064	11.3433
11.9184	10.8198	10.0858	12.6115	3.5553	1.0986	2.7726	0.0000	1.6094	3.5835	1.6094	12.5078	1.6094	1.6094	1.9459	10.1346	8.4118	11.3433
11.0021	10.1266	9.1695	12.2061	3.2958	0.0000	2.6391	0.0000	0.6931	0.0000	0.0000	12.2638	0.6931	0.6931	1.3863	9.0360	7.3132	9.2301
13.3847	9.9035	11.5521	13.9978	4.1744	2.4849	2.3979	10.7144	2.0794	0.0000	1.9459	14.3183	0.6931	2.7081	1.9459	11.4721	9.7981	12.1172
11.0021	10.5966	9.1695	12.4292	3.6109	0.4055	2.4849	0.0000	1.0986	0.0000	0.6931	11.5129	0.9163	1.0986	0.0000	9.4650	8.0064	9.8037
10.7144	9.2103	8.8818	12.4292	3.4657	0.4055	2.4849	9.9035	1.0986	3.1781	1.7918	12.8160	0.4055	1.3863	1.7918	9.4650	8.0064	9.4727
11.2464	7.6009	9.4138	11.2898	3.2958	1.6094	2.6391	10.2400	1.6094	2.0794	0.0000	12.7249	1.7918	1.6094	1.0986	9.9523	8.9092	10.7821
12.2180	0.0000	10.2519	12.4292	3.5553	1.9459	2.6391	11.0021	1.3863	3.4012	0.6931	14.8482	1.3863	1.9459	2.0794	10.5321	9.5750	11.5308
12.4180	0.0000	10.3777	12.6115	3.9703	2.4849	2.4849	11.6082	1.9459	3.2581	1.0986	13.3166	1.7918	3.1355	2.3026	10.8036	9.7981	11.6369
10.9853	0.0000	8.8650	11.9184	3.6376	0.6931	2.6391	0.0000	1.6094	0.0000	0.0000	12.3545	1.3863	1.0986	1.0986	9.7700	8.9227	10.3401
12.1172	0.0000	10.6901	12.3884	3.6109	1.9459	1.9459	0.0000	2.3979	3.2581	1.3863	13.6553	1.3863	2.4849	1.6094	10.3090	9.7981	11.4382
11.5598	9.6158	9.8991	12.2061	3.3673	1.0986	2.4849	0.0000	1.0986	2.4849	0.4055	11.7708	1.3863	1.3863	1.6094	10.0858	8.9092	11.4020
10.8297	8.0064	9.1690	11.9184	3.3673	1.7918	2.6391	0.0000	1.6094	2.0794	1.0986	11.8622	1.3863	1.6094	1.0986	10.3417	8.8537	10.3090
11.1419	8.0064	9.0216	12.0436	3.2958	1.6094	2.6391	0.0000	1.9459	0.0000	1.0986	12.3009	1.3863	1.0986	1.3863	10.8780	9.1050	10.3255
11.5936	8.2940	9.6965	12.2061	4.2195	3.3673	1.6094	0.0000	2.8332	2.0794	1.0986	13.0087	1.3863	2.5649	1.6094	11.2835	10.2681	11.5079
12.7187	9.2103	10.5985	12.6115	3.6889	0.9163	2.7726	10.5713	1.3863	0.0000	0.0000	11.4616	1.3863	1.7918	2.3026	10.0858	8.9092	11.7807
12.7700	9.4727	10.6497	12.7657	3.7612	3.2189	2.4849	0.0000	2.0794	2.0794	1.7918	13.3457	1.3863	2.3026	2.3979	12.1415	10.6596	12.1808
12.3014	0.0000	10.4043	12.4292	3.4657	2.4849	2.7726	11.6082	1.9459	0.0000	1.7918	11.9382	1.7918	1.3863	1.9459	11.4241	10.2955	11.9798
12.1574	0.0000	10.2603	12.3884	3.2189	2.7081	2.7726	11.0821	1.3863	0.0000	1.0986	14.0168	1.9459	0.6931	2.0794	11.1634	10.2036	11.5521
12.0436	9.2103	10.2110	12.2061	3.8712	2.3026	2.7726	11.2898	2.1972	2.4849	2.3026	11.9729	2.3026	2.9957	2.0794	10.6454	9.6024	11.4113

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
11.2023	0.0000	9.1621	11.5129	3.8712	1.6094	2.4849	9.6158	1.9459	0.0000	0.0000	12.3014	1.7918	1.6094	1.0986	9.9427	9.6158	10.6137
11.2898	0.0000	9.0825	11.5129	3.5835	1.3863	2.7726	10.7144	1.7918	0.0000	0.4055	13.4545	1.3863	1.3863	1.3863	9.0119	7.1701	10.6213
9.9035	0.0000	7.6009	10.1266	3.1781	1.3863	2.7081	10.1266	2.0794	0.0000	0.0000	11.7035	1.6094	1.0986	1.0986	9.0119	7.8633	9.5750
9.9035	0.0000	7.6009	10.8198	3.1781	1.0986	2.7081	0.0000	1.0986	0.0000	0.4055	10.5713	1.6094	1.3863	0.6931	8.1887	7.1701	9.2873
10.1266	0.0000	8.5172	10.8198	3.5264	0.0953	2.0794	0.0000	1.6094	3.6376	0.4055	13.0485	1.3863	0.6931	0.6931	8.3664	6.8876	8.7160
9.3927	0.0000	7.4265	10.3090	3.6376	1.7918	2.0794	0.0000	1.7918	2.6391	0.4055	12.1730	1.6094	1.0986	1.0986	8.4118	8.0709	9.9570
9.6158	0.0000	7.3132	10.1266	3.4657	1.0986	1.6094	0.0000	2.0794	2.6391	0.4055	12.6492	1.6094	1.3863	0.6931	8.3187	7.1701	9.7172
10.1266	0.0000	8.0864	12.2061	4.1897	2.3026	2.6391	0.0000	2.3026	0.0000	0.6931	12.3393	1.6094	1.3863	1.0986	8.6482	7.2079	9.3057
11.0021	0.0000	9.1050	12.4490	3.9120	1.0986	2.3026	0.0000	2.1972	2.6391	0.0000	12.7939	1.3863	1.6094	1.3863	9.3414	8.5564	9.7527
9.2103	0.0000	7.1701	12.6115	3.2189	0.0000	2.0794	8.5172	1.3863	0.0000	0.0000	10.4043	1.3863	0.6931	0.6931	6.2146	6.2916	7.9374
9.2103	0.0000	6.9078	11.0021	3.5835	1.0986	0.6931	0.0000	1.9459	0.0000	0.6931	12.8291	1.3863	0.6931	0.6931	8.5172	7.1701	7.9374
9.9035	9.2103	7.6962	10.4631	3.3322	1.0986	2.4849	9.2103	1.0986	0.0000	0.0000	11.9184	1.3863	1.3863	0.0000	8.2940	7.1701	8.3187
11.2898	0.0000	9.0825	12.4292	3.2581	1.7918	2.7081	0.0000	1.3863	0.0000	0.4055	12.8967	1.6094	1.6094	1.3863	9.8522	8.5564	11.2385
11.1563	0.0000	9.4415	11.9184	3.2958	1.3863	2.7081	10.3090	2.0794	0.0000	0.4055	12.1007	1.3863	1.7918	1.0986	8.8537	7.2442	10.0078
11.6245	0.0000	9.5042	12.6115	3.9890	-0.2877	2.4849	10.8198	1.9459	3.1781	0.6931	10.7536	1.3863	2.4849	1.6094	9.9330	5.5607	11.3242
9.9804	0.0000	7.6779	10.5966	3.6889	1.0986	1.6094	0.0000	2.3026	3.1781	0.6931	11.0021	1.3863	1.3863	0.6931	8.4118	7.8633	8.8537
11.9184	9.9035	10.1464	12.6115	3.3322	1.5041	2.7081	10.2449	1.3863	3.4012	0.6931	12.7293	2.9957	1.6094	1.7918	11.3445	10.7144	9.2591
10.3090	8.5172	7.9010	11.4076	3.6636	2.3979	2.7726	9.6803	2.4849	3.6376	1.7918	12.3758	2.7726	1.3863	0.6931	9.6225	8.0064	9.1695
11.0021	9.2103	9.3927	11.1563	3.4012	1.3863	2.4849	0.0000	1.7918	3.1781	0.4055	10.3859	2.8904	0.6931	1.0986	8.1605	7.3132	9.3501
11.9050	9.2103	10.1902	12.2061	3.4657	0.9163	2.7726	10.3417	1.7918	3.5835	0.6931	11.5712	2.7726	1.7918	1.7918	9.5468	7.9194	11.2997
11.9184	9.9035	9.6158	12.2061	3.8918	2.3026	2.4849	0.0000	2.7081	2.4849	1.0986	13.1993	3.4012	2.0794	1.7918	11.5327	9.6158	11.4927
9.6158	8.5172	7.3132	10.8198	3.6376	2.3026	2.7726	9.6158	2.7081	3.1781	1.3863	12.3172	2.5649	1.0986	0.6931	10.1581	8.4118	9.1215
10.8198	0.0000	8.5172	11.5129	3.8067	1.6094	2.7726	9.9035	2.9957	3.5835	1.3863	8.1887	2.9957	1.6094	1.0986	10.3288	8.4118	9.6709
10.8198	8.5172	8.4118	11.4076	4.0254	2.6391	2.7726	0.0000	2.1972	3.5835	0.4055	12.2577	2.7081	1.3863	1.0986	9.6803	8.0064	8.8465
11.5129	10.8198	9.2103	12.4607	3.4012	1.0986	2.7726	9.9523	1.9459	3.7842	0.4055	11.7722	2.8332	1.9459	1.6094	9.9523	8.1017	11.3314
11.1563	8.9872	9.0360	11.8494	3.6636	1.0986	2.7726	9.9035	2.0794	3.1781	1.3863	11.2332	3.0445	1.3863	1.3863	7.8240	7.6962	8.9092

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
10.4341	9.2103	8.1315	11.4927	3.6636	2.9957	2.7726	10.3090	3.4012	3.7377	1.0986	11.6742	2.7081	1.0986	0.6931	11.3145	9.7981	8.4446
11.1563	10.3090	9.3843	11.8494	3.6109	0.9163	2.7726	10.3136	1.3863	3.5553	0.6931	11.6307	3.4012	1.3863	1.3863	10.4282	8.0064	8.7948
10.5966	8.5172	8.0709	11.2898	3.6109	2.1972	2.7726	0.0000	1.3863	0.0000	0.6931	11.2922	3.4012	1.3863	1.0986	8.7948	7.8633	8.1747
11.1563	0.0000	9.3237	11.6952	3.9512	2.3026	2.9444	10.8198	1.9459	0.0000	0.0000	12.7468	2.7081	1.6094	1.3863	10.4574	9.1050	9.5030
10.8198	10.3090	9.1050	11.5129	3.6376	1.6094	2.0794	0.0000	1.3863	3.1781	1.0986	11.1591	2.9957	1.0986	1.6094	8.7641	7.7187	9.2686
13.9553	11.9184	12.2405	13.5278	3.7612	2.7081	2.4849	0.0000	2.7726	0.0000	2.4849	13.9342	1.2528	1.9459	1.6094	11.7440	10.0213	12.6854
12.2061	11.5129	10.4913	12.7939	3.7612	1.0986	2.6391	10.5966	1.7918	3.8286	2.3026	12.6281	1.3863	2.3979	2.0794	10.1346	8.4118	12.1495
12.2381	11.1563	10.5233	13.1224	3.4012	1.0986	2.6391	10.4913	1.0986	0.0000	1.0986	12.6256	0.6931	2.3026	1.9459	10.1346	8.4118	11.5258
13.3847	10.8198	11.6699	13.1224	4.0073	2.9957	1.0986	10.7144	1.7918	0.0000	2.0794	14.3694	0.4055	2.3026	2.5649	12.0317	10.3090	12.2061
11.5129	10.8198	9.6803	13.1224	3.3673	1.7918	2.7726	10.9151	1.0986	0.0000	0.6931	13.0316	0.6931	1.7918	1.6094	10.8198	9.1050	11.3964
11.1563	10.3090	9.3237	12.2061	3.5835	0.0000	2.0794	0.0000	2.3026	0.0000	1.9459	11.1900	1.0986	1.3863	1.3863	9.0360	7.3132	9.2873
12.4292	11.5129	10.5966	12.6115	3.8712	1.4183	0.6931	0.0000	2.3026	0.0000	1.3863	11.9608	1.3863	2.1972	2.3026	10.5401	8.9227	12.0033
11.1563	10.8198	9.3237	11.8130	3.4340	0.6931	2.0794	0.0000	1.9459	2.4849	1.0986	12.5908	0.6931	1.6094	1.3863	9.6550	8.0064	9.2350
11.5129	10.8198	9.6803	12.6115	3.0910	0.6931	2.7726	10.4631	1.6094	0.0000	1.3863	11.9184	0.6931	1.6094	1.6094	9.7291	8.0064	10.8780
11.9184	10.8198	10.0858	13.0170	4.0943	0.6931	2.0794	0.0000	1.6094	0.0000	1.7918	12.9569	1.2528	1.6094	1.7918	9.7291	8.0064	11.3433
11.9184	10.8198	10.0858	12.6115	3.5553	1.0986	2.7726	0.0000	1.6094	3.5835	1.6094	12.5078	1.6094	1.6094	1.9459	10.1346	8.4118	11.3433
11.0021	10.1266	9.1695	12.2061	3.2958	0.0000	2.6391	0.0000	0.6931	0.0000	0.0000	12.2638	0.6931	0.6931	1.3863	9.0360	7.3132	9.2301
13.3847	9.9035	11.5521	13.9978	4.1744	2.4849	2.3979	10.7144	2.0794	0.0000	1.9459	14.3183	0.6931	2.7081	1.9459	11.4721	9.7981	12.1172
11.0021	10.5966	9.1695	12.4292	3.6109	0.4055	2.4849	0.0000	1.0986	0.0000	0.6931	11.5129	0.9163	1.0986	0.0000	9.4650	8.0064	9.8037
10.7144	9.2103	8.8818	12.4292	3.4657	0.4055	2.4849	9.9035	1.0986	3.1781	1.7918	12.8160	0.4055	1.3863	1.7918	9.4650	8.0064	9.4727
11.2464	7.6009	9.4138	11.2898	3.2958	1.6094	2.6391	10.2400	1.6094	2.0794	0.0000	12.7249	1.7918	1.6094	1.0986	9.9523	8.9092	10.7821
12.2180	0.0000	10.2519	12.4292	3.5553	1.9459	2.6391	11.0021	1.3863	3.4012	0.6931	14.8482	1.3863	1.9459	2.0794	10.5321	9.5750	11.5308
12.4180	0.0000	10.3777	12.6115	3.9703	2.4849	2.4849	11.6082	1.9459	3.2581	1.0986	13.3166	1.7918	3.1355	2.3026	10.8036	9.7981	11.6369
10.9853	0.0000	8.8650	11.9184	3.6376	0.6931	2.6391	0.0000	1.6094	0.0000	0.0000	12.3545	1.3863	1.0986	1.0986	9.7700	8.9227	10.3401
12.1172	0.0000	10.6901	12.3884	3.6109	1.9459	1.9459	0.0000	2.3979	3.2581	1.3863	13.6553	1.3863	2.4849	1.6094	10.3090	9.7981	11.4382
11.5598	9.6158	9.8991	12.2061	3.3673	1.0986	2.4849	0.0000	1.0986	2.4849	0.4055	11.7708	1.3863	1.3863	1.6094	10.0858	8.9092	11.4020

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
10.8297	8.0064	9.1690	11.9184	3.3673	1.7918	2.6391	0.0000	1.6094	2.0794	1.0986	11.8622	1.3863	1.6094	1.0986	10.3417	8.8537	10.3090
11.1419	8.0064	9.0216	12.0436	3.2958	1.6094	2.6391	0.0000	1.9459	0.0000	1.0986	12.3009	1.3863	1.0986	1.3863	10.8780	9.1050	10.3255
11.5936	8.2940	9.6965	12.2061	4.2195	3.3673	1.6094	0.0000	2.8332	2.0794	1.0986	13.0087	1.3863	2.5649	1.6094	11.2835	10.2681	11.5079
12.7187	9.2103	10.5985	12.6115	3.6889	0.9163	2.7726	10.5713	1.3863	0.0000	0.0000	11.4616	1.3863	1.7918	2.3026	10.0858	8.9092	11.7807
12.7700	9.4727	10.6497	12.7657	3.7612	3.2189	2.4849	0.0000	2.0794	2.0794	1.7918	13.3457	1.3863	2.3026	2.3979	12.1415	10.6596	12.1808
12.3014	0.0000	10.4043	12.4292	3.4657	2.4849	2.7726	11.6082	1.9459	0.0000	1.7918	11.9382	1.7918	1.3863	1.9459	11.4241	10.2955	11.9798
12.1574	0.0000	10.2603	12.3884	3.2189	2.7081	2.7726	11.0821	1.3863	0.0000	1.0986	14.0168	1.9459	0.6931	2.0794	11.1634	10.2036	11.5521
12.0436	9.2103	10.2110	12.2061	3.8712	2.3026	2.7726	11.2898	2.1972	2.4849	2.3026	11.9729	2.3026	2.9957	2.0794	10.6454	9.6024	11.4113
11.2023	0.0000	9.1621	11.5129	3.8712	1.6094	2.4849	9.6158	1.9459	0.0000	0.0000	12.3014	1.7918	1.6094	1.0986	9.9427	9.6158	10.6137
11.2898	0.0000	9.0825	11.5129	3.5835	1.3863	2.7726	10.7144	1.7918	0.0000	0.4055	13.4545	1.3863	1.3863	1.3863	9.0119	7.1701	10.6213
9.9035	0.0000	7.6009	10.1266	3.1781	1.3863	2.7081	10.1266	2.0794	0.0000	0.0000	11.7035	1.6094	1.0986	1.0986	9.0119	7.8633	9.5750
9.9035	0.0000	7.6009	10.8198	3.1781	1.0986	2.7081	0.0000	1.0986	0.0000	0.4055	10.5713	1.6094	1.3863	0.6931	8.1887	7.1701	9.2873
10.1266	0.0000	8.5172	10.8198	3.5264	0.0953	2.0794	0.0000	1.6094	3.6376	0.4055	13.0485	1.3863	0.6931	0.6931	8.3664	6.8876	8.7160
9.3927	0.0000	7.4265	10.3090	3.6376	1.7918	2.0794	0.0000	1.7918	2.6391	0.4055	12.1730	1.6094	1.0986	1.0986	8.4118	8.0709	9.9570
9.6158	0.0000	7.3132	10.1266	3.4657	1.0986	1.6094	0.0000	2.0794	2.6391	0.4055	12.6492	1.6094	1.3863	0.6931	8.3187	7.1701	9.7172
10.1266	0.0000	8.0864	12.2061	4.1897	2.3026	2.6391	0.0000	2.3026	0.0000	0.6931	12.3393	1.6094	1.3863	1.0986	8.6482	7.2079	9.3057
11.0021	0.0000	9.1050	12.4490	3.9120	1.0986	2.3026	0.0000	2.1972	2.6391	0.0000	12.7939	1.3863	1.6094	1.3863	9.3414	8.5564	9.7527
9.2103	0.0000	7.1701	12.6115	3.2189	0.0000	2.0794	8.5172	1.3863	0.0000	0.0000	10.4043	1.3863	0.6931	0.6931	6.2146	6.2916	7.9374
9.2103	0.0000	6.9078	11.0021	3.5835	1.0986	0.6931	0.0000	1.9459	0.0000	0.6931	12.8291	1.3863	0.6931	0.6931	8.5172	7.1701	7.9374
9.9035	9.2103	7.6962	10.4631	3.3322	1.0986	2.4849	9.2103	1.0986	0.0000	0.0000	11.9184	1.3863	1.3863	0.0000	8.2940	7.1701	8.3187
11.2898	0.0000	9.0825	12.4292	3.2581	1.7918	2.7081	0.0000	1.3863	0.0000	0.4055	12.8967	1.6094	1.6094	1.3863	9.8522	8.5564	11.2385
11.1563	0.0000	9.4415	11.9184	3.2958	1.3863	2.7081	10.3090	2.0794	0.0000	0.4055	12.1007	1.3863	1.7918	1.0986	8.8537	7.2442	10.0078
11.6245	0.0000	9.5042	12.6115	3.9890	0.2877	2.4849	10.8198	1.9459	3.1781	0.6931	10.7536	1.3863	2.4849	1.6094	9.9330	5.5607	11.3242
9.9804	0.0000	7.6779	10.5966	3.6889	1.0986	1.6094	0.0000	2.3026	3.1781	0.6931	11.0021	1.3863	1.3863	0.6931	8.4118	7.8633	8.8537
11.9184	9.9035	10.1464	12.6115	3.3322	1.5041	2.7081	10.2449	1.3863	3.4012	0.6931	12.7293	2.9957	1.6094	1.7918	11.3445	10.7144	9.2591
10.3090	8.5172	7.9010	11.4076	3.6636	2.3979	2.7726	9.6803	2.4849	3.6376	1.7918	12.3758	2.7726	1.3863	0.6931	9.6225	8.0064	9.1695

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
11.0021	9.2103	9.3927	11.1563	3.4012	1.3863	2.4849	0.0000	1.7918	3.1781	0.4055	10.3859	2.8904	0.6931	1.0986	8.1605	7.3132	9.3501
11.9050	9.2103	10.1902	12.2061	3.4657	0.9163	2.7726	10.3417	1.7918	3.5835	0.6931	11.5712	2.7726	1.7918	1.7918	9.5468	7.9194	11.2997
11.9184	9.9035	9.6158	12.2061	3.8918	2.3026	2.4849	0.0000	2.7081	2.4849	1.0986	13.1993	3.4012	2.0794	1.7918	11.5327	9.6158	11.4927
9.6158	8.5172	7.3132	10.8198	3.6376	2.3026	2.7726	9.6158	2.7081	3.1781	1.3863	12.3172	2.5649	1.0986	0.6931	10.1581	8.4118	9.1215
10.8198	0.0000	8.5172	11.5129	3.8067	1.6094	2.7726	9.9035	2.9957	3.5835	1.3863	8.1887	2.9957	1.6094	1.0986	10.3288	8.4118	9.6709
10.8198	8.5172	8.4118	11.4076	4.0254	2.6391	2.7726	0.0000	2.1972	3.5835	0.4055	12.2577	2.7081	1.3863	1.0986	9.6803	8.0064	8.8465
11.5129	10.8198	9.2103	12.4607	3.4012	1.0986	2.7726	9.9523	1.9459	3.7842	0.4055	11.7722	2.8332	1.9459	1.6094	9.9523	8.1017	11.3314
11.1563	8.9872	9.0360	11.8494	3.6636	1.0986	2.7726	9.9035	2.0794	3.1781	1.3863	11.2332	3.0445	1.3863	1.3863	7.8240	7.6962	8.9092
10.4341	9.2103	8.1315	11.4927	3.6636	2.9957	2.7726	10.3090	3.4012	3.7377	1.0986	11.6742	2.7081	1.0986	0.6931	11.3145	9.7981	8.4446
11.1563	10.3090	9.3843	11.8494	3.6109	0.9163	2.7726	10.3136	1.3863	3.5553	0.6931	11.6307	3.4012	1.3863	1.3863	10.4282	8.0064	8.7948
10.5966	8.5172	8.0709	11.2898	3.6109	2.1972	2.7726	0.0000	1.3863	0.0000	0.6931	11.2922	3.4012	1.3863	1.0986	8.7948	7.8633	8.1747
11.1563	0.0000	9.3237	11.6952	3.9512	2.3026	2.9444	10.8198	1.9459	0.0000	0.0000	12.7468	2.7081	1.6094	1.3863	10.4574	9.1050	9.5030
10.8198	10.3090	9.1050	11.5129	3.6376	1.6094	2.0794	0.0000	1.3863	3.1781	1.0986	11.1591	2.9957	1.0986	1.6094	8.7641	7.7187	9.2686
13.9553	11.9184	12.2405	13.5278	3.7612	2.7081	2.4849	0.0000	2.7726	0.0000	2.4849	13.9342	1.2528	1.9459	1.6094	11.7440	10.0213	12.6854
12.2061	11.5129	10.4913	12.7939	3.7612	1.0986	2.6391	10.5966	1.7918	3.8286	2.3026	12.6281	1.3863	2.3979	2.0794	10.1346	8.4118	12.1495
12.2381	11.1563	10.5233	13.1224	3.4012	1.0986	2.6391	10.4913	1.0986	0.0000	1.0986	12.6256	0.6931	2.3026	1.9459	10.1346	8.4118	11.5258
13.3847	10.8198	11.6699	13.1224	4.0073	2.9957	1.0986	10.7144	1.7918	0.0000	2.0794	14.3694	0.4055	2.3026	2.5649	12.0317	10.3090	12.2061
11.5129	10.8198	9.6803	13.1224	3.3673	1.7918	2.7726	10.9151	1.0986	0.0000	0.6931	13.0316	0.6931	1.7918	1.6094	10.8198	9.1050	11.3964
11.1563	10.3090	9.3237	12.2061	3.5835	0.0000	2.0794	0.0000	2.3026	0.0000	1.9459	11.1900	1.0986	1.3863	1.3863	9.0360	7.3132	9.2873
12.4292	11.5129	10.5966	12.6115	3.8712	1.4183	0.6931	0.0000	2.3026	0.0000	1.3863	11.9608	1.3863	2.1972	2.3026	10.5401	8.9227	12.0033
11.1563	10.8198	9.3237	11.8130	3.4340	0.6931	2.0794	0.0000	1.9459	2.4849	1.0986	12.5908	0.6931	1.6094	1.3863	9.6550	8.0064	9.2350
11.5129	10.8198	9.6803	12.6115	3.0910	0.6931	2.7726	10.4631	1.6094	0.0000	1.3863	11.9184	0.6931	1.6094	1.6094	9.7291	8.0064	10.8780
11.9184	10.8198	10.0858	13.0170	4.0943	0.6931	2.0794	0.0000	1.6094	0.0000	1.7918	12.9569	1.2528	1.6094	1.7918	9.7291	8.0064	11.3433
11.9184	10.8198	10.0858	12.6115	3.5553	1.0986	2.7726	0.0000	1.6094	3.5835	1.6094	12.5078	1.6094	1.6094	1.9459	10.1346	8.4118	11.3433
11.0021	10.1266	9.1695	12.2061	3.2958	0.0000	2.6391	0.0000	0.6931	0.0000	0.0000	12.2638	0.6931	0.6931	1.3863	9.0360	7.3132	9.2301
13.3847	9.9035	11.5521	13.9978	4.1744	2.4849	2.3979	10.7144	2.0794	0.0000	1.9459	14.3183	0.6931	2.7081	1.9459	11.4721	9.7981	12.1172

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
11.0021	10.5966	9.1695	12.4292	3.6109	0.4055	2.4849	0.0000	1.0986	0.0000	0.6931	11.5129	0.9163	1.0986	0.0000	9.4650	8.0064	9.8037
10.7144	9.2103	8.8818	12.4292	3.4657	0.4055	2.4849	9.9035	1.0986	3.1781	1.7918	12.8160	0.4055	1.3863	1.7918	9.4650	8.0064	9.4727
11.2464	7.6009	9.4138	11.2898	3.2958	1.6094	2.6391	10.2400	1.6094	2.0794	0.0000	12.7249	1.7918	1.6094	1.0986	9.9523	8.9092	10.7821
12.2180	0.0000	10.2519	12.4292	3.5553	1.9459	2.6391	11.0021	1.3863	3.4012	0.6931	14.8482	1.3863	1.9459	2.0794	10.5321	9.5750	11.5308
12.4180	0.0000	10.3777	12.6115	3.9703	2.4849	2.4849	11.6082	1.9459	3.2581	1.0986	13.3166	1.7918	3.1355	2.3026	10.8036	9.7981	11.6369
10.9853	0.0000	8.8650	11.9184	3.6376	0.6931	2.6391	0.0000	1.6094	0.0000	0.0000	12.3545	1.3863	1.0986	1.0986	9.7700	8.9227	10.3401
12.1172	0.0000	10.6901	12.3884	3.6109	1.9459	1.9459	0.0000	2.3979	3.2581	1.3863	13.6553	1.3863	2.4849	1.6094	10.3090	9.7981	11.4382
11.5598	9.6158	9.8991	12.2061	3.3673	1.0986	2.4849	0.0000	1.0986	2.4849	0.4055	11.7708	1.3863	1.3863	1.6094	10.0858	8.9092	11.4020
10.8297	8.0064	9.1690	11.9184	3.3673	1.7918	2.6391	0.0000	1.6094	2.0794	1.0986	11.8622	1.3863	1.6094	1.0986	10.3417	8.8537	10.3090
11.1419	8.0064	9.0216	12.0436	3.2958	1.6094	2.6391	0.0000	1.9459	0.0000	1.0986	12.3009	1.3863	1.0986	1.3863	10.8780	9.1050	10.3255
11.5936	8.2940	9.6965	12.2061	4.2195	3.3673	1.6094	0.0000	2.8332	2.0794	1.0986	13.0087	1.3863	2.5649	1.6094	11.2835	10.2681	11.5079
12.7187	9.2103	10.5985	12.6115	3.6889	0.9163	2.7726	10.5713	1.3863	0.0000	0.0000	11.4616	1.3863	1.7918	2.3026	10.0858	8.9092	11.7807
12.7700	9.4727	10.6497	12.7657	3.7612	3.2189	2.4849	0.0000	2.0794	2.0794	1.7918	13.3457	1.3863	2.3026	2.3979	12.1415	10.6596	12.1808
12.3014	0.0000	10.4043	12.4292	3.4657	2.4849	2.7726	11.6082	1.9459	0.0000	1.7918	11.9382	1.7918	1.3863	1.9459	11.4241	10.2955	11.9798
12.1574	0.0000	10.2603	12.3884	3.2189	2.7081	2.7726	11.0821	1.3863	0.0000	1.0986	14.0168	1.9459	0.6931	2.0794	11.1634	10.2036	11.5521
12.0436	9.2103	10.2110	12.2061	3.8712	2.3026	2.7726	11.2898	2.1972	2.4849	2.3026	11.9729	2.3026	2.9957	2.0794	10.6454	9.6024	11.4113
11.2023	0.0000	9.1621	11.5129	3.8712	1.6094	2.4849	9.6158	1.9459	0.0000	0.0000	12.3014	1.7918	1.6094	1.0986	9.9427	9.6158	10.6137
11.2898	0.0000	9.0825	11.5129	3.5835	1.3863	2.7726	10.7144	1.7918	0.0000	0.4055	13.4545	1.3863	1.3863	1.3863	9.0119	7.1701	10.6213
9.9035	0.0000	7.6009	10.1266	3.1781	1.3863	2.7081	10.1266	2.0794	0.0000	0.0000	11.7035	1.6094	1.0986	1.0986	9.0119	7.8633	9.5750
9.9035	0.0000	7.6009	10.8198	3.1781	1.0986	2.7081	0.0000	1.0986	0.0000	0.4055	10.5713	1.6094	1.3863	0.6931	8.1887	7.1701	9.2873
10.1266	0.0000	8.5172	10.8198	3.5264	0.0953	2.0794	0.0000	1.6094	3.6376	0.4055	13.0485	1.3863	0.6931	0.6931	8.3664	6.8876	8.7160
9.3927	0.0000	7.4265	10.3090	3.6376	1.7918	2.0794	0.0000	1.7918	2.6391	0.4055	12.1730	1.6094	1.0986	1.0986	8.4118	8.0709	9.9570
9.6158	0.0000	7.3132	10.1266	3.4657	1.0986	1.6094	0.0000	2.0794	2.6391	0.4055	12.6492	1.6094	1.3863	0.6931	8.3187	7.1701	9.7172
10.1266	0.0000	8.0864	12.2061	4.1897	2.3026	2.6391	0.0000	2.3026	0.0000	0.6931	12.3393	1.6094	1.3863	1.0986	8.6482	7.2079	9.3057
11.0021	0.0000	9.1050	12.4490	3.9120	1.0986	2.3026	0.0000	2.1972	2.6391	0.0000	12.7939	1.3863	1.6094	1.3863	9.3414	8.5564	9.7527
9.2103	0.0000	7.1701	12.6115	3.2189	0.0000	2.0794	8.5172	1.3863	0.0000	0.0000	10.4043	1.3863	0.6931	0.6931	6.2146	6.2916	7.9374

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
9.2103	0.0000	6.9078	11.0021	3.5835	1.0986	-0.6931	0.0000	1.9459	0.0000	0.6931	12.8291	1.3863	0.6931	0.6931	8.5172	7.1701	7.9374
9.9035	9.2103	7.6962	10.4631	3.3322	1.0986	2.4849	9.2103	1.0986	0.0000	0.0000	11.9184	1.3863	1.3863	0.0000	8.2940	7.1701	8.3187
11.2898	0.0000	9.0825	12.4292	3.2581	1.7918	2.7081	0.0000	1.3863	0.0000	0.4055	12.8967	1.6094	1.6094	1.3863	9.8522	8.5564	11.2385
11.1563	0.0000	9.4415	11.9184	3.2958	1.3863	2.7081	10.3090	2.0794	0.0000	0.4055	12.1007	1.3863	1.7918	1.0986	8.8537	7.2442	10.0078
11.6245	0.0000	9.5042	12.6115	3.9890	-0.2877	2.4849	10.8198	1.9459	3.1781	0.6931	10.7536	1.3863	2.4849	1.6094	9.9330	5.5607	11.3242
9.9804	0.0000	7.6779	10.5966	3.6889	1.0986	1.6094	0.0000	2.3026	3.1781	0.6931	11.0021	1.3863	1.3863	0.6931	8.4118	7.8633	8.8537
11.9184	9.9035	10.1464	12.6115	3.3322	1.5041	2.7081	10.2449	1.3863	3.4012	0.6931	12.7293	2.9957	1.6094	1.7918	11.3445	10.7144	9.2591
10.3090	8.5172	7.9010	11.4076	3.6636	2.3979	2.7726	9.6803	2.4849	3.6376	1.7918	12.3758	2.7726	1.3863	0.6931	9.6225	8.0064	9.1695
11.0021	9.2103	9.3927	11.1563	3.4012	1.3863	2.4849	0.0000	1.7918	3.1781	0.4055	10.3859	2.8904	0.6931	1.0986	8.1605	7.3132	9.3501
11.9050	9.2103	10.1902	12.2061	3.4657	0.9163	2.7726	10.3417	1.7918	3.5835	0.6931	11.5712	2.7726	1.7918	1.7918	9.5468	7.9194	11.2997
11.9184	9.9035	9.6158	12.2061	3.8918	2.3026	2.4849	0.0000	2.7081	2.4849	1.0986	13.1993	3.4012	2.0794	1.7918	11.5327	9.6158	11.4927
9.6158	8.5172	7.3132	10.8198	3.6376	2.3026	2.7726	9.6158	2.7081	3.1781	1.3863	12.3172	2.5649	1.0986	0.6931	10.1581	8.4118	9.1215
10.8198	0.0000	8.5172	11.5129	3.8067	1.6094	2.7726	9.9035	2.9957	3.5835	1.3863	8.1887	2.9957	1.6094	1.0986	10.3288	8.4118	9.6709
10.8198	8.5172	8.4118	11.4076	4.0254	2.6391	2.7726	0.0000	2.1972	3.5835	0.4055	12.2577	2.7081	1.3863	1.0986	9.6803	8.0064	8.8465
11.5129	10.8198	9.2103	12.4607	3.4012	1.0986	2.7726	9.9523	1.9459	3.7842	0.4055	11.7722	2.8332	1.9459	1.6094	9.9523	8.1017	11.3314
11.1563	8.9872	9.0360	11.8494	3.6636	1.0986	2.7726	9.9035	2.0794	3.1781	1.3863	11.2332	3.0445	1.3863	1.3863	7.8240	7.6962	8.9092
10.4341	9.2103	8.1315	11.4927	3.6636	2.9957	2.7726	10.3090	3.4012	3.7377	1.0986	11.6742	2.7081	1.0986	0.6931	11.3145	9.7981	8.4446
11.1563	10.3090	9.3843	11.8494	3.6109	0.9163	2.7726	10.3136	1.3863	3.5553	0.6931	11.6307	3.4012	1.3863	1.3863	10.4282	8.0064	8.7948
10.5966	8.5172	8.0709	11.2898	3.6109	2.1972	2.7726	0.0000	1.3863	0.0000	0.6931	11.2922	3.4012	1.3863	1.0986	8.7948	7.8633	8.1747
11.1563	0.0000	9.3237	11.6952	3.9512	2.3026	2.9444	10.8198	1.9459	0.0000	0.0000	12.7468	2.7081	1.6094	1.3863	10.4574	9.1050	9.5030
10.8198	10.3090	9.1050	11.5129	3.6376	1.6094	2.0794	0.0000	1.3863	3.1781	1.0986	11.1591	2.9957	1.0986	1.6094	8.7641	7.7187	9.2686
13.9553	11.9184	12.2405	13.5278	3.7612	2.7081	2.4849	0.0000	2.7726	0.0000	2.4849	13.9342	1.2528	1.9459	1.6094	11.7440	10.0213	12.6854
12.2061	11.5129	10.4913	12.7939	3.7612	1.0986	2.6391	10.5966	1.7918	3.8286	2.3026	12.6281	1.3863	2.3979	2.0794	10.1346	8.4118	12.1495
12.2381	11.1563	10.5233	13.1224	3.4012	1.0986	2.6391	10.4913	1.0986	0.0000	1.0986	12.6256	0.6931	2.3026	1.9459	10.1346	8.4118	11.5258
13.3847	10.8198	11.6699	13.1224	4.0073	2.9957	1.0986	10.7144	1.7918	0.0000	2.0794	14.3694	0.4055	2.3026	2.5649	12.0317	10.3090	12.2061
11.5129	10.8198	9.6803	13.1224	3.3673	1.7918	2.7726	10.9151	1.0986	0.0000	0.6931	13.0316	0.6931	1.7918	1.6094	10.8198	9.1050	11.3964

dd for agri-credit	Loan rationing	Interest	Value of collateral	Age of farmer	Size of land	level of education	Salary per month	Household members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
11.1563	10.3090	9.3237	12.2061	3.5835	0.0000	2.0794	0.0000	2.3026	0.0000	1.9459	11.1900	1.0986	1.3863	1.3863	9.0360	7.3132	9.2873
12.4292	11.5129	10.5966	12.6115	3.8712	1.4183	0.6931	0.0000	2.3026	0.0000	1.3863	11.9608	1.3863	2.1972	2.3026	10.5401	8.9227	12.0033
11.1563	10.8198	9.3237	11.8130	3.4340	0.6931	2.0794	0.0000	1.9459	2.4849	1.0986	12.5908	0.6931	1.6094	1.3863	9.6550	8.0064	9.2350
11.5129	10.8198	9.6803	12.6115	3.0910	0.6931	2.7726	10.4631	1.6094	0.0000	1.3863	11.9184	0.6931	1.6094	1.6094	9.7291	8.0064	10.8780
11.9184	10.8198	10.0858	13.0170	4.0943	0.6931	2.0794	0.0000	1.6094	0.0000	1.7918	12.9569	1.2528	1.6094	1.7918	9.7291	8.0064	11.3433
11.9184	10.8198	10.0858	12.6115	3.5553	1.0986	2.7726	0.0000	1.6094	3.5835	1.6094	12.5078	1.6094	1.6094	1.9459	10.1346	8.4118	11.3433
11.0021	10.1266	9.1695	12.2061	3.2958	0.0000	2.6391	0.0000	0.6931	0.0000	0.0000	12.2638	-0.6931	0.6931	1.3863	9.0360	7.3132	9.2301
13.3847	9.9035	11.5521	13.9978	4.1744	2.4849	2.3979	10.7144	2.0794	0.0000	1.9459	14.3183	0.6931	2.7081	1.9459	11.4721	9.7981	12.1172
11.0021	10.5966	9.1695	12.4292	3.6109	0.4055	2.4849	0.0000	1.0986	0.0000	0.6931	11.5129	0.9163	1.0986	0.0000	9.4650	8.0064	9.8037
10.7144	9.2103	8.8818	12.4292	3.4657	0.4055	2.4849	9.9035	1.0986	3.1781	1.7918	12.8160	0.4055	1.3863	1.7918	9.4650	8.0064	9.4727

Un-transformed Data

dd for agri-credit	Loan rationing	Interest rate	Value of collateral	Age of farmer	Size of land	level of educ	Salary per month	HH members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
76600.00	2000.00	16.00	80000.00	27.00	5.00	14.00	28000.00	5.00	8.00	1.00	336000.00	6.00	5.00	3.00	21000.00	7400.00	48150.00
202400.00	1.00	14.00	250000.00	35.00	7.00	14.00	60000.00	4.00	30.00	2.00	2808500.00	4.00	7.00	8.00	37500.00	14400.00	101800.00
247200.00	1.00	13.00	300000.00	53.00	12.00	12.00	110000.00	7.00	26.00	3.00	607200.00	6.00	23.00	10.00	49200.00	18000.00	113200.00
59000.00	1.00	12.00	150000.00	38.00	2.00	14.00	1.00	5.00	1.00	1.00	232000.00	4.00	3.00	3.00	17500.00	7500.00	30950.00
183000.00	1.00	24.00	240000.00	37.00	7.00	7.00	1.00	11.00	26.00	4.00	852000.00	4.00	12.00	5.00	30000.00	18000.00	92800.00
104800.00	15000.00	19.00	200000.00	29.00	3.00	12.00	1.00	3.00	12.00	1.50	129415.00	4.00	4.00	5.00	24000.00	7400.00	89500.00
50500.00	3000.00	19.00	150000.00	29.00	6.00	14.00	1.00	5.00	8.00	3.00	141800.00	4.00	5.00	3.00	31000.00	7000.00	30000.00
69000.00	3000.00	12.00	170000.00	27.00	5.00	14.00	1.00	7.00	1.00	3.00	219900.00	4.00	3.00	4.00	53000.00	9000.00	30500.00
108400.00	4000.00	15.00	200000.00	68.00	29.00	5.00	1.00	17.00	8.00	3.00	446300.00	4.00	13.00	5.00	79500.00	28800.00	99500.00
333950.00	10000.00	12.00	300000.00	40.00	2.50	16.00	39000.00	4.00	1.00	1.00	95000.00	4.00	6.00	10.00	24000.00	7400.00	130700.00
351500.00	13000.00	12.00	350000.00	43.00	25.00	12.00	1.00	8.00	8.00	6.00	625150.00	4.00	10.00	11.00	187500.00	42600.00	195000.00
220000.00	1.00	15.00	250000.00	32.00	12.00	16.00	110000.00	7.00	1.00	6.00	153000.00	6.00	4.00	7.00	91500.00	29600.00	159500.00
190500.00	1.00	15.00	240000.00	25.00	15.00	16.00	65000.00	4.00	1.00	3.00	1223000.00	7.00	2.00	8.00	70500.00	27000.00	104000.00
170000.00	10000.00	16.00	200000.00	48.00	10.00	16.00	80000.00	9.00	12.00	10.00	158400.00	10.00	20.00	8.00	42000.00	14800.00	90334.00
73300.00	1.00	13.00	100000.00	48.00	5.00	12.00	15000.00	7.00	1.00	1.00	220000.00	6.00	5.00	3.00	20800.00	15000.00	40690.00
80000.00	1.00	11.00	100000.00	36.00	4.00	16.00	45000.00	6.00	1.00	1.50	697000.00	4.00	4.00	4.00	8200.00	1300.00	41000.00
20000.00	1.00	10.00	25000.00	24.00	4.00	15.00	25000.00	8.00	1.00	1.00	121000.00	5.00	3.00	3.00	8200.00	2600.00	14400.00
20000.00	1.00	10.00	50000.00	24.00	3.00	15.00	1.00	3.00	1.00	1.50	39000.00	5.00	4.00	2.00	3600.00	1300.00	10800.00
25000.00	1.00	20.00	50000.00	34.00	1.10	8.00	1.00	5.00	38.00	1.50	464400.00	4.00	2.00	2.00	4300.00	980.00	6100.00
12000.00	1.00	14.00	30000.00	38.00	6.00	8.00	1.00	6.00	14.00	1.50	193500.00	5.00	3.00	3.00	4500.00	3200.00	21100.00
15000.00	1.00	10.00	25000.00	32.00	3.00	5.00	1.00	8.00	14.00	1.50	311500.00	5.00	4.00	2.00	4100.00	1300.00	16600.00
25000.00	1.00	13.00	200000.00	66.00	10.00	14.00	1.00	10.00	1.00	2.00	228500.00	5.00	4.00	3.00	5700.00	1350.00	11000.00
60000.00	1.00	15.00	255000.00	50.00	3.00	10.00	1.00	9.00	14.00	1.00	360000.00	4.00	5.00	4.00	11400.00	5200.00	17200.00
10000.00	1.00	13.00	300000.00	25.00	1.00	8.00	5000.00	4.00	1.00	1.00	33000.00	4.00	2.00	2.00	500.00	540.00	2800.00
10000.00	1.00	10.00	60000.00	36.00	3.00	0.50	1.00	7.00	1.00	2.00	372900.00	4.00	2.00	2.00	5000.00	1300.00	2800.00
20000.00	10000.00	11.00	35000.00	28.00	3.00	12.00	10000.00	3.00	1.00	1.00	150000.00	4.00	4.00	1.00	4000.00	1300.00	4100.00
80000.00	1.00	11.00	250000.00	26.00	6.00	15.00	1.00	4.00	1.00	1.50	399000.00	5.00	5.00	4.00	19000.00	5200.00	76000.00
70000.00	1.00	18.00	150000.00	27.00	4.00	15.00	30000.00	8.00	1.00	1.50	180000.00	4.00	6.00	3.00	7000.00	1400.00	22200.00
111800.00	1.00	12.00	300000.00	54.00	0.75	12.00	50000.00	7.00	24.00	2.00	46800.00	4.00	12.00	5.00	20600.00	260.00	82800.00
21600.00	1.00	10.00	40000.00	40.00	3.00	5.00	1.00	10.00	24.00	2.00	60000.00	4.00	4.00	2.00	4500.00	2600.00	7000.00
150000.00	20000.00	17.00	300000.00	28.00	4.50	15.00	28140.00	4.00	30.00	2.00	337500.00	20.00	5.00	6.00	84500.00	45000.00	10500.00
30000.00	5000.00	9.00	90000.00	39.00	11.00	16.00	16000.00	12.00	38.00	6.00	237000.00	16.00	4.00	2.00	15100.00	3000.00	9600.00
60000.00	10000.00	20.00	70000.00	30.00	4.00	12.00	1.00	6.00	24.00	1.50	32400.00	18.00	2.00	3.00	3500.00	1500.00	11500.00
148000.00	10000.00	18.00	200000.00	32.00	2.50	16.00	31000.00	6.00	36.00	2.00	106000.00	16.00	6.00	6.00	14000.00	2750.00	80800.00
150000.00	20000.00	10.00	200000.00	49.00	10.00	12.00	1.00	15.00	12.00	3.00	540000.00	30.00	8.00	6.00	102000.00	15000.00	98000.00
15000.00	5000.00	10.00	50000.00	38.00	10.00	16.00	15000.00	15.00	24.00	4.00	223500.00	13.00	3.00	2.00	25800.00	4500.00	9150.00
50000.00	1.00	10.00	100000.00	45.00	5.00	16.00	20000.00	20.00	36.00	4.00	3600.00	20.00	5.00	3.00	30600.00	4500.00	15850.00
50000.00	5000.00	9.00	90000.00	56.00	14.00	16.00	1.00	9.00	36.00	1.50	210600.00	15.00	4.00	3.00	16000.00	3000.00	6950.00

dd for agri-credit	Loan rationing	Interest rate	Value of collateral	Age of farmer	Size of land	level of educ	Salary per month	HH members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
100000.00	50000.00	10.00	258000.00	30.00	3.00	16.00	21000.00	7.00	44.00	1.50	129600.00	17.00	7.00	5.00	21000.00	3300.00	83400.00
70000.00	8000.00	12.00	140000.00	39.00	3.00	16.00	20000.00	8.00	24.00	4.00	75600.00	21.00	4.00	4.00	2500.00	2200.00	7400.00
34000.00	10000.00	10.00	98000.00	39.00	20.00	16.00	30000.00	30.00	42.00	3.00	117500.00	15.00	3.00	2.00	82000.00	18000.00	4650.00
70000.00	30000.00	17.00	140000.00	37.00	2.50	16.00	30140.00	4.00	35.00	2.00	112500.00	30.00	4.00	4.00	33800.00	3000.00	6600.00
40000.00	5000.00	8.00	80000.00	37.00	9.00	16.00	1.00	4.00	1.00	2.00	80190.00	30.00	4.00	3.00	6600.00	2600.00	3550.00
70000.00	1.00	16.00	120000.00	52.00	10.00	19.00	50000.00	7.00	1.00	1.00	343440.00	15.00	5.00	4.00	34800.00	9000.00	13400.00
50000.00	30000.00	18.00	100000.00	38.00	5.00	8.00	1.00	4.00	24.00	3.00	70200.00	20.00	3.00	5.00	6400.00	2250.00	10600.00
1150000.00	150000.00	18.00	750000.00	43.00	15.00	12.00	1.00	16.00	1.00	12.00	1126050.00	3.50	7.00	5.00	126000.00	22500.00	323000.00
200000.00	100000.00	18.00	360000.00	43.00	3.00	14.00	40000.00	6.00	46.00	10.00	305000.00	4.00	11.00	8.00	25200.00	4500.00	189000.00
206500.00	70000.00	18.00	500000.00	30.00	3.00	14.00	36000.00	3.00	1.00	3.00	304250.00	2.00	10.00	7.00	25200.00	4500.00	101300.00
650000.00	50000.00	18.00	500000.00	55.00	20.00	3.00	45000.00	6.00	1.00	8.00	1740000.00	1.50	10.00	13.00	168000.00	30000.00	200000.00
100000.00	50000.00	16.00	500000.00	29.00	6.00	16.00	55000.00	3.00	1.00	2.00	456600.00	2.00	6.00	5.00	50000.00	9000.00	89000.00
70000.00	30000.00	16.00	200000.00	36.00	1.00	8.00	1.00	10.00	1.00	7.00	72400.00	3.00	4.00	4.00	8400.00	1500.00	10800.00
250000.00	100000.00	16.00	300000.00	48.00	4.13	0.50	1.00	10.00	1.00	4.00	156500.00	4.00	9.00	10.00	37800.00	7500.00	163300.00
70000.00	50000.00	16.00	135000.00	31.00	2.00	8.00	1.00	7.00	12.00	3.00	293850.00	0.50	5.00	4.00	15600.00	3000.00	10250.00
100000.00	50000.00	16.00	300000.00	22.00	2.00	16.00	35000.00	5.00	1.00	4.00	150000.00	0.50	5.00	5.00	16800.00	3000.00	53000.00
150000.00	50000.00	16.00	450000.00	60.00	2.00	8.00	1.00	5.00	1.00	6.00	423750.00	3.50	5.00	6.00	16800.00	3000.00	84400.00
150000.00	50000.00	16.00	300000.00	35.00	3.00	16.00	1.00	5.00	36.00	5.00	270450.00	5.00	5.00	7.00	25200.00	4500.00	84400.00
60000.00	25000.00	16.00	200000.00	27.00	1.00	14.00	1.00	2.00	1.00	1.00	211875.00	0.50	2.00	4.00	8400.00	1500.00	10200.00
650000.00	20000.00	16.00	1200000.00	65.00	12.00	11.00	45000.00	8.00	1.00	7.00	1653300.00	2.00	15.00	7.00	96000.00	18000.00	183000.00
60000.00	40000.00	16.00	250000.00	37.00	1.50	12.00	1.00	3.00	1.00	2.00	100000.00	2.50	3.00	1.00	12900.00	3000.00	18100.00
45000.00	10000.00	16.00	250000.00	32.00	1.50	12.00	20000.00	3.00	24.00	6.00	368050.00	1.50	4.00	6.00	12900.00	3000.00	13000.00
76600.00	2000.00	16.00	80000.00	27.00	5.00	14.00	28000.00	5.00	8.00	1.00	336000.00	6.00	5.00	3.00	21000.00	7400.00	48150.00
202400.00	1.00	14.00	250000.00	35.00	7.00	14.00	60000.00	4.00	30.00	2.00	2808500.00	4.00	7.00	8.00	37500.00	14400.00	101800.00
247200.00	1.00	13.00	300000.00	53.00	12.00	12.00	110000.00	7.00	26.00	3.00	607200.00	6.00	23.00	10.00	49200.00	18000.00	113200.00
59000.00	1.00	12.00	150000.00	38.00	2.00	14.00	1.00	5.00	1.00	1.00	232000.00	4.00	3.00	3.00	17500.00	7500.00	30950.00
183000.00	1.00	24.00	240000.00	37.00	7.00	7.00	1.00	11.00	26.00	4.00	852000.00	4.00	12.00	5.00	30000.00	18000.00	92800.00
104800.00	15000.00	19.00	200000.00	29.00	3.00	12.00	1.00	3.00	12.00	1.50	129415.00	4.00	4.00	5.00	24000.00	7400.00	89500.00
50500.00	3000.00	19.00	150000.00	29.00	6.00	14.00	1.00	5.00	8.00	3.00	141800.00	4.00	5.00	3.00	31000.00	7000.00	30000.00
69000.00	3000.00	12.00	170000.00	27.00	5.00	14.00	1.00	7.00	1.00	3.00	219900.00	4.00	3.00	4.00	53000.00	9000.00	30500.00
108400.00	4000.00	15.00	200000.00	68.00	29.00	5.00	1.00	17.00	8.00	3.00	446300.00	4.00	13.00	5.00	79500.00	28800.00	99500.00
333950.00	10000.00	12.00	300000.00	40.00	2.50	16.00	39000.00	4.00	1.00	1.00	95000.00	4.00	6.00	10.00	24000.00	7400.00	130700.00
351500.00	13000.00	12.00	350000.00	43.00	25.00	12.00	1.00	8.00	8.00	6.00	625150.00	4.00	10.00	11.00	187500.00	42600.00	195000.00
220000.00	1.00	15.00	250000.00	32.00	12.00	16.00	110000.00	7.00	1.00	6.00	153000.00	6.00	4.00	7.00	91500.00	29600.00	159500.00
190500.00	1.00	15.00	240000.00	25.00	15.00	16.00	65000.00	4.00	1.00	3.00	1223000.00	7.00	2.00	8.00	70500.00	27000.00	104000.00
170000.00	10000.00	16.00	200000.00	48.00	10.00	16.00	80000.00	9.00	12.00	10.00	158400.00	10.00	20.00	8.00	42000.00	14800.00	90334.00
73300.00	1.00	13.00	100000.00	48.00	5.00	12.00	15000.00	7.00	1.00	1.00	220000.00	6.00	5.00	3.00	20800.00	15000.00	40690.00
80000.00	1.00	11.00	100000.00	36.00	4.00	16.00	45000.00	6.00	1.00	1.50	697000.00	4.00	4.00	4.00	8200.00	1300.00	41000.00
20000.00	1.00	10.00	25000.00	24.00	4.00	15.00	25000.00	8.00	1.00	1.00	121000.00	5.00	3.00	3.00	8200.00	2600.00	14400.00
20000.00	1.00	10.00	50000.00	24.00	3.00	15.00	1.00	3.00	1.00	1.50	39000.00	5.00	4.00	2.00	3600.00	1300.00	10800.00
25000.00	1.00	20.00	50000.00	34.00	1.10	8.00	1.00	5.00	38.00	1.50	464400.00	4.00	2.00	2.00	4300.00	980.00	6100.00

dd for agri-credit	Loan rationing	Interest rate	Value of collateral	Age of farmer	Size of land	level of educ	Salary per month	HH members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
12000.00	1.00	14.00	30000.00	38.00	6.00	8.00	1.00	6.00	14.00	1.50	193500.00	5.00	3.00	3.00	4500.00	3200.00	21100.00
15000.00	1.00	10.00	25000.00	32.00	3.00	5.00	1.00	8.00	14.00	1.50	311500.00	5.00	4.00	2.00	4100.00	1300.00	16600.00
25000.00	1.00	13.00	200000.00	66.00	10.00	14.00	1.00	10.00	1.00	2.00	228500.00	5.00	4.00	3.00	5700.00	1350.00	11000.00
60000.00	1.00	15.00	255000.00	50.00	3.00	10.00	1.00	9.00	14.00	1.00	360000.00	4.00	5.00	4.00	11400.00	5200.00	17200.00
10000.00	1.00	13.00	300000.00	25.00	1.00	8.00	5000.00	4.00	1.00	1.00	33000.00	4.00	2.00	2.00	500.00	540.00	2800.00
10000.00	1.00	10.00	60000.00	36.00	3.00	0.50	1.00	7.00	1.00	2.00	372900.00	4.00	2.00	2.00	5000.00	1300.00	2800.00
20000.00	10000.00	11.00	35000.00	28.00	3.00	12.00	10000.00	3.00	1.00	1.00	150000.00	4.00	4.00	1.00	4000.00	1300.00	4100.00
80000.00	1.00	11.00	250000.00	26.00	6.00	15.00	1.00	4.00	1.00	1.50	399000.00	5.00	5.00	4.00	19000.00	5200.00	76000.00
70000.00	1.00	18.00	150000.00	27.00	4.00	15.00	30000.00	8.00	1.00	1.50	180000.00	4.00	6.00	3.00	7000.00	1400.00	22200.00
111800.00	1.00	12.00	300000.00	54.00	0.75	12.00	50000.00	7.00	24.00	2.00	46800.00	4.00	12.00	5.00	20600.00	260.00	82800.00
21600.00	1.00	10.00	40000.00	40.00	3.00	5.00	1.00	10.00	24.00	2.00	60000.00	4.00	4.00	2.00	4500.00	2600.00	7000.00
150000.00	20000.00	17.00	300000.00	28.00	4.50	15.00	28140.00	4.00	30.00	2.00	337500.00	20.00	5.00	6.00	84500.00	45000.00	10500.00
30000.00	5000.00	9.00	90000.00	39.00	11.00	16.00	16000.00	12.00	38.00	6.00	237000.00	16.00	4.00	2.00	15100.00	3000.00	9600.00
60000.00	10000.00	20.00	70000.00	30.00	4.00	12.00	1.00	6.00	24.00	1.50	32400.00	18.00	2.00	3.00	3500.00	1500.00	11500.00
148000.00	10000.00	18.00	200000.00	32.00	2.50	16.00	31000.00	6.00	36.00	2.00	106000.00	16.00	6.00	6.00	14000.00	2750.00	80800.00
150000.00	20000.00	10.00	200000.00	49.00	10.00	12.00	1.00	15.00	12.00	3.00	540000.00	30.00	8.00	6.00	102000.00	15000.00	98000.00
15000.00	5000.00	10.00	50000.00	38.00	10.00	16.00	15000.00	15.00	24.00	4.00	223500.00	13.00	3.00	2.00	25800.00	4500.00	9150.00
50000.00	1.00	10.00	100000.00	45.00	5.00	16.00	20000.00	20.00	36.00	4.00	3600.00	20.00	5.00	3.00	30600.00	4500.00	15850.00
50000.00	5000.00	9.00	90000.00	56.00	14.00	16.00	1.00	9.00	36.00	1.50	210600.00	15.00	4.00	3.00	16000.00	3000.00	6950.00
100000.00	50000.00	10.00	258000.00	30.00	3.00	16.00	21000.00	7.00	44.00	1.50	129600.00	17.00	7.00	5.00	21000.00	3300.00	83400.00
70000.00	8000.00	12.00	140000.00	39.00	3.00	16.00	20000.00	8.00	24.00	4.00	75600.00	21.00	4.00	4.00	2500.00	2200.00	7400.00
34000.00	10000.00	10.00	98000.00	39.00	20.00	16.00	30000.00	30.00	42.00	3.00	117500.00	15.00	3.00	2.00	82000.00	18000.00	4650.00
70000.00	30000.00	17.00	140000.00	37.00	2.50	16.00	30140.00	4.00	35.00	2.00	112500.00	30.00	4.00	4.00	33800.00	3000.00	6600.00
40000.00	5000.00	8.00	80000.00	37.00	9.00	16.00	1.00	4.00	1.00	2.00	80190.00	30.00	4.00	3.00	6600.00	2600.00	3550.00
70000.00	1.00	16.00	120000.00	52.00	10.00	19.00	50000.00	7.00	1.00	1.00	343440.00	15.00	5.00	4.00	34800.00	9000.00	13400.00
50000.00	30000.00	18.00	100000.00	38.00	5.00	8.00	1.00	4.00	24.00	3.00	70200.00	20.00	3.00	5.00	6400.00	2250.00	10600.00
1150000.00	150000.00	18.00	750000.00	43.00	15.00	12.00	1.00	16.00	1.00	12.00	1126050.00	3.50	7.00	5.00	126000.00	22500.00	323000.00
200000.00	100000.00	18.00	360000.00	43.00	3.00	14.00	40000.00	6.00	46.00	10.00	305000.00	4.00	11.00	8.00	25200.00	4500.00	189000.00
206500.00	70000.00	18.00	500000.00	30.00	3.00	14.00	36000.00	3.00	1.00	3.00	304250.00	2.00	10.00	7.00	25200.00	4500.00	101300.00
650000.00	50000.00	18.00	500000.00	55.00	20.00	3.00	45000.00	6.00	1.00	8.00	1740000.00	1.50	10.00	13.00	168000.00	30000.00	200000.00
100000.00	50000.00	16.00	500000.00	29.00	6.00	16.00	55000.00	3.00	1.00	2.00	456600.00	2.00	6.00	5.00	50000.00	9000.00	89000.00
70000.00	30000.00	16.00	200000.00	36.00	1.00	8.00	1.00	10.00	1.00	7.00	72400.00	3.00	4.00	4.00	8400.00	1500.00	10800.00
250000.00	100000.00	16.00	300000.00	48.00	4.13	0.50	1.00	10.00	1.00	4.00	156500.00	4.00	9.00	10.00	37800.00	7500.00	163300.00
70000.00	50000.00	16.00	135000.00	31.00	2.00	8.00	1.00	7.00	12.00	3.00	293850.00	0.50	5.00	4.00	15600.00	3000.00	10250.00
100000.00	50000.00	16.00	300000.00	22.00	2.00	16.00	35000.00	5.00	1.00	4.00	150000.00	0.50	5.00	5.00	16800.00	3000.00	53000.00
150000.00	50000.00	16.00	450000.00	60.00	2.00	8.00	1.00	5.00	1.00	6.00	423750.00	3.50	5.00	6.00	16800.00	3000.00	84400.00
150000.00	50000.00	16.00	300000.00	35.00	3.00	16.00	1.00	5.00	36.00	5.00	270450.00	5.00	5.00	7.00	25200.00	4500.00	84400.00
60000.00	25000.00	16.00	200000.00	27.00	1.00	14.00	1.00	2.00	1.00	1.00	211875.00	0.50	2.00	4.00	8400.00	1500.00	10200.00
650000.00	20000.00	16.00	1200000.00	65.00	12.00	11.00	45000.00	8.00	1.00	7.00	1653300.00	2.00	15.00	7.00	96000.00	18000.00	183000.00
60000.00	40000.00	16.00	250000.00	37.00	1.50	12.00	1.00	3.00	1.00	2.00	100000.00	2.50	3.00	1.00	12900.00	3000.00	18100.00
45000.00	10000.00	16.00	250000.00	32.00	1.50	12.00	20000.00	3.00	24.00	6.00	368050.00	1.50	4.00	6.00	12900.00	3000.00	13000.00

dd for agri-credit	Loan rationing	Interest rate	Value of collateral	Age of farmer	Size of land	level of educ	Salary per month	HH members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
76600.00	2000.00	16.00	80000.00	27.00	5.00	14.00	28000.00	5.00	8.00	1.00	336000.00	6.00	5.00	3.00	21000.00	7400.00	48150.00
202400.00	1.00	14.00	250000.00	35.00	7.00	14.00	60000.00	4.00	30.00	2.00	2808500.00	4.00	7.00	8.00	37500.00	14400.00	101800.00
247200.00	1.00	13.00	300000.00	53.00	12.00	12.00	110000.00	7.00	26.00	3.00	607200.00	6.00	23.00	10.00	49200.00	18000.00	113200.00
59000.00	1.00	12.00	150000.00	38.00	2.00	14.00	1.00	5.00	1.00	1.00	232000.00	4.00	3.00	3.00	17500.00	7500.00	30950.00
183000.00	1.00	24.00	240000.00	37.00	7.00	7.00	1.00	11.00	26.00	4.00	852000.00	4.00	12.00	5.00	30000.00	18000.00	92800.00
104800.00	15000.00	19.00	200000.00	29.00	3.00	12.00	1.00	3.00	12.00	1.50	129415.00	4.00	4.00	5.00	24000.00	7400.00	89500.00
50500.00	3000.00	19.00	150000.00	29.00	6.00	14.00	1.00	5.00	8.00	3.00	141800.00	4.00	5.00	3.00	31000.00	7000.00	30000.00
69000.00	3000.00	12.00	170000.00	27.00	5.00	14.00	1.00	7.00	1.00	3.00	219900.00	4.00	3.00	4.00	53000.00	9000.00	30500.00
108400.00	4000.00	15.00	200000.00	68.00	29.00	5.00	1.00	17.00	8.00	3.00	446300.00	4.00	13.00	5.00	79500.00	28800.00	99500.00
333950.00	10000.00	12.00	300000.00	40.00	2.50	16.00	39000.00	4.00	1.00	1.00	95000.00	4.00	6.00	10.00	24000.00	7400.00	130700.00
351500.00	13000.00	12.00	350000.00	43.00	25.00	12.00	1.00	8.00	8.00	6.00	625150.00	4.00	10.00	11.00	187500.00	42600.00	195000.00
220000.00	1.00	15.00	250000.00	32.00	12.00	16.00	110000.00	7.00	1.00	6.00	153000.00	6.00	4.00	7.00	91500.00	29600.00	159500.00
190500.00	1.00	15.00	240000.00	25.00	15.00	16.00	65000.00	4.00	1.00	3.00	1223000.00	7.00	2.00	8.00	70500.00	27000.00	104000.00
170000.00	10000.00	16.00	200000.00	48.00	10.00	16.00	80000.00	9.00	12.00	10.00	158400.00	10.00	20.00	8.00	42000.00	14800.00	90334.00
73300.00	1.00	13.00	100000.00	48.00	5.00	12.00	15000.00	7.00	1.00	1.00	220000.00	6.00	5.00	3.00	20800.00	15000.00	40690.00
80000.00	1.00	11.00	100000.00	36.00	4.00	16.00	45000.00	6.00	1.00	1.50	697000.00	4.00	4.00	4.00	8200.00	1300.00	41000.00
20000.00	1.00	10.00	25000.00	24.00	4.00	15.00	25000.00	8.00	1.00	1.00	121000.00	5.00	3.00	3.00	8200.00	2600.00	14400.00
20000.00	1.00	10.00	50000.00	24.00	3.00	15.00	1.00	3.00	1.00	1.50	39000.00	5.00	4.00	2.00	3600.00	1300.00	10800.00
25000.00	1.00	20.00	50000.00	34.00	1.10	8.00	1.00	5.00	38.00	1.50	464400.00	4.00	2.00	2.00	4300.00	980.00	6100.00
12000.00	1.00	14.00	30000.00	38.00	6.00	8.00	1.00	6.00	14.00	1.50	193500.00	5.00	3.00	3.00	4500.00	3200.00	21100.00
15000.00	1.00	10.00	25000.00	32.00	3.00	5.00	1.00	8.00	14.00	1.50	311500.00	5.00	4.00	2.00	4100.00	1300.00	16600.00
25000.00	1.00	13.00	200000.00	66.00	10.00	14.00	1.00	10.00	1.00	2.00	228500.00	5.00	4.00	3.00	5700.00	1350.00	11000.00
60000.00	1.00	15.00	255000.00	50.00	3.00	10.00	1.00	9.00	14.00	1.00	360000.00	4.00	5.00	4.00	11400.00	5200.00	17200.00
10000.00	1.00	13.00	300000.00	25.00	1.00	8.00	5000.00	4.00	1.00	1.00	33000.00	4.00	2.00	2.00	500.00	540.00	2800.00
10000.00	1.00	10.00	60000.00	36.00	3.00	0.50	1.00	7.00	1.00	2.00	372900.00	4.00	2.00	2.00	5000.00	1300.00	2800.00
20000.00	10000.00	11.00	35000.00	28.00	3.00	12.00	10000.00	3.00	1.00	1.00	150000.00	4.00	4.00	1.00	4000.00	1300.00	4100.00
80000.00	1.00	11.00	250000.00	26.00	6.00	15.00	1.00	4.00	1.00	1.50	399000.00	5.00	5.00	4.00	19000.00	5200.00	76000.00
70000.00	1.00	18.00	150000.00	27.00	4.00	15.00	30000.00	8.00	1.00	1.50	180000.00	4.00	6.00	3.00	7000.00	1400.00	22200.00
111800.00	1.00	12.00	300000.00	54.00	0.75	12.00	50000.00	7.00	24.00	2.00	46800.00	4.00	12.00	5.00	20600.00	260.00	82800.00
21600.00	1.00	10.00	40000.00	40.00	3.00	5.00	1.00	10.00	24.00	2.00	60000.00	4.00	4.00	2.00	4500.00	2600.00	7000.00
150000.00	20000.00	17.00	300000.00	28.00	4.50	15.00	28140.00	4.00	30.00	2.00	337500.00	20.00	5.00	6.00	84500.00	45000.00	10500.00
30000.00	5000.00	9.00	90000.00	39.00	11.00	16.00	16000.00	12.00	38.00	6.00	237000.00	16.00	4.00	2.00	15100.00	3000.00	9600.00
60000.00	10000.00	20.00	70000.00	30.00	4.00	12.00	1.00	6.00	24.00	1.50	32400.00	18.00	2.00	3.00	3500.00	1500.00	11500.00
148000.00	10000.00	18.00	200000.00	32.00	2.50	16.00	31000.00	6.00	36.00	2.00	106000.00	16.00	6.00	6.00	14000.00	2750.00	80800.00
150000.00	20000.00	10.00	200000.00	49.00	10.00	12.00	1.00	15.00	12.00	3.00	540000.00	30.00	8.00	6.00	102000.00	15000.00	98000.00
15000.00	5000.00	10.00	50000.00	38.00	10.00	16.00	15000.00	15.00	24.00	4.00	223500.00	13.00	3.00	2.00	25800.00	4500.00	9150.00
50000.00	1.00	10.00	100000.00	45.00	5.00	16.00	20000.00	20.00	36.00	4.00	3600.00	20.00	5.00	3.00	30600.00	4500.00	15850.00
50000.00	5000.00	9.00	90000.00	56.00	14.00	16.00	1.00	9.00	36.00	1.50	210600.00	15.00	4.00	3.00	16000.00	3000.00	6950.00
100000.00	50000.00	10.00	258000.00	30.00	3.00	16.00	21000.00	7.00	44.00	1.50	129600.00	17.00	7.00	5.00	21000.00	3300.00	83400.00
70000.00	8000.00	12.00	140000.00	39.00	3.00	16.00	20000.00	8.00	24.00	4.00	75600.00	21.00	4.00	4.00	2500.00	2200.00	7400.00
34000.00	10000.00	10.00	98000.00	39.00	20.00	16.00	30000.00	30.00	42.00	3.00	117500.00	15.00	3.00	2.00	82000.00	18000.00	4650.00

dd for agri-credit	Loan rationing	Interest rate	Value of collateral	Age of farmer	Size of land	level of educ	Salary per month	HH members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
70000.00	30000.00	17.00	140000.00	37.00	2.50	16.00	30140.00	4.00	35.00	2.00	112500.00	30.00	4.00	4.00	33800.00	3000.00	6600.00
40000.00	5000.00	8.00	80000.00	37.00	9.00	16.00	1.00	4.00	1.00	2.00	80190.00	30.00	4.00	3.00	6600.00	2600.00	3550.00
70000.00	1.00	16.00	120000.00	52.00	10.00	19.00	50000.00	7.00	1.00	1.00	343440.00	15.00	5.00	4.00	34800.00	9000.00	13400.00
50000.00	30000.00	18.00	100000.00	38.00	5.00	8.00	1.00	4.00	24.00	3.00	70200.00	20.00	3.00	5.00	6400.00	2250.00	10600.00
1150000.00	150000.00	18.00	750000.00	43.00	15.00	12.00	1.00	16.00	1.00	12.00	1126050.00	3.50	7.00	5.00	126000.00	22500.00	323000.00
200000.00	100000.00	18.00	360000.00	43.00	3.00	14.00	40000.00	6.00	46.00	10.00	305000.00	4.00	11.00	8.00	25200.00	4500.00	189000.00
206500.00	70000.00	18.00	500000.00	30.00	3.00	14.00	36000.00	3.00	1.00	3.00	304250.00	2.00	10.00	7.00	25200.00	4500.00	101300.00
650000.00	50000.00	18.00	500000.00	55.00	20.00	3.00	45000.00	6.00	1.00	8.00	1740000.00	1.50	10.00	13.00	168000.00	30000.00	200000.00
100000.00	50000.00	16.00	500000.00	29.00	6.00	16.00	55000.00	3.00	1.00	2.00	456600.00	2.00	6.00	5.00	50000.00	9000.00	89000.00
70000.00	30000.00	16.00	200000.00	36.00	1.00	8.00	1.00	10.00	1.00	7.00	72400.00	3.00	4.00	4.00	8400.00	1500.00	10800.00
250000.00	100000.00	16.00	300000.00	48.00	4.13	0.50	1.00	10.00	1.00	4.00	156500.00	4.00	9.00	10.00	37800.00	7500.00	163300.00
70000.00	50000.00	16.00	135000.00	31.00	2.00	8.00	1.00	7.00	12.00	3.00	293850.00	0.50	5.00	4.00	15600.00	3000.00	10250.00
100000.00	50000.00	16.00	300000.00	22.00	2.00	16.00	35000.00	5.00	1.00	4.00	150000.00	0.50	5.00	5.00	16800.00	3000.00	53000.00
150000.00	50000.00	16.00	450000.00	60.00	2.00	8.00	1.00	5.00	1.00	6.00	423750.00	3.50	5.00	6.00	16800.00	3000.00	84400.00
150000.00	50000.00	16.00	300000.00	35.00	3.00	16.00	1.00	5.00	36.00	5.00	270450.00	5.00	5.00	7.00	25200.00	4500.00	84400.00
60000.00	25000.00	16.00	200000.00	27.00	1.00	14.00	1.00	2.00	1.00	1.00	211875.00	0.50	2.00	4.00	8400.00	1500.00	10200.00
650000.00	20000.00	16.00	1200000.00	65.00	12.00	11.00	45000.00	8.00	1.00	7.00	1653300.00	2.00	15.00	7.00	96000.00	18000.00	183000.00
60000.00	40000.00	16.00	250000.00	37.00	1.50	12.00	1.00	3.00	1.00	2.00	100000.00	2.50	3.00	1.00	12900.00	3000.00	18100.00
45000.00	10000.00	16.00	250000.00	32.00	1.50	12.00	20000.00	3.00	24.00	6.00	368050.00	1.50	4.00	6.00	12900.00	3000.00	13000.00
76600.00	2000.00	16.00	80000.00	27.00	5.00	14.00	28000.00	5.00	8.00	1.00	336000.00	6.00	5.00	3.00	21000.00	7400.00	48150.00
202400.00	1.00	14.00	250000.00	35.00	7.00	14.00	60000.00	4.00	30.00	2.00	2808500.00	4.00	7.00	8.00	37500.00	14400.00	101800.00
247200.00	1.00	13.00	300000.00	53.00	12.00	12.00	110000.00	7.00	26.00	3.00	607200.00	6.00	23.00	10.00	49200.00	18000.00	113200.00
59000.00	1.00	12.00	150000.00	38.00	2.00	14.00	1.00	5.00	1.00	1.00	232000.00	4.00	3.00	3.00	17500.00	7500.00	30950.00
183000.00	1.00	24.00	240000.00	37.00	7.00	7.00	1.00	11.00	26.00	4.00	852000.00	4.00	12.00	5.00	30000.00	18000.00	92800.00
104800.00	15000.00	19.00	200000.00	29.00	3.00	12.00	1.00	3.00	12.00	1.50	129415.00	4.00	4.00	5.00	24000.00	7400.00	89500.00
50500.00	3000.00	19.00	150000.00	29.00	6.00	14.00	1.00	5.00	8.00	3.00	141800.00	4.00	5.00	3.00	31000.00	7000.00	30000.00
69000.00	3000.00	12.00	170000.00	27.00	5.00	14.00	1.00	7.00	1.00	3.00	219900.00	4.00	3.00	4.00	53000.00	9000.00	30500.00
108400.00	4000.00	15.00	200000.00	68.00	29.00	5.00	1.00	17.00	8.00	3.00	446300.00	4.00	13.00	5.00	79500.00	28800.00	99500.00
333950.00	10000.00	12.00	300000.00	40.00	2.50	16.00	39000.00	4.00	1.00	1.00	95000.00	4.00	6.00	10.00	24000.00	7400.00	130700.00
351500.00	13000.00	12.00	350000.00	43.00	25.00	12.00	1.00	8.00	8.00	6.00	625150.00	4.00	10.00	11.00	187500.00	42600.00	195000.00
220000.00	1.00	15.00	250000.00	32.00	12.00	16.00	110000.00	7.00	1.00	6.00	153000.00	6.00	4.00	7.00	91500.00	29600.00	159500.00
190500.00	1.00	15.00	240000.00	25.00	15.00	16.00	65000.00	4.00	1.00	3.00	1223000.00	7.00	2.00	8.00	70500.00	27000.00	104000.00
170000.00	10000.00	16.00	200000.00	48.00	10.00	16.00	80000.00	9.00	12.00	10.00	158400.00	10.00	20.00	8.00	42000.00	14800.00	90334.00
73300.00	1.00	13.00	100000.00	48.00	5.00	12.00	15000.00	7.00	1.00	1.00	220000.00	6.00	5.00	3.00	20800.00	15000.00	40690.00
80000.00	1.00	11.00	100000.00	36.00	4.00	16.00	45000.00	6.00	1.00	1.50	697000.00	4.00	4.00	4.00	8200.00	1300.00	41000.00
20000.00	1.00	10.00	25000.00	24.00	4.00	15.00	25000.00	8.00	1.00	1.00	121000.00	5.00	3.00	3.00	8200.00	2600.00	14400.00
20000.00	1.00	10.00	50000.00	24.00	3.00	15.00	1.00	3.00	1.00	1.50	39000.00	5.00	4.00	2.00	3600.00	1300.00	10800.00
25000.00	1.00	20.00	50000.00	34.00	1.10	8.00	1.00	5.00	38.00	1.50	464400.00	4.00	2.00	2.00	4300.00	980.00	6100.00
12000.00	1.00	14.00	30000.00	38.00	6.00	8.00	1.00	6.00	14.00	1.50	193500.00	5.00	3.00	3.00	4500.00	3200.00	21100.00
15000.00	1.00	10.00	25000.00	32.00	3.00	5.00	1.00	8.00	14.00	1.50	311500.00	5.00	4.00	2.00	4100.00	1300.00	16600.00
25000.00	1.00	13.00	200000.00	66.00	10.00	14.00	1.00	10.00	1.00	2.00	228500.00	5.00	4.00	3.00	5700.00	1350.00	11000.00

dd for agri-credit	Loan rationing	Interest rate	Value of collateral	Age of farmer	Size of land	level of educ	Salary per month	HH members	period while in group	Extension service	Farm income	Distance to market	Years in farming	No of cattle	Value of fertilizer	Value of seeds	Value of labor
60000.00	1.00	15.00	255000.00	50.00	3.00	10.00	1.00	9.00	14.00	1.00	360000.00	4.00	5.00	4.00	11400.00	5200.00	17200.00
10000.00	1.00	13.00	300000.00	25.00	1.00	8.00	5000.00	4.00	1.00	1.00	33000.00	4.00	2.00	2.00	500.00	540.00	2800.00
10000.00	1.00	10.00	60000.00	36.00	3.00	0.50	1.00	7.00	1.00	2.00	372900.00	4.00	2.00	2.00	5000.00	1300.00	2800.00
20000.00	10000.00	11.00	35000.00	28.00	3.00	12.00	10000.00	3.00	1.00	1.00	150000.00	4.00	4.00	1.00	4000.00	1300.00	4100.00
80000.00	1.00	11.00	250000.00	26.00	6.00	15.00	1.00	4.00	1.00	1.50	399000.00	5.00	5.00	4.00	19000.00	5200.00	76000.00
70000.00	1.00	18.00	150000.00	27.00	4.00	15.00	30000.00	8.00	1.00	1.50	180000.00	4.00	6.00	3.00	7000.00	1400.00	22200.00
111800.00	1.00	12.00	300000.00	54.00	0.75	12.00	50000.00	7.00	24.00	2.00	46800.00	4.00	12.00	5.00	20600.00	260.00	82800.00
21600.00	1.00	10.00	40000.00	40.00	3.00	5.00	1.00	10.00	24.00	2.00	60000.00	4.00	4.00	2.00	4500.00	2600.00	7000.00
150000.00	20000.00	17.00	300000.00	28.00	4.50	15.00	28140.00	4.00	30.00	2.00	337500.00	20.00	5.00	6.00	84500.00	45000.00	10500.00
30000.00	5000.00	9.00	90000.00	39.00	11.00	16.00	16000.00	12.00	38.00	6.00	237000.00	16.00	4.00	2.00	15100.00	3000.00	9600.00
60000.00	10000.00	20.00	70000.00	30.00	4.00	12.00	1.00	6.00	24.00	1.50	32400.00	18.00	2.00	3.00	3500.00	1500.00	11500.00
148000.00	10000.00	18.00	200000.00	32.00	2.50	16.00	31000.00	6.00	36.00	2.00	106000.00	16.00	6.00	6.00	14000.00	2750.00	80800.00
150000.00	20000.00	10.00	200000.00	49.00	10.00	12.00	1.00	15.00	12.00	3.00	540000.00	30.00	8.00	6.00	102000.00	15000.00	98000.00
15000.00	5000.00	10.00	50000.00	38.00	10.00	16.00	15000.00	15.00	24.00	4.00	223500.00	13.00	3.00	2.00	25800.00	4500.00	9150.00
50000.00	1.00	10.00	100000.00	45.00	5.00	16.00	20000.00	20.00	36.00	4.00	3600.00	20.00	5.00	3.00	30600.00	4500.00	15850.00
50000.00	5000.00	9.00	90000.00	56.00	14.00	16.00	1.00	9.00	36.00	1.50	210600.00	15.00	4.00	3.00	16000.00	3000.00	6950.00
100000.00	50000.00	10.00	258000.00	30.00	3.00	16.00	21000.00	7.00	44.00	1.50	129600.00	17.00	7.00	5.00	21000.00	3300.00	83400.00
70000.00	8000.00	12.00	140000.00	39.00	3.00	16.00	20000.00	8.00	24.00	4.00	75600.00	21.00	4.00	4.00	2500.00	2200.00	7400.00
34000.00	10000.00	10.00	98000.00	39.00	20.00	16.00	30000.00	30.00	42.00	3.00	117500.00	15.00	3.00	2.00	82000.00	18000.00	4650.00
70000.00	30000.00	17.00	140000.00	37.00	2.50	16.00	30140.00	4.00	35.00	2.00	112500.00	30.00	4.00	4.00	33800.00	3000.00	6600.00
40000.00	5000.00	8.00	80000.00	37.00	9.00	16.00	1.00	4.00	1.00	2.00	80190.00	30.00	4.00	3.00	6600.00	2600.00	3550.00
70000.00	1.00	16.00	120000.00	52.00	10.00	19.00	50000.00	7.00	1.00	1.00	343440.00	15.00	5.00	4.00	34800.00	9000.00	13400.00
50000.00	30000.00	18.00	100000.00	38.00	5.00	8.00	1.00	4.00	24.00	3.00	70200.00	20.00	3.00	5.00	6400.00	2250.00	10600.00
1150000.00	150000.00	18.00	750000.00	43.00	15.00	12.00	1.00	16.00	1.00	12.00	1126050.00	3.50	7.00	5.00	126000.00	22500.00	323000.00
200000.00	100000.00	18.00	360000.00	43.00	3.00	14.00	40000.00	6.00	46.00	10.00	305000.00	4.00	11.00	8.00	25200.00	4500.00	189000.00
206500.00	70000.00	18.00	500000.00	30.00	3.00	14.00	36000.00	3.00	1.00	3.00	304250.00	2.00	10.00	7.00	25200.00	4500.00	101300.00
650000.00	50000.00	18.00	500000.00	55.00	20.00	3.00	45000.00	6.00	1.00	8.00	1740000.00	1.50	10.00	13.00	168000.00	30000.00	200000.00
100000.00	50000.00	16.00	500000.00	29.00	6.00	16.00	55000.00	3.00	1.00	2.00	456600.00	2.00	6.00	5.00	50000.00	9000.00	89000.00
70000.00	30000.00	16.00	200000.00	36.00	1.00	8.00	1.00	10.00	1.00	7.00	72400.00	3.00	4.00	4.00	8400.00	1500.00	10800.00
250000.00	100000.00	16.00	300000.00	48.00	4.13	0.50	1.00	10.00	1.00	4.00	156500.00	4.00	9.00	10.00	37800.00	7500.00	163300.00
70000.00	50000.00	16.00	135000.00	31.00	2.00	8.00	1.00	7.00	12.00	3.00	293850.00	0.50	5.00	4.00	15600.00	3000.00	10250.00
100000.00	50000.00	16.00	300000.00	22.00	2.00	16.00	35000.00	5.00	1.00	4.00	150000.00	0.50	5.00	5.00	16800.00	3000.00	53000.00
150000.00	50000.00	16.00	450000.00	60.00	2.00	8.00	1.00	5.00	1.00	6.00	423750.00	3.50	5.00	6.00	16800.00	3000.00	84400.00
150000.00	50000.00	16.00	300000.00	35.00	3.00	16.00	1.00	5.00	36.00	5.00	270450.00	5.00	5.00	7.00	25200.00	4500.00	84400.00
60000.00	25000.00	16.00	200000.00	27.00	1.00	14.00	1.00	2.00	1.00	1.00	211875.00	0.50	2.00	4.00	8400.00	1500.00	10200.00
650000.00	20000.00	16.00	1200000.00	65.00	12.00	11.00	45000.00	8.00	1.00	7.00	1653300.00	2.00	15.00	7.00	96000.00	18000.00	183000.00
60000.00	40000.00	16.00	250000.00	37.00	1.50	12.00	1.00	3.00	1.00	2.00	100000.00	2.50	3.00	1.00	12900.00	3000.00	18100.00
45000.00	10000.00	16.00	250000.00	32.00	1.50	12.00	20000.00	3.00	24.00	6.00	368050.00	1.50	4.00	6.00	12900.00	3000.00	13000.00