"ANALYSIS OF DETERMINANTS OF DEMAND FOR CREDIT: A CASE STUDY OF CENTRAL DIVISION OF LAIKIPIA DISTRICT."

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DECLARATION

This Research Paper is my original work and has not been presented for award of a degree in any other University.

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DEDICATION

This Paper is dedicated to my dear wife and children Jacqueline, Sylvia and Felix.

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ACRONYMS AND ABBREVIATIONS

AERC	African Economic Research Consortium
Agri	Agriculture
ASAL	Arid and Semi-Aid land
CBK	Central Bank of Kenya
CES	Constant Elasticity of Substitution
CGE	Comparable General Equilibrium
DRSRS	Department of Resource Survey and Remote Sensing
ESS	Explained Sum of Squares
GDP	Gross Domestic Product
GOK	Government of Kenya
H_0	Null hypothesis
H_1	Alternative hypothesis
HH	Household
HQs	Headquarters
KM	Kilometer
Kshs	Kenya Shillings
LOG	Logarithmic
MLE	Maximum Likelihood Estimation
mm	millimeter
NGOs	Non-Governmental organizations
NIID	Normal Identical and Independent Distributed
OLS	Ordinary Least Square
PROB	Probability
ROSCAs	Rotating Savings and Credit Associations
WMS	Welfare Monitoring Survey

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ABSTRACT

Despite presence of credit providers, credit inaccessibility remains a major issue in Kenya. Credit plays an important role in the economy by increasing investment, production and consumption and thereby economic growth and development in general. Using primary data collected from Central Division of Laikipia District, and employing Heckman two-step model and multinomial logit model estimations, we analyze demand for credit. The study has found out that education level, interest rates, and distance from the credit providers relate negatively to amount of credit demanded. However, repayment period and income have positive relationship to the amount of credit demanded. From the study's findings, credit inaccessibility can be attributed to household and individuals' characteristics as well as credit providers' attribute. While government concerns primarily have been on the supply of credit, the focus should be improved credit accessibility through addressing factors that adversely affect demand for credit. These factors include: low levels of education; low level of income to household/individuals; high interest rates; short repayment period; and lack of information on the available of credit providers.

CHAPTER 1.0: INTRODUCTION

1.1.1 Background

Poverty remains one of the main challenges in Kenya. High poverty incidence is mostly common in the rural areas and some pockets in urban areas. According to the Welfare Monitoring Survey conducted in 1992, 46.6% and 29.3% of the population was living below the poverty line in rural and urban areas respectively. From the Welfare Monitoring Survey of 1997, 53% of the people in the rural areas were categorized as overall poor and 51% as food poor (GOK, 2000).

Since high poverty incidences are mostly common in the rural areas and some pockets of urban areas, the importance of rural credit services can be understood by examining their contribution to the development of the agricultural and informal sectors. The Kenyan economy depends mainly on agricultural sector. The sector accounts for 24.0 % of Value Added and therefore the largest contributor to GDP. It accounts for 23% (males) and 25% (females) employment (World Bank, 2001). Despite its contribution, it only receives about 5.0% of loans and advances from financial intermediaries.

In a country with low per capita income, opportunities for individuals and therefore opportunities for macro-economic growth are likely to be impended by lack of access to resources to invest. It is in this line of argument that credit to individual/households builds a bridge between micro-economic opportunities for individuals/households and macro-economic performance of the economy.

One of the causes of poverty is low level of income in both urban and rural areas. Households in the rural areas depend on agricultural products whose demand is low, prices fluctuate and they are at the mercy of weather. These translate to low incomes to farmers. Urban households, especially in slums, have low incomes for investment, production and consumption. With low incomes, investment levels are low. The Government identifies inaccessibility to credit as one of the major challenges facing the economy (GOK, 1994).

The solution to this problem is to improve accessibility of credit. With increased credit accessibility, there would be improvement in agricultural and non-agricultural production.

While most economists concur that financial deepening through financial liberation (reforms) would spur economic growth, one question mostly asked is whether financial reforms (liberalization) have contributed towards improving accessibility of the poor to formal credit and if not what has been the role of informal credit in the rural areas. Funds needed for investment by the majority of households come from retained earnings, external credit, family members and friends. Individual/household may get credit either from formal or informal institutions or both. The two types of institutions serve different segment of individuals and households. Formal institutions' clientele are mostly the high-income earners based in urban areas unlike the informal institutions, which targets the low-income earners mostly in the rural and urban areas.

Access to formal financial institutions is restricted to a small proportion of the population who can meet their stringent requirements, which include high minimum balances for opening an account, high value of collateral required for loans and, long and costly bureaucratic loan processing. As they are mainly urban-based, the transportation cost worsens the credit inaccessibility. As a result of constrained access to formal credit, the poor rely mostly on informal financial sector, which seek to solve the problems of high risk, high cost and low returns that banks face when serving the poor.

The widespread use of informal financial institutions can be attributed to several factors: borrower's level of income; distance from the nearest formal financial institution; security/collateral required by formal financial institutions; flexibility in repayment; sex of borrower; level of education; and minimum balance requirement by the formal financial institutions.

Availability of credit does not imply that the demand for credit will be satisfied. Lenders decide the amount of credit to extend and whether or not to extend credit to the borrower

resulting to credit rationing. This is dictated by borrower's characteristics: reputation on repayment; wealth status; strength of previous business relationship; debt-service capacity (outstanding debt as proportion of total household income) and acceptance of interlinked credit contracts (Nathan Okurut et al, 2004).

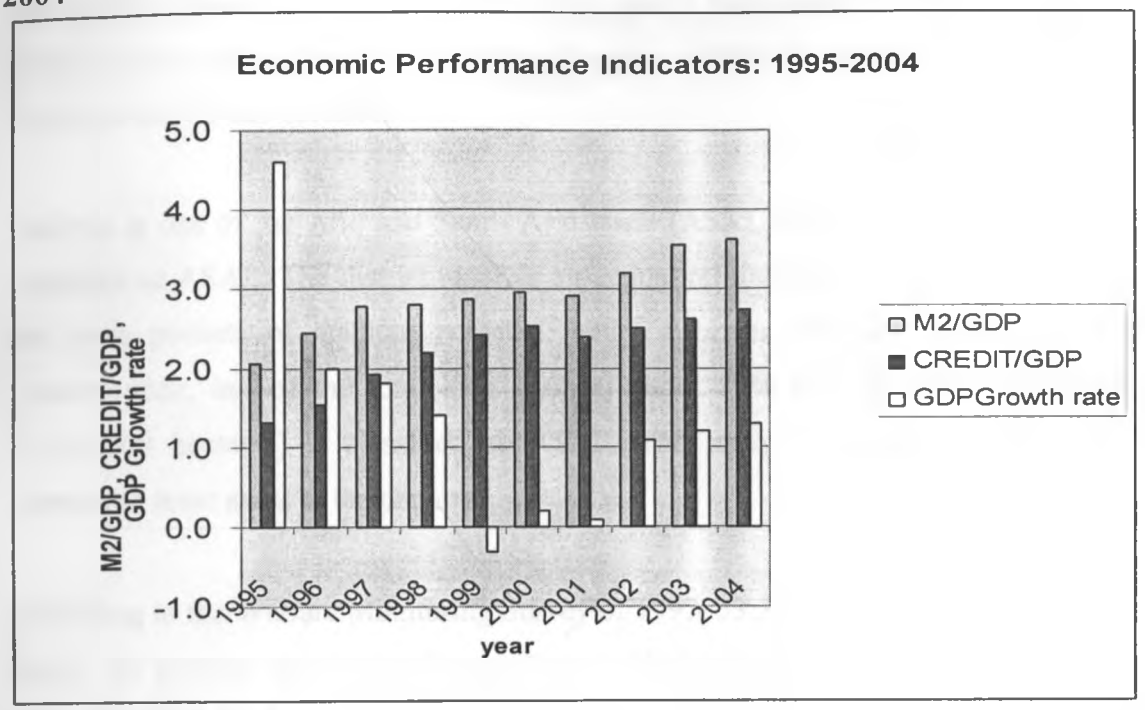
1.1.2 Overview of Kenya Macroeconomy

Financial liberalization, undertaken in 1990s, led to financial deepening (growth) in the economy. The ratio of money supply (M_2)[1] to GDP has been growing. The ratio in 1995 was 2.1. This improved to 2.78 and 3.6 in 1998 and 2004 respectively. The ratio of private credit to GDP has also been increasing from 1.3 in 1995 to 1.55, 2.19 and 2.7 in 1996, 1998 and 2004 respectively (GOK,1995-2003).

Despite financial deepening, Kenya's GDP has been declining. In 1995, the GDP growth rate was 4.6%. This declined to 2.0%, 1.8% 1.4% and -0.3% in 1996, 1997, 1998 and 1999 respectively (GOK, 2000). The growth rate has been increasing since 2002 to 2004. However, the M_2/GDP ratio has been increasing at a faster rate than the GDP growth rate for the same period.

[1] M_2 is money supply which comprises of Currency in circulation (M_0), Demand deposits, Saving deposits and Time deposits where currency in circulation plus demand deposits constitute M_1 (CBK, December 2002)

Graph 1.1: Ratios of Money Supply, credit to GDP and GDP Growth rate: 1995-2004



Source: Central Bureau of Statistics.

Commercial Banks and Non-Bank Financial Institutions constitute the formal financial institutions[2]. According to the Central Bank's Annual reports, 1981-2003, there were 18 Banks and 16 Non-bank financial institutions in 1982. The highest number of formal financial institutions was in 1997 with 53 banks and 17 Non-bank financial institutions. However, by 2002 the number of banks declined to 43 while non-bank financial institutions declined to 2.

1.1.3 Overview of Laikipia District

Laikipia district is in Rift Valley Province. The district lies east of the Rift Valley. It borders Samburu District to the north, Nyeri District to the south, Isiolo District to the northeast, Meru to the southeast and Nyandarua District to the southwest and Baringo and Nakuru districts to the west (see map 1). Its headquarters is in Nanyuki town in Central division.

[2] Formal financial institutions are the ones that are regulated and supervised by the Central Bank, as opposed to informal financial institutions.

The district covers an area of 9,229.2 km^2, has a population of 393,759 people and density of 42 persons per km^2. It has six divisions, which are further subdivided into 25 locations and 50 sub-locations.

Laikipia is one of the Arid and Semi- Arid lands (ASAL) districts with 85% of its area classified as ASAL. The district receives an annual rainfall of 612.5mm or less but there are some pockets of medium potential, which receives between 735mm – 875mm. Country-wide, out of the total land surface, about 80% (42,105,000 hectares out of 52,047,000 hectares) is classified as ASAL. The study's findings will therefore be relevant to most areas in the country.

According to the Welfare Monitoring Survey of 1997, 53.7% of the population was living below the poverty line in the district (GOK, 2002). National poverty incidences were 51% and 53% food poverty and overall poverty respectively in the rural areas. This implies that the study will be relevant to most areas in the country.

Some of the economic activities in the district include: agricultural production (cereals, small-scale horticultural and cash crops like coffee, pyrethrum pineapples and castor); dairy and beef livestock keeping; small-scale industrial activities (bakeries, sawmilling, and food processing) and various informal activities and general merchandise.

Three commercial banks namely the Standard Chartered Bank, the Kenya Commercial Bank and Barclays Bank have branches in the district, all located at the district headquarters (Nanyuki), with no branches in the rural areas. The informal financial institutions include: K-Rep; Faulu Kenya; Pride Kenya; Kenya Women Finance Trust; several Employees' Co-operative Societies; farmers' Co-operative Societies; Family/Relative members and Rotating Savings and Credit Associations (ROSCAs)[3].

[3] ROSCA is an informal, indigenous saving and credit institution, which is a widespread phenomenon in rural and urban economies (Chavas et al, 1997).

1.2 Statement of the Problem

Despite the financial deepening arising from financial liberalization, the gains have not been translated to the rural areas in terms of improved income levels. The growth of the ratio of money supply (M_2) to GDP would have implied availability of finances for credit. However, this may not be the case as there are several factors that influences demand for credit.

The concern for understanding the characteristics of the demand for credit in the rural areas is important because of the increasing role played by micro-credit on investment to increase agricultural productivity and support off-farm activities.

Credit is used for productive purposes (purchase of intermediate inputs, pay labour), investment purposes (purchase of land, equipment, building and construction) and consumption purposes (education, health, services, social expenses) which are all geared towards improvement of household's/individual's standard of living. An analysis of household credit thus has implications that link micro-level analysis with factors that determine long-term macro-economic growth.

One of the main components of development strategy by developing countries is the provision of affordable credit to rural population. To fulfill this objective, governments and donors have sponsored and/or initiated supply-led rural finance institution without considering the factors that may hinder demand for the credit. Credit may be available but effective demand for it may be hindered by several factors that affect both individuals/households and financial institutions.

The study focuses on identifying the factors that influence demand for credit and those that lead to the credit-rationing by lenders. An understanding of both these set of determinants could assist in policy formulation to enhance productivity of the poor through improved access to credit.

1.3 Objectives of the study

The underlying objective is to analyze the factors that affect individual/household demand for credit in Laikipia District. The aim is to provide a better understanding of the individuals'/households' characteristics, as they not only influence demand for credit but also influence lenders in assessing the borrower creditworthiness.

Specific Objectives include:

- To identify determinants that affect amount of credit demanded;
- To develop a micro level econometric model that would explain the factors affecting individual/household participation in the credit market;
- To identify factors that influence an individual to apply credit from a particular credit provider;
- Based on the above, suggest practical ways to meet individual/household demand for credit and explain the role of Government, NGOs, private sector and donor community in promoting access to credit.

1.4 Justification of the Study

The study identifies factors that hinder demand for credit by households/individuals. The identified factors can be addressed in pursuit of increased/improved accessibility of credit to households. With improved credit accessibility to the households, economic activities would lead to various potential benefits such as improved incomes to households, thereby reducing income inequality which usually contributes to rural-urban exodus.

Knowledge about the factors that influence demand for credit is an important step towards solving the problem of lack of information on credit inaccessibility. Significance of these factors on demand for credit is analyzed and thus the study attempts to fill this information gap on demand for credit through a comprehensive case study of the issue in Laikipia district.

Information on operations of informal financial institutions in Developing Countries is scanty and Kenya is not an exception. By studying various sources of credit, the study attempts to identify credit providers and therefore provide information on the categories of credit providers; their characteristics; their market shares and this information can be used for further analysis. The information gathered and analyzed would also be used to prepare policies and guidelines to regulate the operations of micro-financial institutions to protect the vulnerable segment of the society.

Laikipia District has been chosen as a study area because, on average, it has the same poverty levels and aridity with most areas in the country. The District's Poverty levels (53%) almost tallies with the National poverty figures (51%). In terms of aridity, the District is about 85% ASAL while as, 80% of the total country's land is classified as ASAL. It is from this that the study's findings would be relevant to most areas in the country.

The findings and recommendations of the study are expected to stimulate debate and further research in the area of credit market.

1.5 Hypotheses

The study attempts to answer the following hypothesis:

- Individual's/household's socio-economic characteristics and attributes of financial institutions influence the demand for and participation in credit market.

  H_o: $\beta_i = 0$

  H_1: $\beta_i \neq 0$

  Where β_i are the estimated coefficients of independent variables.

1.6 Organization of the Study

This study is organized as follows: chapter one comprises of Background, overview of Kenya Macro economy, overview of Laikipia district, statement of the problem, objectives of the study, Justification and hypothesis. Chapter two looks at literature review, both theoretical and empirical, and overview of the literature. Chapter three comprises of data source, methodology, analytical framework and specification of models, expected signs and limitations of the study. In chapter four are the data analysis and interpretation, which include both descriptive and econometric analysis. Conclusions and policy implications have been discussed in chapter five.

CHAPTER 2.0: LITERATURE REVIEW

2.1 Theoretical Literature Review

Various theories have been documented on the impact of financial liberalization on economic growth through credit, role of both informal and formal financial institutions and governments emphasize on the supply of credit to households.

Political structure (democracy) has been cited as one of the impediment of realization of benefits from financial liberalization. According to Chinn (1979), Credit in small farm size has been marginally successful in directing the farm inputs for high production. This is because attempts by Indian Government to supply small farmers with credit at subsidized interest rates had only limited success because existing political structure have enabled large landowners to capture the benefits in spite of the intent of the programme.

Informal financial institutions have become a major source of funds for both well-to-do and poor. Both Drake (1980) and Jungsoo (1987) argue that the informal loan is the only possible source of credit for many borrowers due to: the borrower does not have the standing or the collateral required by the formal institutions; the speed and/or secrecy with which loan can be raised; strict collateral requirements by formal financial institutions, and bank reluctance to lend for some purposes.

The theoretical analysis on credit rationing of small agriculture done by Carter (1986), showed that small farms might be rationed out of unrestricted, laissez-faire credit markets. Adverse incentives and selection effects, combined with farm size discriminate against access to formal credit. The key factors of credit rationing are the variability in production and informational imperfections. According to Carter, either government interventions designed to enhance small credit access or laissez-faire credit policies are both impotent and counter-productive. Under either policy regime, informational imperfections explain the small farm credit problems.

To Campbell and Mankiw (1989), aggregate consumption and saving patterns respond not just to changes in permanent income but also to changes in current income. A reduction in reserve requirements may make more resources available for lending to firm/households. The same can be achieved by redirection of credit in favour of specific firms/households, loosening their liquidity constraints.

According to Karl and Stiglitz (1990), rural credit has been at the center of policy intervention in developing countries since independence. Many governments, supported by Multilateral and Bilateral aid agencies, have devoted considerable resources to supplying cheap credit to farmers in a myriad of institutional settings. However, the results of these interventions have been disappointing and one explanation might be based on the inadequate understanding of the workings of rural credit markets (the demand side).

Aryeetey (1995) classified types of informal finance in Africa into three categories namely: primarily savings mobilization units with little or no lending; primarily lending units that are not involved in saving mobilization; and a mixture of the two who mobilizes deposits and do lending to members of association or groups.

According to Chavas et al (1997), moral hazard, arising from imperfect information, is reduced in informal financial institutions through the institutional design. However, there are several ways to reduce the moral hazard and in particular through the institutional design of the rotating savings and credit associations (ROSCAs). The new risky members are put in the last position and the existence of a parallel loan fund for emergency situations is instrumental in reducing such risks. Since information and enforcement problems are greatly reduced, the institutions do not need to rely on collateral in the form of physical assets as security for credit transactions and this increases demand for credit in informal credit providers.

As indicated by Johnson and Rogaly (1997), the remedy to improving access to credit to the poor is through promotion of micro-finance schemes. This is because micro-finance serves both the savings (consumption smoothening) and investment objectives.

While considering equitable income distribution as a public good, the study undertaken by Kellogg foundation (2002) observed that widening income inequality increases the potential for political instability. This implies that improving credit accessibility, to broaden the benefits to the rural areas and low-income people are important. The foundation suggested that this can be achieved through an integrated programme of intervention, of which improved access to finance for 'unbankeable' small entrepreneurs/households through micro-credit is a key component.

While analyzing household decisions on credit and saving, Lawrence (2002) concluded that both decisions are governed by consumption smoothing objectives. He, however, recommended for further research on: whether access to credit is really constrained; whether entry into the labour market, by adults or children is a widespread method of reducing income variability; and whether liberalization of credit markets results in more credit being made available from informal sector and what might hinder this.

2.2 Empirical Literature Review

This section provides some empirical studies on factors that affect demand for credit. Some of the studies undertaken include: impact of financial intermediation on economic growth; relationship between interest rate and credit; problem of information asymmetry and factors that hinder demand for credit.

An attempt to find out whether financial intermediation is linked to growth in selected African countries and estimating an OLS model, Bhatia et al (1975) established that one could not predict in a priori. In some cases, there was positive relationship (Kenya, Gambia and Ivory Coast) while in others the relationship between financial intermediation and per capita GDP was small and even negative (Ghana, Mauritius, and

Sierra Leone). Explanation given was that of inadequacy and undeveloped financial intermediation in African economies.

While considering small economy with full employment and assuming a CES production function, Buffie (1982) showed that by the government setting the interest rate, it induced the emergence of informal (curb) market. To him, there is no guarantee that interest rate policy alone will lead to more bank credit and hence improving availability of working capital due to the substitution from informal market, foreign bonds and currency in circulation toward demand deposits. But because of the reserve ratio requirement, every dollar switched from the informal market to demand deposits lowers aggregate loan supply. Buffie also observed in his paper that the commercial banking system (formal financial institutions) is recognized as an important source of finance, but it is the informal market that plays the pivotal role as the marginal supplier of funds.

In his article Udry (1990) addressed the issue of incomplete markets and imperfect information in the context of credit marketing in the rural Northern Nigeria. The results contrasted earlier belief that the problems of moral hazard and adverse selection are decisive for the accessibility of credit. Instead, his study found that credit transactions, in the informal financial institutions, take advantage of the free flow of information within rural communities. Information asymmetries between borrower and lender are unimportant, and their institutional consequences (the use of collateral and interlinked controls) are absent. His study indicated that there is only minimal use of collateral and no evidence of contractual inter-linkages with other markets.

According to a household survey carried out in the NR Province in Thailand conducted by Siamwalla et al (1990), 72% of informal borrowers reported that they had not attempted to borrow from other informal lenders. Creditworthiness vis-à-vis an individual lender takes time to buildup. A 42% of household did not report any credit transaction and these were the poorest group in the village. Well-to-do farmers were more likely to obtain credit from formal sources. Households that borrowed from commercial banks belonged to the richest strata.

The findings of a field survey conducted by Levy (1993) on leather industry (in Sri Lanka) and furniture industry (in Tanzania) revealed that, lack of access to finance emerged as the binding constraint for smaller, less established firms in the two countries. Not only is formal financing limited to Small and medium enterprises for Tanzania's firms but even firms of adequate size and experience have difficulty borrowing from Banks. Even if they borrow, they have difficult relations with their lenders. Sources of informal finance for both Sri Lanka and Tanzania were 28.9% and 0.5% respectively while sources of formal finance for Sri Lanka and Tanzania were 42.9% and 45% respectively. From retained earnings, Sri Lanka firms used 100% while Tanzania's firms utilized 95%.

Decaluwe and Nsengiyumva (1994) developed a Computable General Equilibrium model and analyzed the links between real and financial sectors via credit financing of working capital in a financially repressed economy. By undertaking a number of policy simulations, their study revealed that the magnitude of changes on the price and production due to changes in credit depends on whether domestic bank credit is controlled by direct credit ceiling or by a required reserve ratio. A series of comparative static experiments applied to the Rwanda economy showed that the sign and magnitude of the effects of economic policies are different from those obtained from a model that ignores the direct link between economic activity and bank credit cost and availability.

Zeller (1994) in a study undertaken of formal lenders and formal credit groups in Madagascar and estimating a probit model, found that age, education levels are positively significant in applying for informal credit while gender of the individual appeared not to affect the application process for credit.

Mayada et al (1994) conducted a study on Ecuadorian micro-enterprises. The results of multinomial logit model showed that although a smaller number of women than men entrepreneurs applied for loans, a larger percentage of women did not receive the loan, which indicated discrimination against women.

A survey to quantify both size and the role of formal and informal financial sectors in Egypt conducted by Wright and Mohieldin (1996) found that the informal financial sector is more active than the formal sector, though the loans obtained are generally smaller. There was also indication that people borrow from the formal and informal sectors for different reasons: obtaining credit from the formal sector for production purposes; and from the informal sector for non-production motives (consumption smoothening).

Aryeetey et al (1997) carried out a survey of formal and informal financial institutions and their clients in Ghana, Malawi, Nigeria and Tanzania. The survey's results indicated that there were strong increases in the number of loan applications received and approved for all informal lenders in the sampled countries. The activities of moneylenders increased sharply in all four countries: the number of loans rose from 20% to 130% in Malawi and Tanzania during the 1975-1996 period. In many cases, loan approval rates rose along with the number of applications, implying an increase in demand for as well as supply of funds.

Revine (1997) in her study on whether finance simply follows growth and estimating an OLS model, found that financial depth in 1960 is significantly correlated with each of the growth indicators averaged over the period 1960-1989. The results suggested that initial level of financial development is a good predictor of subsequent rates of economic growth, physical capital accumulation, and economic efficiency improvements over the next 30 years even after controlling for income, education, political stability and measures of monetary, trade and fiscal policy.

According to Bhuiya et al (2001), micro-credit benefits only the better-off people, leading to increasing economic inequalities. This is because the extreme poor do not join micro-credit programme because of their meagre initial endowment (both material, and non-material e.g education), high opportunity cost of time and limited capacity for labour substitution.

While comparing means and standard deviations before and after financial reforms in some selected low- and medium-income countries, Carmen and Loannis (2003), found

that financial liberalization had positive impact. The study revealed higher real interest rates reflecting the allocation of capital toward more productive projects. To them, financial liberalization appeared to deliver financial deepening as measured by the credit and monetary aggregates, but low-income countries do not appear to show as clear signs of such benefit. In some regions, savings increased following liberalization but in the majority of case, savings declined following the reforms.

Lensik et al (2003) conducted a survey among members and group leaders of borrowers, who accessed loans from two micro-credit programmes in Eritrea. They found out that group leaders take more risk than normal group members; better educated borrowers take more risk; and that borrowers that have had payments problems in the past will take more risk.

Using a probit model on a cross-sectional data from Ugandan's Social welfare Survey of 1999 , Mpunga (2003) found that the educated and the young are likely to demand credit while women are less likely to apply and if they do they apply for smaller loans.

Okurut et al (2004) while analyzing credit demand and credit rationing in the informal financial sector in Uganda by using a Heckman two-stage model, found that credit demand increases significantly with the age, level of education and level of household expenditure.

2.3 Overview of the Literature

The literature reviewed supports the hypothesis that there is a positive relationship between financial growth and economic growth. It has been also noted, from the literature reviewed, that informal credit is the largest source of credit for production, investment and consumption. Further, both theoretical and empirical literature have explained the emergence of informal financial institutions due to information asymmetries, and stringent conditions.

Most empirical studies made use of probit models. However, logit models are more superior to probit in that the former has fatter tails, which closely resembles the *t* distribution. The logit model transforms the problem of predicting binary choice (0, 1) to the problem of predicting the odds of an event's occurring within the range of the real line. In this study, multinomial logit model attempts to analyze the factors that affect decision to or not to apply credit from particular credit provider.

Several studies analyzed factors that determine demand for credit as sex of individual, income level, family size, age and purpose for the credit. However, they concentrated on the demand side only and yet; characteristics of financial institutions affect demand for credit. This study includes financial institutions` characteristics.

CHAPTER 3.0: DATA AND METHODOLOGY

3.1 Data

The study used cross-sectional primary data from seven clusters[4] of Central Division of Laikipia District. From each cluster, 20% of the households were selected and interviewed through administering a structured questionnaire.

The questionnaires were crossed-checked for purposes of ensuring completeness, clarity and consistency in answering the questions. When inconsistency was detected, the respondent was contacted again for clarification. Coding of the open-ended questions was then done. Both qualitative and quantitative data were extracted and data summarized, presented and analyzed in tables, graphs and charts.

3.2 Methodology

3.2.1 Analytical Framework

The study attempts to examine the factors that determine demand for credit by individuals/households. Factors affecting demand for credit, both from formal and informal financial institutions, can be categorized into two: individual/household characteristics and financial institutions attributes. Individuals/household characteristics to be considered in the study include sex, age, household size, level of income, educational level, uses of credit and marital status. Attributes to be considered under financial institutions include distance from the financial institutions, repayment period, collateral requirement and price (interest rate).

Data analysis includes both descriptive and econometric analyses. Econometric analysis include determination of the relationship between amount of credit demanded and participation in credit markets (both formal and informal sectors) with respect to

[4] Cluster is a selected enumeration area consisting of approximately 100 households in a specific area that are sampled for the purpose of a study.

individual/household socio-economic characteristics and attributes of the financial institutions.

In estimating the demand of credit by individuals, the study estimates a log-log linear function by using Heckman two-step selection method, given households'/individuals' characteristics and financial institutions' attributes.

In order to establish the demand for credit from, and the relative importance of the different sources available to the households, the study estimates a multinomial logit model.

3.2.2 Specification of models

The analysis is premised on the assumption that the borrower is a rational consumer whose utility maximization function is given as $U = U(X_1, X_2 \ldots X_n)$ and he/she is constrained by his/her total income $Y = P_1 X_1 + P_2 X_2 + \ldots P_n X_n$

Where X is the individual/household demand for goods 1, 2...n and P is the price of goods 1, 2 ...n.

Since credit results in increased access to goods and services, credit is thought to ease the budget constraint, individual/household is able to purchase more goods because of additional resources that are made available either for immediate consumption, investment (and therefore increased consumption at future date) or production (intermediate inputs).

Demand for credit can be expressed as

$C = f(r, Y, H, V)$

Where;

C -represents the amount of credit demanded.

r -stands for price of the credit (interest rate).

H -represents the vector representing individual/household characteristics like sex, age, level of education, marital status, and household size.

Y –stands for the income level of individual/household.

V - represents the availability of financial institutions in that area (sources of credit in an area).

a) Estimating extent (amount) of credit demand by using Heckman two-step selection model.

The study estimates the significance of the various variables in determining the amount of credit borrowed on all valid credit transactions. The model can be written as Cobb-Douglas function

$C = AX_i^{\beta i}$ .....equ. (1)

Where C stands for amount (in Kshs) of credit demanded. β_i are parameters to be estimated and they provide appropriate adjustment to obtain consistent estimates of the changes in the explanatory variables on C for those who demand credit and also indicate the proportion of the total effect due to induced changes in behaviour of those who demand credit.

X_i is a vector of socio-economic explanatory variables, and ε is the error term.

The C.D function can be linearized as

$\ln amorec = \beta_0 + \beta_1 \ln inco + \beta_2 \ln age + \beta_3 \ln dist + \beta_4 \ln shh + \beta_5 \ln inter + \beta_6 \ln rep + \beta_7 sex + \beta_8 mstatus + \beta_9 educ + \beta_{10} scredit + \beta_{11} use + \varepsilon$. ..... equ. (2)

lnamorec= log of amount of credit demanded (Kshs)

lninco =log of household income (Kshs) from sale of agricultural produce, business profit, and salaries and wages.

lnage =log of age of individual in complete years

lndist = log of distance from the credit provider in km

lnshh = log of size of household

lninter=log of interest rate

lnrep = log of repayment period in months

sex = dummy for sex of individual (1= female, 0=otherwise)

mstatus = dummy for marital status of individual (0=married, 1…4=otherwise)
educ = dummy for individual level of education (0=no education, 1…4=otherwise)
scredit = dummies for the sources of credit (0=not applied, 1…7= applied from the 7 sources)
use = dummy for reason for applying for credit (1= consumption, 2…n= otherwise)
ε = Error term

However, in models dealing with the amount of credit, only those who actually applied for credit are retained in the sample. Where the dependent variable measures values, ordinary OLS regression is subject to possible sample bias. In this case, the study will employ a Heckman two-stage model, separating the model (determining who apply for credit) from the equation of interest, e.g. amount of credit applied for. Sample bias is equivalent to missing variable bias, and can be overcome by including the inverse Mills ratio (lambda) from the sample selection equation of interest. We thus use a Heckman two-stage selection model, where the selection into the sample of those who demand credit is first modeled, and then the inverse Mills ratio from this regression is incorporated into the equation of interest.

Equation 1 represents the observation equation and thus the population regression function given as

$E[C_i/X_i]=\beta x_i$ 3

Since some observations on C are not available, the sample will be censored. The regression function for the incomplete sample is

$E[C_i/x_i,$ selection rule$]=\beta x_i + E[\epsilon_i/$ selection rule$]$.

Logit model estimation will be employed where the selection rule is based on $C_i>0$
For the sample selection model, the selection equation is given as

$Z_i=\gamma w_i + \mu_i$, 1=1,n. 4

The error terms (ϵ, μ_i) are assumed to come from a bivariate Normal distribution with parameters σ_e^2 σ_u^2 and ρ. By including inverse Mills ratio, equation 3 can be expressed as

$E[C_i/X_i$ selection rule$]=\beta x_i + \beta_\lambda \lambda_i(\alpha_{\mu i})$ 5

Equation 5 highlights the omitted variable $\lambda_i(\alpha_{\mu i})$ that cause OLS estimation of equation 2 to be biased. λ is the hazard ratio or inverse mills ratio. Heckman's two-step procedure will involve first estimating the selection equation 4 as a probit model to get $\alpha_{\mu i}$. The observation equation 5 will then be estimated by OLS with $\lambda_i(\alpha_{\mu i})$ as an additional explanatory variable representing the omitted variable in equation 2.

Test

a) Multicollinearity

In the study to avoid a spurious regression results, it is important that the data is subjected to some diagnostic analysis. Multicollinearity is a question of degree and not kind and therefore we do not test for multicollinearity but measure its degree in a particular sample. There is no single measure of multicollinearity but there are some rules of the thumb or indicators that provide evidence of presence of the multicollinearity (Gujarati, 1999)

There are some ways of detecting presence of multicollinearity. These include

(a) High R^2 but few significant *t* ratios.

(b) Large variance and standard error of the OLS estimators

(c) Wider confidence intervals because of large standard errors

(d) Wrong signs for regression estimates

The study employed the high Pair-Wise Correlation Analysis which computes coefficients of correlation between any pair of variables. Coefficient of correlation approaching unity (one) is an indication of the presence of a serious multicollinearity. This will affect inferences as serious multicollinearity leads to large standard error of the estimate and this reduces the value of *t* calculated and therefore one can wrongly accept a

null hypothesis. Solution to serious multicollinearity includes dropping the collinear variable or changing the model from log linear specification to linear in the Variable (LIV).

b) Multinomial logit model

Multinomial logit model is used when the decision maker has more than two choices and it is assumed that only one alternative has to be chosen at a time.

Letting D_{ik} be the dependent variable (the alternative choices/sources of credit the model can be stated as

$D_{ik} = M|X = f$ (inco, age, dist, shh, inter, rep, sex, mstatus, educ, scredit, use). … equ. (5)

D_{ik} is the probability of observing outcome M given independent variables and these are as defined above. The dependent variable D_i takes the value of 1 if individual i did not obtain credit and values of 2…k if the individual received credit from alternative sources of credit. The rest of the explanatory variables are defined as before. To avoid generating same probabilities of the observed outcomes, we impose a constraint on the model which is done by setting parameters like those of first alternative source of credit be zero. For this case those who demand credit will be set at zero and thus excluded (base category for comparison).

3.2.3 Signs of the estimated parameters

A priori, the estimated parameters ($\beta_0 \ldots \beta_{11}$) have the following signs:

$\beta_0, \beta_1, \beta_4, \beta_7, \beta_8 > 0$

$\beta_3, \beta_6 < 0$

$\beta_2, \beta_5, \beta_9, \beta_{10}, \beta_{11} = (?)$ –Uncertain

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

This chapter highlights sampling method of households and analysis of data, which include both descriptive and econometric discussions.

4.1 Sample Size and Selection

Primary data was collected from 7 clusters in Central division of Laikipia district. In each cluster. 20% of the households were identified. The first household was randomly identified and the subsequent households were selected through systematic sampling i.e. after every 4^{th} or 5^{th} or 6^{th} household. A total of 125 households were identified and 262 people interviewed: 142 females and 120 males. Interviews were carried out to all persons of age 18 years and above in the sampled households. Among information collected included:

- Demographic characteristics of an individual like sex, age, marital status, level of education and relationship to household head;
- Participation in credit market (whether one had applied or was repaying credit in the period June 2004- June 2005, amount applied, amount received, interest rate, repayment period, collateral required, sources of credit providers and use of credit);
- Reasons for not participating in the credit market;
- Income level of households/individuals;
- Distance from the district HQs as a proxy to distance from credit providers.

4.2.0 Data Analysis

This section provides both descriptive and econometric analysis of the data.

4.2.1 Descriptive Discussion

As shown in table1, there were 69 people (representing 23%) who had applied for or were repaying credit in the period June 2004-June 2005. However, 193 had not applied or

were not repaying credit. Table 4.1shows the proportion of those who participated in credit market by age cohorts. Proportion of those who applied or were repaying credit is disproportional for those who participated in the credit market unlike those who did not. People of medium age (26-55) constituted a bigger proportion (86%) of those who applied for or were repaying credit. This is the active age cohort and invests to increase production for future. The youthful age (18-25) constituted a small proportion (12%). In this group are sons, daughters (in and out of school) and housemaids who depend on their head of the household and this explains the small percentage in credit participation.

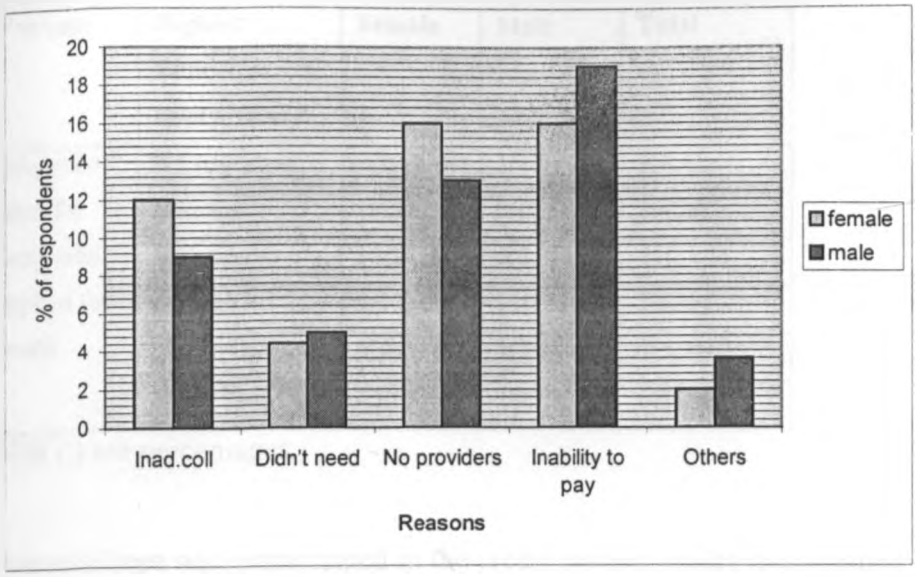
Table1 4.1: Age Cohorts for the respondents

Age cohorts	**Not applied/ or not repaying**		**Applied or repaying credit**	
18-25	73	38%	8	12%
26-55	93	48%	59	86%
55>	27	14%	2	2%
Total	**193**	**100%**	**69**	**100%**

The old people (above 55) constituted only 2% of those who had applied or were repaying credit. This category consumes what they had saved or accumulated in their middle age.

Various reasons were given for not participating in the credit market. Respondents gave reasons for not participating in the credit market like inadequate collateral, lack of credit providers and inability to pay. As shown in graph 4.1, a bigger proportion of females attributed their non-participation in the credit market to inadequacy of collateral, lack of credit providers and inability to repay while most males attributed their lack of participation in credit market to inability to repay and lack of credit providers.

Graph 4.1: Reasons for not participating in the Credit market



16% of the female indicated that there were no credit providers, 16% reported that they were unable to pay, 12% reported that lack of adequate collateral while 4.4% indicated that they did not need credit. These (4.4%) comprised of sons, daughters and housemaids of ages between 18 and 25 years in a household.

In the male category, 19% indicated that they were unable to repay, 13% reported that there were no credit providers, 9% had inadequate collateral while 5% indicated that they did not need the credit. The latter group constituted male of ages between 18 to 22 years and those above 55 years. The former consists of sons and daughters who are not engaged in productive activities and depends on their families. The old individuals mostly spend their past savings/accumulated wealth.

Table 4.2 shows highest level of education attained by individuals who had applied or were repaying credit. Out of the total number of those who had applied for or were repaying credit for the last 12 months (June2004-June2005), 65% were females.

Table 4.2: Education levels attained by those who had participated in credit market.

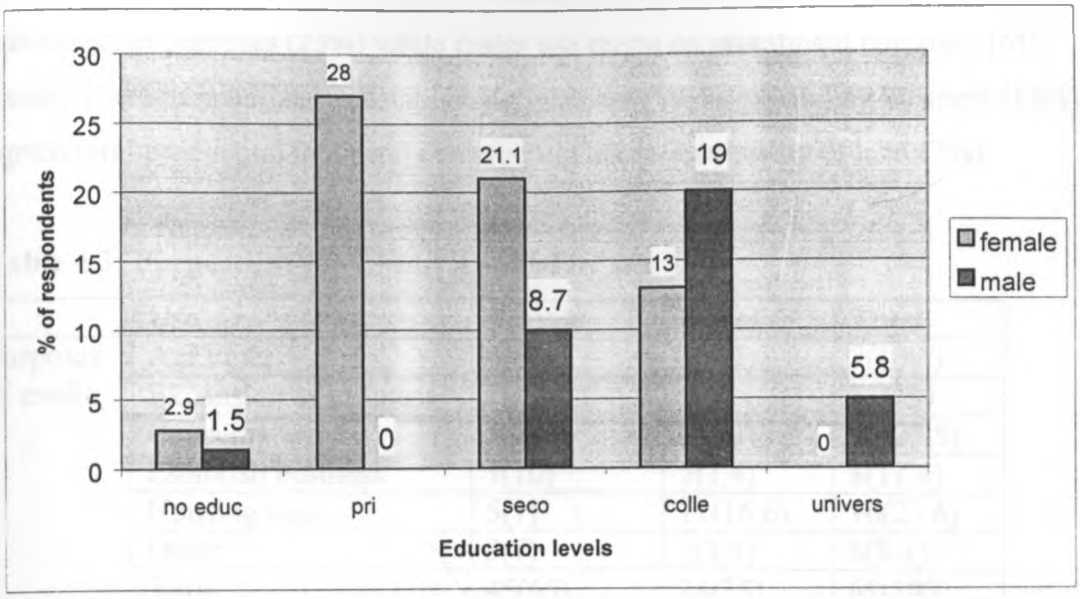
Variable	Highest Education level attained	Female	Male	Total
Education level for those who applied for credit	No education	2(2.9)	1(1.5)	3(4.4)
	Primary	19(28)	0(0)	19(28)
	Secondary	15(21.1)	6(8.7)	21(29.8)
	College	9(13)	13(19)	22(32)
	University	0(0)	4(5.8)	4(5.8)
	Total	**45(65)**	**24(35)**	**69(100)**

N/B (.) are percentages.

Among those who participated in the credit market, males had attained high levels of education (24.8% college and above) unlike female (13%). Graph 4.2 shows percentage of those who participated in credit market. In the category of female who participated in credit, 2.9% had no education, 28% had primary education, 21% secondary education 13% college, and none had attained university level of education. Only 35% of male applied or were repaying credit. In this category, 8.7% had attained secondary education, none had primary education, 19% had college education, and 1.5% had no education while only 5.8% had university education.

Most female (30.9%) had no education or had attained only primary level of education. Only 13% had attained college education and none had attained university level of education. However, most male (33.5%) had attained secondary education level and above. From above, it is evident that females have lower levels of education. Cultural/traditional values contribute to the female discrimination education opportunities. Low level of education impact negatively on the decision to apply credit and the amount of credit applied especially in the formal financial institutions.

Graph 4.2: Highest Education Level attained.



There were 6 uses for the credit in the study area. As shown in chart 4.1, the most common use of credit was consumption (30%), Expansion of business (18%), establishing business (11%), Constructing houses/purchase of land (23%), agricultural production (10%) and Other (8%).

Chart 4.1: Uses of Credit

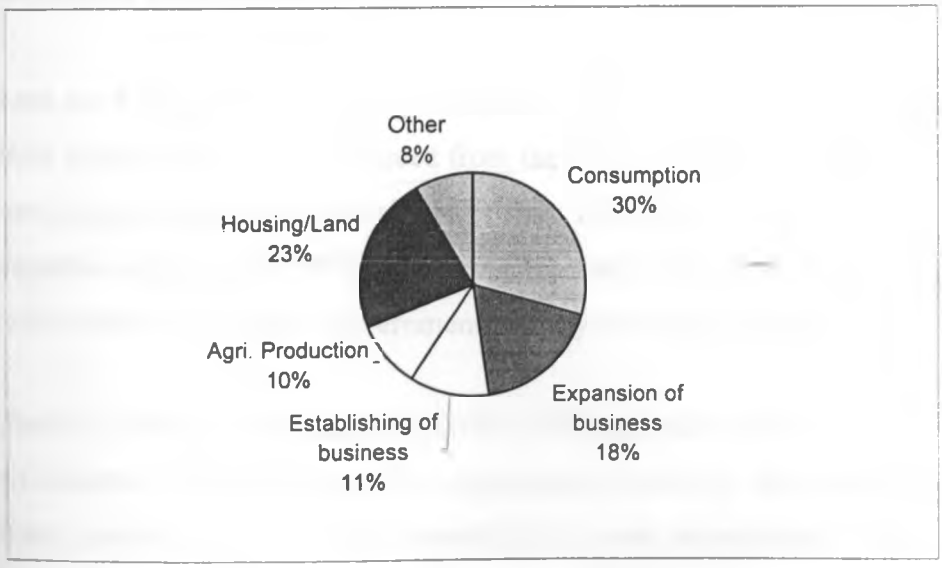


Table 4.3 shows uses of credit by individuals. Females use most of their credit on consumption purposes (23%) while males use credit on investment purposes 16%. Females' credit is utilized in establishing business (10%), expanding business (12%), agricultural production (6%) and constructing house/purchasing of land (7%).

Table 4.3: Purposes of the Credit Applied by sex

	Use	Female	Males	Total
Purposes of credit	Agr.input	4(6)	3(4.3)	7(10.3)
	Expansion of business	8(12)	5(7)	13(19)
	Consumption	16(23)	3(4.3)	19(27.5)
	Establish business	7(10)	1(1.4)	8(11.4)
	Housing/land	5(7)	11(16.6)	16(23.6)
	Other	5(7)	1(1.4)	6(8.4)
	Total	**45(65)**	**24(35)**	**69(100)**

N/B (.) are percentages

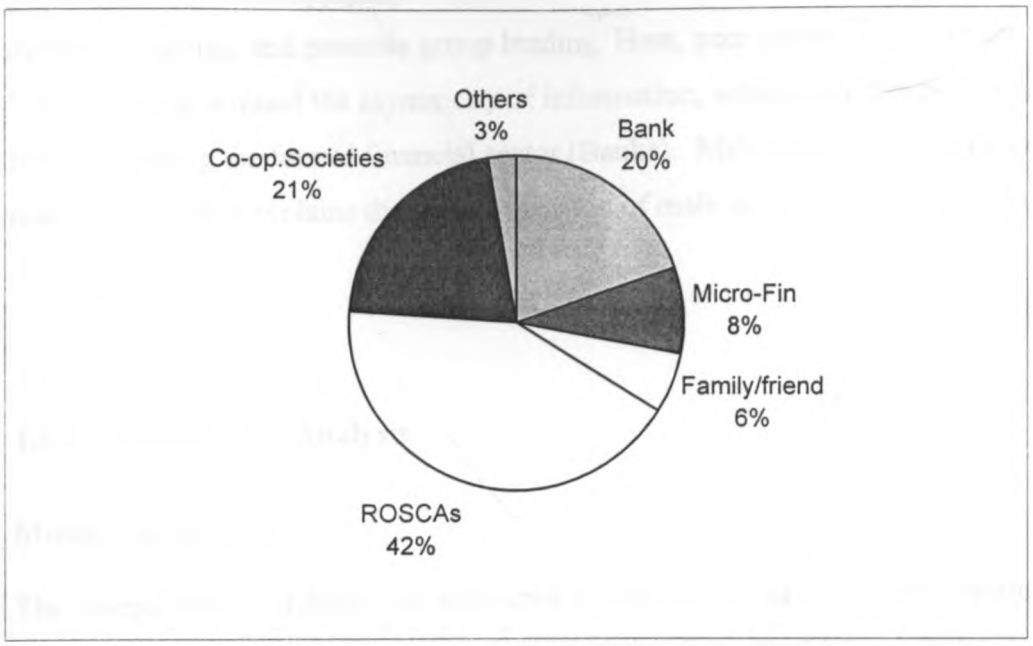
Among male, 16.6% used the credit in constructing house/purchase of land; 8.4% utilized their credit in establishing/expanding business; 4.3% used credit on consumption (education, health and food) while 4.3% of the male used credit on agricultural production. From the above, female borrow credit primarily for consumption to maintain a household unlike male whose credit is used for increased production and investment.

There are 6 categories of credit providers in the division. As shown in chart 4.2, most of credit in the studied area is sourced from the ROSCAs. 42% of those who had applied or were repaying had received their credit from ROSCAs, 20% from Banks, 21% from Co-operative societies and 8% from Micro-Financial Institutions. The study did not capture credit sourced from either Government Agency or Money-Lenders.

Informal financial sector plays a pivotal role in provision of credit as 80% of the credit was sourced from this sector. The implication of this is that strengthening this sector would greatly improve credit accessibility to most households. These institutions are spread in the district and thus improving this sector would serve large population in the country. Co-operative societies also known as Savings and Credit Co-operative organizations (SACCOs) are voluntary organizations established by salaried people,

business people and farmers. Their principle objective is to mobilize members' savings and extend credit to their members on the strength of members' shares.

Chart 4.2: Sources of Credit



As shown in table 4.4, females mostly apply credit from the ROSCAs (39%) unlike males (3%). Male sought their credit mostly from Banks (16%), Co-operative Societies (10%), Micro-Financial Institutions (6%) and family/friend (1.5%). In the female category, only 4% had sought credit from Banks, 3% from Micro-Financial Institutions, and 4% from family/friend while 11% had sought credit from Co-operative Societies.

Table 4.4: Sources of Credit

	Credit provider	Females	Males	Total
Source of credit	Bank	3(4)	11((16)	14(20)
	Micro-financial institutions	2(3)	4(6)	6(9)
	Family/friends	3(4)	1(1.5)	4(5.5)
	ROSCAs	28(40.5)	2(3)	30(43.5)
	Money-lenders	0(0)	0(0)	0(0)
	Government	0(0)	0(0)	0(0)
	Co-operative Societies	8(12)	5(7)	13(19)
	Other	1(1.5)	1(1.5)	2(3)
	Total	**45(65)**	**24(35)**	**69(100)**

N/B (.) are percentages

Lack of collateral by most women worsens credit inaccessibility especially from Banks. Women are known to be cohesive in groups and this explains reasons for the big percentage of women applying credit from ROSCAs. These associations mobilize members' savings and promote group lending. Here, peer monitoring and peer information gets round the asymmetry of information, which excludes poor households from borrowing the formal financial sector (Banks). Male mostly own and control resources and this explains the high proportion of male applying credit from banks.

4.2.2 Econometric Analysis

Multicollinearity Test

The independent variables were subjected to correlation test. As shown in annex 3, there is no serious multicollinearity among the independent variables as all the indexes range from 0 to 0.6.

Results of the Models

The study used the Heckman two-step estimation. First probit model is estimated to get the Inverse Mills ratio (lambda). Table 4.5 shows the results.

Table 4.5: 1st Step estimation of Heckman two-step selection model estimation: Regression with Sample Selection.

	Coef.	Std. Err.	z
lnamorec			
male	.8393335	.3059774	2.74
lnage	-19.75116	6.050635	-3.26
mstat1	-3.324818	.547155	-6.08
lnshh	-1.200585	.3764138	-3.19
educ1	-2.605284	.9901741	-2.63
lninter	1.197574	.592341	2.02
lnrep	1.195554	.1064697	11.23
scredit1	3.01257	.7227892	4.17
use1	.0292661	.5355528	0.05
lninco	.0725076	.1952179	3.37
lndist	-.1713914	.1722309	-1.00

agesq	.2864662	.0870851	3.29
_cons	55.8246	14.40298	3.88
apploan			
aploan1	0.41364	0.02836	14.566
agesq	-3.94215	0.75475	-5.229
lndist	-6.67176	2.15689	-3.063
lninco	3.45154	3.34951	1.034
use1	-4.54159	4.09009	-1.119
scredt1	-3.34151	0.19643	-17.585
lnrep	-4.87157	0.55723	-0.747
lninter	-9.51152	14.5426	-0.654
educ1	-1.44148	0.13806	-10.437
lnshh	7.54157	1.38095	5.468
mstat1	1.62143	0.47240	3.439
lnage	3.86139	1.62869	2.378
male	-2.04151	0.24460	-8.346
_cons	-6.12899	1.04081	-5.884
mills	-0.86488	0.20093	-4.285***
rho	-0.50183		
sigma	1.40311		

As the results indicate, the lambda is significant and therefore direct estimation using OLS would have produced biased estimates. It should be noted that the coefficients of age, age squared, interest rate and income have signs that do not correspond to the theory or study's expectations. This is due to sample selection bias. There were 262 observations and only 69 had applied or were repaying credit. Estimation of the whole sample would have produced selection bias. This necessitated estimation of the whole sample to get Inverse Mills ratio and then include it in the direct estimation using OLS.

By including the Inverse Mills ratio in the OLS regression, coefficients of age, age squared, interest rate and income reverted to the predicted signs as shown in table 4.6.

Table 4.6: 2nd Step: OLS Estimation with lambda.

Lnamorec	Coef.	t
male	0.8393398	1.62*
lnage	19.7511653	-1.93*
mstat1	-3.3248181	-3.59***
lnshh	-1.2005852	-1.89*
educ1	-2.6052844	-1.76*
lninter	-1.1975749	1.20
lnrep	1.1955547	6.64***
scredit1	3.0125741	2.47**
use1	0.0292661	0.03

lninco	0.0725076	-2.22**
lndist	-0.1713914	-0.59
agesq	-0.2864662	1.95*
_cons	55.824623	2.29

* Significant at 10%, ** Significant at 5% and *** Significant at 1%

```
Number of obs      =        69
Censored obs       =         1
Uncensored obs     =        68
F( 12,     7)      =     16.14
Prob > F           =    0.0006
R-squared          =    0.9651
Adj R-squared      =    0.9053
```

The independent variables explain 90% of the variation in the amount of credit demanded. The 10% of the variation maybe explained by other independent variables not captured by the model, errors in estimation or sample biases.

The demand for credit can thus be expressed as

Lnamorec=55.8 + 0.07lninco + 19.7lnage – 0.2lndist – 1.2lnshh – 1.2lninter – 1.2lnrep -3.3mstat1 + 0.8male – 2.6educ1 + 3scredit1 + 0.03use1

The estimated coefficients indicate that household's/individual's and credit provider's characteristics have important implications for the amount of credit demanded. As predicted, the study finds that the age of an individual is significant and positively related to the amount of credit demanded. However, age squared has a negative relationship, implying a quadratic relationship between age and amount of credit demanded. This supports the Life Cycle Hypothesis in which case the younger and the older household members borrow relatively little. The old "di-save" what they had accumulated but the young people depends on their families. Most of the borrowers are of medium ages who borrow to invest and hence increase production, and in the process, they smoothen their consumption.

As hypothesized, education level positively affects amount of credit demanded. Although not significant, those with higher education apply and receive more credit as compared to those with no education. A change of education level would increase amount applied and

received by about 2.6%. The implication is that education level plays a role in decision making of whether to apply for credit and the amount. Educated individuals are risk-takers unlike less educated individuals who are risk averters.

Males apply and receive high amount of credit than females. As indicated in the descriptive discussion, male apply and receive credit mostly for investment purposes unlike female whose credit goes towards production and consumption purposes. Credit for investment is usually large as compared to credit for consumption purposes. Although positive, the coefficient is not significant. However, being a male increase amount of credit demanded by about 0.84%.

Comparing being single and others, single people apply and receive less credit compared to the other categories. The coefficient is negative and significant at 10%. The findings that married individuals apply and receive higher amount as compared to unmarried supports the societal security attached to institution of marriage.

As predicted, household size has a significant and positive relationship with amount of credit demanded. Households with large family size tend to use more resources for both production and consumption. Large families have more 'mouths to feed' and require large amount of money to maintain their production. With any deficit, such households tend to borrow to smoothen their consumption and increase production. Amount of credit applied and received would increase by 1.2% when household size increases by 1%.

As expected household/individual income is significant and has positive relationship to amount of credit demanded. Income does significantly explain variation in the amount of credit received in this study. Credit providers consider level of income, alongside with other variables, as an ability to repay credit. An increase in income by 1% would result to increase in amount of credit applied and received by 0.07% holding other factors constant.

Price of credit is the interest rate charged. Although not significant, interest rate is negatively related to amount of credit demanded. The implication is that a 1% increase in interest rate would result to a decline in the amount of credit demanded by 1.2%. With high interest rates, few individuals would demand credit and those who do apply, amount is little.

Constant term significantly and positively explains variation in amount of credit demanded. The term represents the autonomous demand for credit, which is not explained by the independent variables.

Although distance is not significant at the three levels, it is negatively related to amount of credit demanded. An increase in distance by 1% would reduce amount of credit applied and received by 0.17%.

Repayment period significantly and positively relate to amount of credit demanded. With large amount of credit, repayment period tends to be long especially with the Banks. Repayment of large amount of credit is distributed over a long period of time.

Applying from the Banks, individuals demand large amount of credit compared to other sources of credit. This support the theory that Banks mostly extends credit for production and investment, which tend to be large amount of credit. This is contrary to ROSCAs, family/friends whose credit is mostly sought by women for the consumption and production purposes. Individuals applying from the banks get 3% more credit than other sources.

For the use of credit, applying credit for agricultural production is not significant but an individual receives more credit (by 0.03%) as compared to an individual applies for consumption, establishing/expanding business or housing/land.

Estimation of a Multinomial Logit Model

Table 4.7 shows results of multinomial logit estimation on various credit providers. The model was meant to answer the question: "which are the factors that influence an individual to apply credit from a particular credit provider?"

Table 4.7: Demand for Credit: Multinomial logit estimation

Indep. variable	Scredit1 Banks	Scredit2 Micro-Finance	Scredit4 ROSCAs	Scredit7 Co-oper.Socie
shh	0.89(0.69)	-0.51(-0.38)	0.11(4.87)***	0.34(0.4)
inter	0.43(0.88)	0.79(1.27)	0.136(0.79)	-0.33(-0.60)
rep	0.68(0.46)	0.28(1.61)*	-0.105(1.92)*	0.24(2.05)*
inco	0.001(2.04)**	0.005(1.66)*	-0.433(2.52)**	0.006(1.84)*
dist	-0.42(-1.52)	-0.24(-0.95)	0.156(0.56)	-0.61(1.85)*
male	0.40(0.11)	0.8(0.58)	-0.45(2.28)**	2.8(0.97)
mstatus1	-0.48(0.26)	-0.74(-1.05)	-0.49(0.29)	-58.1(0.33)
educ1	-0.14(1.97)*	-0.39(0.67)	-0.19(0.78)	-27.9(0.59)
use1	-0.78(-0.90)	0.58(0.01)	0.407(1.3)	-36.1(0.71)
age	0.199(4.68)***	0.14(6.66)***	0.145(1.70)*	0.105(1.90)*
agesq	-0.18(1.79)*	-0.95(-1.69)*	-0.09(2.37)**	-.43(3.43)***
const	-32.3(-2.00)**	-199.9(-1.39)	-9.19(17.3)***	-8.29(-0.69)

Absolute value of z statistics in parentheses

*Significant at 10%; **significant at 5%; ***significant at 1%

(Omitted category for comparison in the dependent variable is individuals who did not apply or were not repaying credit)

Table 4.7 shows results of the multinomial logit estimation (odds ratios) of demand for credit from different sources compared to those who did not apply or were not repaying credit in the period June 2004-June 2005. Results of the multinomial estimation for scredit3 (family/friends), scredit5 (Money-lenders) and scredit6 (Government agency) have not been reported since there was no individual who had borrowed from these sources. The multinomial model shows that several variables have an impact on whether households/individuals apply credit from a particular source of credit or not.

The results (odds ratios) represent the impact of each independent variable, holding all other variables constant, on the dependent variables (sources of credit). The extent of remoteness of an individual, captured by distance from the district HQs, is significant

only in the case of demand for credit from Co-operative Societies. The odds ratio is –0.61 which implies that an individual in the far place from the district HQs have lower likelihood of applying and receiving credit from Co-operative Societies. Although distance is not a significant factor for Banks, Micro-Financial Institutions, the odds ratios are lower. This implies that there will be a lower likelihood of applying from Banks (-0.42) and Micro-Financial Institutions (-0.24). ROSCAs have non-significant positive odds ratio. Individuals are more likely to apply from ROSCAs irrespective of distance. This is because ROSCAs are formed by groups of individuals in a given locality and have information on one another. This conforms to the real situation that ROSCAs are widely spread in most areas of the country.

Having a large family significantly increases the probability of applying credit from ROSCAs but not in other sources of credit providers. Although the odds ratios are large for the other credit providers, (Banks-0.89; Micro-Financial Institutions- -0.51; Co-operative Societies-0.34), they are not significant. The implication is that households with large family have a higher probability of applying credit from ROSCAs. From the descriptive discussion, it had been mentioned that women mostly apply credit from ROSCAs mainly for consumption purposes.

The probability of applying credit increases with the repayment period in the case of Micro-Financial Institutions and Co-operative Societies. Though small coefficient, probability of applying from ROSCAs decreases with the repayment period. Credit from ROSCAs is for bridging the shortfall in the consumption deficit. This kind of expenditure is usually for short period and therefore repayment period is shorter. The implication is that the probability of applying from ROSCAs declines with the repayment period but increases with the other credit providers.

Individual's income dictates the probability of applying from the 4 sources. Individual's probability of whether to apply from Banks, Micro-Financial Institutions and Co-operative Societies increases with the level of income. However, probability of applying from ROSCAs declines with the level of income. The odds ratio is highest for only

ROSCAs (-0.45). This implies that a unit increase in income will lead to the probability that individuals will decline by almost 45%. ROSCAs are mostly formed by women for mobilizing savings and subsequently extend credit to their members. These associations are built on group dynamism, which may not require level of income as a determining factor for credit application. Individuals with high income tend to apply credit from Micro-Financial Institutions, Banks and Co-operative Societies.

Being a male decreases the probability of demanding credit from the ROSCAs. Although not significant, the probability of applying from the other sources increases for male individuals. It should be recalled that ROSCAs are women dominated associations and male are unlikely to apply from them. Although not significant, probability of applying from Banks, Micro-Financial Institutions and Co-operative Societies increases with being a male.

Marital status does not significantly affect the choice of credit providers. However, the probability of applying credit from all the 4 sources decreases with being single. In the Banks and ROSCAs, the probability of applying from them is high as compared to when an individual applies from Micro-Financial Institutions and Co-operative societies. From the earlier discussion, it can be recalled that the relationship between being single and amount of credit received was negatively related. Single individual, in the survey were mostly people of ages 18- 25 and comprised of sons daughters to the households and housemaids. This category of individual may not apply credit from any credit providers.

Both age and age squared are significant in explaining the probability of applying credit from the 4 credit providers. However, change in age would increase the probability of applying credit from the 4 sources but decreases with age squared. Individuals of the medium age tend have high probability of applying credit unlike the young and old individuals. This supports the Life Cycle hypothesis where medium aged individuals save for future consumption. The young individual depends on their families while the old spend what they had saved and accumulated in their medium age.

Individuals with no education have a low probability of demanding credit from the 4 sources. Education levels do significantly explains an individual's likelihood of demanding credit from Banks. Banks value education level as individuals with high education make sound and informed decision. They (educated) can therefore invest where the returns are high. It should be recalled that individuals with high education comparatively have high income. These two factors, high levels of education and income are crucial for individual in deciding whether to apply credit and not.

Use of credit on agricultural production does not explain the likelihood of applying from the 4 sources of credit. This implies that use of credit does not explain the decision of whether to apply from the 4 credit providers or not.

CHAPTER 5: CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Conclusions

It is shown that demand for credit is strongly influenced by both household/individual and credit provider's characteristics. In particular, the study has found out that age, level of education, interest rate, sex, repayment period, marital status and household size influences to credit inaccessibility. We found also that source of credit and purposes for that credit have limited impact on demand for credit. The study further found out that women shy away from applying for credit from banks, Co-operative Societies and Micro-financial institutions and that they apply for less amount compared to men. This suggests that the Banks (formal financial institutions) are out of reach of most women.

Individual's age displays a quadratic relationship with the demand for credit. This implies that those at intermediate ages have a high demand while the old and young are less inclined to demand credit. It is shown that educational level is a very important element in the demand for credit. In addition, the demand for credit is higher for high-income group, indicating that those households with collateral stand a high chance of applying and receiving large amount of credit.

We find growing importance of ROSCAs, Co-operative Societies and Micro-Financial Institutions as sources of credit. In addition, interest rate is significant and negatively related to demand for credit.

Distance from district the HQs, level of education, marital status and interest rate does not significantly explains why individuals apply from ROSCAs while income, level of education, age and age squared explains why individuals apply from the banks. Interest rate, marital status and use of credit do not explain the decision-making on why to apply for the credit from among the 4 credit providers.

5.2 Policy Implications

As it had been indicated in chapter one, the findings from the sampled district and Central Division in particular would be relevant to most of other areas in the country. This implies that the findings can be replicated to other areas in the economy.

Both descriptive and econometric analyses have demonstrated that informal financial sector (ROSCAs, Micro-Financial Institutions, Family/friends and Co-operative Societies) plays an important role as 80% of the credit is accessed from this sector. The role that this sector plays to the economy is not documented in Kenya. The sector does not operate under any Law. To assess its contribution, these institutions need to be regulated and coordinated by the Central Bank through an Act of Parliament. This would ensure that their operations are regulated and monitored to safeguard individuals from malpractices. Statistics can also be readily available for assessing the sector's contribution to the economic growth and poverty reduction.

High interest rates adversely affect demand for credit. To improve credit accessibility, interest rate regime should be revised downward. This would be achieved through reduction of Government Domestic borrowing. This would reduce crowding out of the private sector. Domestic borrowing through the sale of Treasury Bills and Bonds tend to increase interest rates as this encourages formal financial institutions to utilize their finances on these instruments as they have high returns. Government should intensify revenue collection and/or widen revenue base so as to improve on revenue. This would, subsequently, reduce Government's reliance on domestic borrowing.

One of the determinants of demand for credit is income. Individuals with low income are less likely to apply and if they do, amount applied is small. This calls for development of policies aimed at increasing household incomes so as to improve credit accessibility. Policies and programmes geared towards improved agricultural production should be devised and implemented. High value crops, modern farming practices, use of certified seeds and prompt payment of agricultural produce are some of the measures that would increase agricultural production and subsequently household incomes.

Kenyan economy is agricultural based. To achieve economic growth, development of this sector would have more multiplier effects. To this end, there should be establishment of specialized agricultural credit institutions to offer crop finance to small-scale farmers. Specialized financial institutions could significantly contribute to financial development, economic growth and poverty reduction. The Agricultural Finance Corporation (AFC) and Kenya Farmers Association (KFA) need to be redefined and revitalized to cater for viable small-scale farmers. Establishment of crop insurance, in case of crop failure, could protect such institutions but adverse selection and moral hazards have to be considered in such arrangement.

Due to the vulnerability in agricultural sector the government can, borrowing from the study's recommendation, facilitate establishment of a specialized agricultural credit programmes. These programmes would focus on a single enterprise, insurance services and policies that can reschedule loans in times of crops failure. The risk of crop failure would best shared between the lender and the farmer, but incentives and penalties for circumventing free-rider problems and moral hazard must be addressed appropriately.

Dairy sub-sector is fast growing in Kenya. The sub-sector can be further improved through establishing credit system where 'checking-off system' is developed. Dairy farmers can borrow agricultural inputs in kind from, say, KFA or AFC. The milk processors would subsequently deduct the cost of the inputs from farmers' milk payments and pass the same to the credit providers (KFA and AFC).

To increase efficiency in credit market, Government should formulate policies that would enhance establishment of more financial institutions.

Individual's level of education affects decision of whether to apply or not and the amount to apply. This calls for concerted effort from the Government, the private sector and community to improve on individuals' level of education. The Government should devise a system of giving incentives and discourage non-performance of government officials through disincentives. Since Government embarked on Free Primary Education and

Bursary Schemes for Secondary school students, all school-going age children are supposed to be in school. For a certain number of children out of school, local administrators (chiefs and their assistants) should be demoted or sacked. For those who achieve a certain agreed percentage, promotion can be used as a reward and encouragement. Parents with children of school-going age but who not attending school should be punished. Bursaries from both private sector and Government should be increased and be extended to the deserving cases only.

Financial services must be recognized as an integral component of any development. The study has indicated that sustainable financial institutions signify investment but also consumption, agricultural production and income diversification. This calls upon the Government through the Central Bureau of Statistics to include financial services as one of the variables while collecting data in the Welfare Monitoring Surveys. The amount of credit individuals receives can signify welfare improvement over time. The data can also be used to analyze the growth and contribution of financial sector to the economic growth and development. Both Uganda and Tanzania have been collecting data on financial services and this has been used to assess both contribution and growth of financial sector in their respective economies.

This study recommends the following issues for further research: (i) whether liberalization of credit markets (removing subsidized credit) results in more credit being made available from informal sector i.e. "crowding in" rather than "crowding out" and (ii) whether both formal and informal financial institutions compliments or substitutes each other.

5.3 Limitations of the Study

Non-response was a problem especially from the less educated individuals. Some individuals were reluctant to give the interviewers audience as they had been providing information but nothing had been done to improve their wellbeing. Some households were not willing to provide information on their income levels. Use of village elders and assistant Chiefs minimized this problem.

Resource inadequacy of was another problem. The study could not collect information from as many households as expected due to limitation of funds. This necessitated collection of data from 7 clusters and from each cluster, 20% of households were identified and interviewed.

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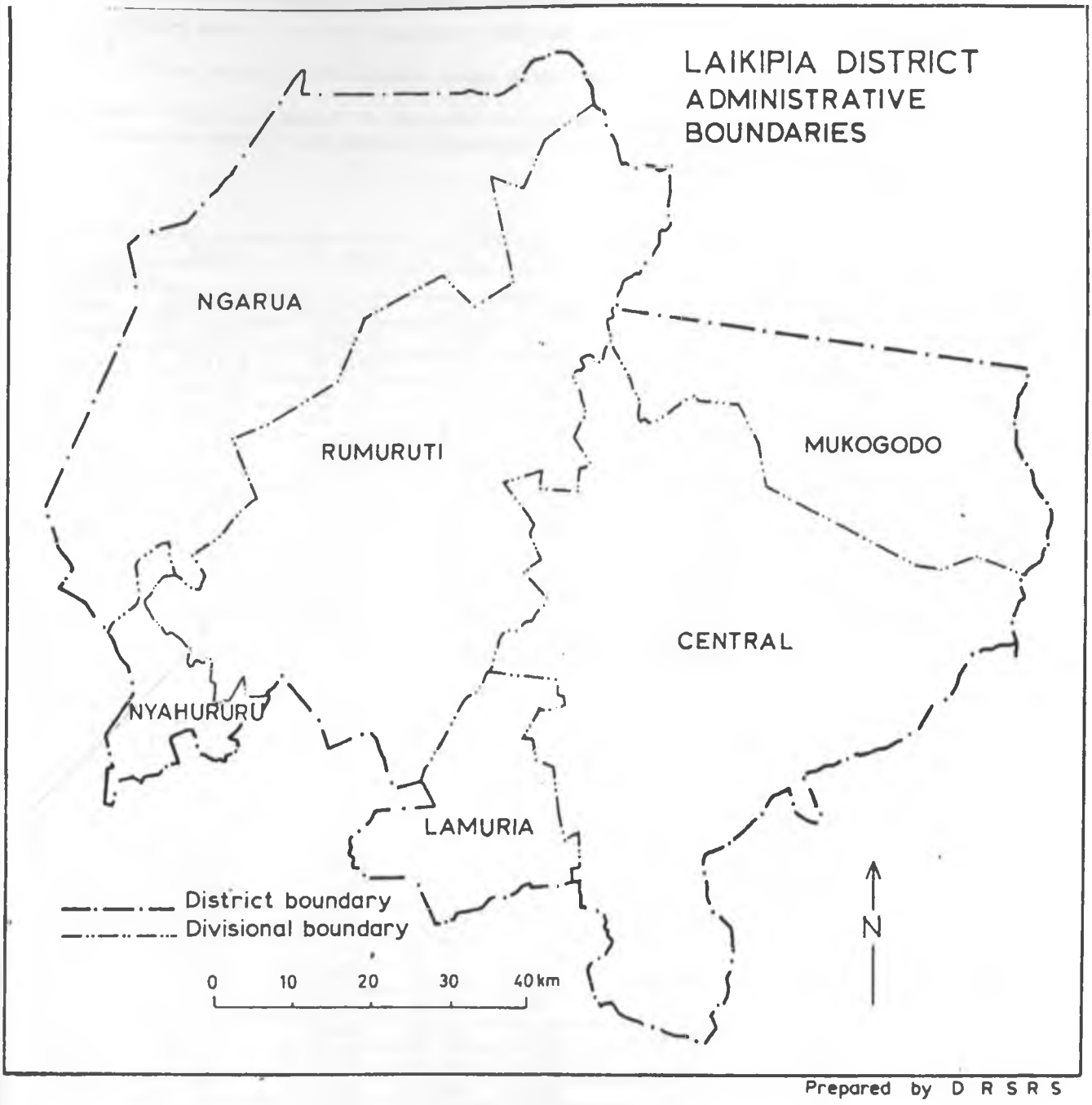
ANNEXES

Annex 1: Maps

Map 1

Map No 1

Map 2


LAIKIPIA DISTRICT
ADMINISTRATIVE
BOUNDARIES
NGARUA
RUMURUTI
MUKOGODO
CENTRAL
NYAHURURU
LAMURIA
District boundary
Divisional boundary
0 10 20 30 40km
N
Prepared by D R S R S

Annex 2: Heckman Two-Step Model Results

. heckman lnamorec male lnage mstat1 lnshh educ1 lninter lnrep screditl use1 lninc

```
> o lndist agesq, select( apploan= apploan1 agesq lndist lninco use1 screditl
lnre
> p lninter educ1 lnshh mstat1 lnage male) twostep mills(lambda)
```

Heckman selection model -- two-step estimates (regression model with sample selection)

Number of obs	=69
Censored obs	=1
Uncensored obs	=68
Wald chi2(12)	=553.51
Prob > chi2	=0.0000

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
lnamorec						
male	.8393335	.3059774	2.74	0.006	.2396288	1.439038
lnage	-19.75116	6.050635	-3.26	0.001	-31.61019	-7.892131
mstat1	-3.324818	.547155	-6.08	0.000	-4.397222	-2.252414
lnshh	-1.200585	.3764138	-3.19	0.001	-1.938343	-.4628277
educ1	-2.605284	.9901741	-2.63	0.009	-4.54599	-.6645783
lninter	-1.197574	.592341	-2.02	0.043	.0366065	2.358541
lnrep	1.195554	.1064697	11.23	0.000	.9868768	1.404231
screditl	3.01257	.7227892	4.17	0.000	1.59593	4.429211
use1	.0292661	.5355528	0.05	0.956	-1.020398	1.07893
lninco	.0725076	.1952179	0.37	0.710	-.4551277	.3101125
lndist	-.1713914	.1722309	-1.00	0.320	-.5089578	.166175
agesq	.2864662	.0870851	3.29	0.001	.1157824	.4571499
_cons	55.8246	14.40298	3.88	0.000	27.59528	84.05391
apploan						
aploan1	0.41364	0.02836	14.566	0.000	.9732111	1.405188
agesq	-3.94215	0.75475	-5.229	0.001	.4367887	2.053280
lndist	-6.67178	2.15689	-3.063	0.065	.4387809	.5375567
lninco	3.45157	3.34951	1.034	0.983	1.529997	.3446547
use1	-4.54151	4.09009	-1.119	0.549	21.53095	.3684268
scredt1	-3.34157	0.19643	-17.585	0.764	1.423697	.4369679
lnrep	-4.87158	0.55723	-0.747	0.467	1.646467	.6864388
lninter	-9.51151	14.5426	-.654	0.746	1.076443	.4987467
educ1	-1.44146	0.13806	-10.437	0.008	.897645	1.543358
lnshh	7.54153	1.38095	5.468	0.021	.423575	2.454673
mstat1	1.62147	0.47240	3.439	0.071	.462932	1.964643
lnage	3.86139	1.62869	2.378	0.943	.863599	.5357897
male	-2.04151	0.24460	-8.346	0.467	.367476	.6548847
_cons	-6.12899	1.04081	-5.884	0.576	.477698	.6423467
mills	-0.86488	0.20093	-4.28	0.916	.896757	.3975463
rho	-0.501871					
sigma	1.403118					

```
. reg lnamorec male lnage mstat1 lnshh educ1 lninter lnrep scredit1 use1 lninco
ln
> dist agesq lambda if apploan1

Source       SS       df       MS              Number of obs =      68
                                                F( 12,     7) =   16.14
Model    89.9476631    12  7.49563859           Prob > F      =  0.0006
Residual3.25009421      7  .464299173           R-squared     =  0.9651
                                                Adj R-squared =  0.9053
Total    93.1977573    19  4.90514512           Root MSE      =  .6814
```

lnamorec	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
male	.8393335	.5171962	1.62	0.149	-.3836412	2.062308
lnage	19.75116	10.22744	-1.93	0.095	-43.93521	4.432895
mstat1	-3.324818	.9248608	-3.59	0.009	-5.511766	-1.13787
lnshh	-1.200585	.6362555	-1.89	0.101	-2.70509	.3039199
educ1	-2.605284	1.6737	-1.76	0.164	-6.562955	1.352387
lninter	-1.197574	1.001239	1.20	0.271	-1.169981	3.565128
lnrep	1.195554	.1799667	6.64	0.000	.7756461	1.621107
scredit1	3.012578	1.221737	2.47	0.043	.1236221	5.901518
use1	.0292661	.9052495	0.03	0.975	-2.111309	2.169841
lninco	.0725076	.3299785	-2.22	0.832	-.8527828	.7077676
lndist	-.1713914	.2911234	-0.59	0.575	-.8597888	.5170061
agesq	-.2864662	.1472008	1.95	0.093	-.0616083	.6345407
lambda	(dropped)					
_cons	55.8246	24.34548	2.29	0.056	-1.74331	113.3925

Annex 3: Correlation Test

	scredit	use	male	lnage
scredit	1.0000			
use	-0.0255	1.0000		
male	-0.1728	0.0837	1.0000	
lnage	-0.0878	0.1949	-0.0122	1.0000
mstat	0.1185	-0.0847	-0.1433	0.3565
lnshh	0.0809	-0.1966	-0.2054	-0.0147
educ	-0.1592	0.0210	0.5100	0.0457
lninter	-0.3104	0.2494	0.3444	0.1373
lnrep	-0.0880	0.1015	0.4661	0.2258
lninco	-0.3060	0.2193	0.5511	0.1814
lndist	0.3674	-0.2627	-0.2924	0.0264
sex	-0.1728	0.0837	1.0000	-0.0122
age	-0.0864	0.1806	-0.0391	0.0845

	lninco	lndist	sex	age
lninco	1.0000			
lndist	-0.5983	1.0000		
sex	0.5511	-0.2924	1.0000	
age	0.1373	0.0513	-0.0391	1.0000

mstat	lnshh	educ	lninter	lnrep
1.0000				
0.0106	1.0000			
-0.1837	0.0429	1.0000		
-0.0812	-0.1894	0.3346	1.0000	
-0.0452	0.0886	0.3692	0.3751	1.0000
0.0211	-0.1046	0.4657	0.4092	0.6608
0.1037	0.2218	-0.4961	-0.4884	-0.4352
-0.1433	-0.2054	0.5100	0.3444	0.4661
0.3457	-0.0290	-0.0224	0.0840	0.1622

Annex 5: QUESTIONNAIRE

QUESTIONNAIRE ON DEMAND FOR CREDIT IN CENTRAL DIVISION OF LAIKIPIA DISTRICT.

Name of Enumerator.....

Household No----------

N/B Information collected will be treated with utmost confidentiality.

To be administered to persons of age 18 years and above

	A	B	C	D	E	F	G	H
S/No.	**Sex of respondent**	**Age (years)**	**Marital status**	**Relationship to HH**	**Size of HH (Question for only the head of HH)**	**Education Level**	**Applied for or repaying credit for the last 1 yr**	**If yes, amount applied (Kshs)**
	1-male 0-female		0=single 1=married 2=separated 3=divorced 4=other (specify)	0=Head 1= son 2= daughter 3= spouse 4=other (specify)	No of children in school & stays here No of children out of school & stays here No of other people living with HH	0=No education 1=primary 2=secondary 3 =College 4=university	O=no 1=Yes **N/B If no move to P**	

I	J	K	L	M	N	O
Amount received (Kshs)	**Interest rate paid on loan(%)**	**Duration of Repayment (months or yrs)**	**if credit inadequate, reasons**	**Source of Credit**	**Collateral required**	**Purpose of credit**
			1=collateral 2=high interest rate 3=lending ceiling 4=N/A 5=other (specify).....	1=Bank 2=Micro-finance 3=Family/relative 4=ROSCA 5=Money-lenders 6=Government Agency 7=Co-operative society 8=Other (specify)....	0= none 1=land/plot 2=livestock 3=HH assets 4=building 5=members 6=future harvest 7=shares	1=agri. Inputs 2=expansion of business 3=education & health 4=Establish business 5=consumption 6=housing/land 7=other (specify)...

P	Q	R
If no, reasons	**Income in the last 1 yr (Kshs)**	**Distance from the District HQs (KM)**
1=inadequate collateral 2=did not need loan 3=no credit providers 4=unable to repay 5=other (specify).....	Income from crops= Income from livestock= Profit from business= monthly salary= Other (specify).. total=	

Annex 6:

DATA ON DETERMINANTS OF DEMAND FOR CREDIT IN CENTRAL DIVISION OF LAIKIPIA DISTRICT

Sex	Age	Mstatus	rhh	shh	Educ	apploan	amappl	Amorec	Inter	rep	Inadeq	Sourc	Colla	use	reas	Inco	Dist
0	34	1	0	3	1	1	5000	4000	20	2	3	4	7	5		64800	2.5
1	25	1	0	3	1	0									3	48000	2.5
0	23	1	3	3	0	0									3	48000	2.5
1	31	1	0	4	3	0									5	144000	2.5
0	23	1	3	4	2	0									4		2.5
1	28	1	0	2	3	1	150000	150000	12	36	4	7	7	4		110000	2.5
0	25	1	3	2	3	0									3		2.5
1	33	1	0	2	2	0									3	54000	2.5
0	28	1	3	2	1	1	100	100	10	0.3	4	3	0	7		54000	2.5
0	30	0	0	1	2	0									4	14000	2.5
1	35	1	0	4	3	1	200000	150000	15	36	4	2	7	6		144000	2.5
0	22	1	3	4	0	0									2		2.5
1	26	1	0	4	3	0									3	300000	2.5
1	19	1	0	1	2	0									2		2.5
0	22	1	3	1	2	0									3		2.5
0	56	4	0	1	0	1	2000	2000	10	1	4	3	0	4		60000	2.5
0	39	2	0	2	3	0									3	300000	2.5
1	26	1	0	3	2	0									3	49000	2.5
0	23	1	3	3	1	0									4		2.5
0	20	0	0	2	1	1	500	500	10	1	4	3	0	3		120000	2.5
0	25	0	4	2	1	0									3	120000	2.5
1	39	1	0	5	3	1	77000	66000	15	36	3	7	7	2		84000	2.5
0	26	1	3	5	2	0									4	44000	2.5
1	19	1	0	2	2	0									4		2.5
0	20	1	4	2	2	0									4	52000	2.5
1	27	1	0	2	2	0									3	60000	2.5
0	20	1	3	2	1	0									2		2.5
1	30	1	0	2	2	0									4	36000	2.5
0	26	1	3	2	2	1	10000	10000	10	6	4	4	7	2		36000	2.5
1	34	1	0	3	2	0									4	60000	2.5
0	32	1	3	3	2	1	10000	10000	20	6	4	4	7	4		60000	2.5
0	28	0	0	3	1	0									3	6000	2.5
1	27	1	0	3	1	0									4	144000	2.5
0	21	1	3	3	2	0									3		2.5
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