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CONSTRAINTS TO SMALLHOLDER CREDIT FARM INVESTMENT:

A CASE STUDY OF COFFEE FARMING IN MAJOGE CHACHE LOCATION, KISII DISTRICT.

BY

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A Research Paper submitted to the Department of Economics,

Kenyatta University, in Partial Fulfillment of the Requirements of the

Degree of Master of Arts in Economics.
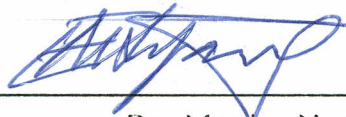
November, 1995

DECLARATION

This research paper is my original work and has not been presented for a degree in another University.

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To my wife, parents, brothers, sisters and relatives for their prayers, support, patience and encouragement throughout my studies.

ACKNOWLEDGEMENTS

ABSTRACT

This study analyses the constraints to smallholder credit farm investment. The data for the study were collected in Majoge Chache Location, Kisii District. A total of 40 respondents were interviewed for a period extending from 17th of July to the 5th of August, 1995. A list of farmers in Majoge Chache Location who had borrowed funds for investment in coffee farms was obtained from the Loans Officer based at Ogembo Divisional Headquarters. Following the list, systematic sampling procedure was then applied in which every sixth loanee farmer was picked until a sample size of 40 was obtained.

The estimated results of both semi-log and double log models indicate that initial household endowment of housing services and investment in non-farm activities have very significant effects on credit farm investment. Specifically, sample farmers with quality houses were observed to invest more of the credit they received on the farm. The main non-farm activity to which most of the sample farmers diverted farm credit was school fees.

The results indicated that other variables studied do not have significant effects on the proportion of credit invested in coffee farms in the study area. These variables are: Family size, number of children in school, price of coffee per kg., and household income.

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CHAPTER 1:   INTRODUCTION AND THE PROBLEM

1.0.   INTRODUCTION

About 85% of Kenya's population live in rural areas where they derive their livelihood from small scale agricultural production (Kenya, 1994 - 96). The agricultural sector accounts for 30% of Kenya's Gross Domestic Product. Over 50% of the total agricultural output is contributed by small farms (Kenya 1994 - 1996). Agriculture also absorbs a majority of the labour force, provides nearly all national food requirements and is a major foreign exchange earner (Whyeth 1981). The sector's performance and problems are thus crucial determinants of the rate of progress of the economy and its ability to deliver improved living standards.

The development of the agricultural sector not only involves the improvement of productivity from the land but also how the improved productivity affects income distribution in rural areas. In Kenya, to promote agricultural development, it is more crucial to raise the productivity of the land than of any other input. This is because high potential agricultural land is the factor of production which is in least elastic supply. However, a number of factors inhibit the development of small farms. These include: lack of capital, low fertilizer use, poor pest and disease control, poor management and frequent damages caused by hailstones (Kisii District Annual Agriculture Report 1987). Small farmers especially at the subsistence level, for the most part, are unable to accumulate capital (Josef 1968). Thus one way of improving farm productivity especially for smallholders is through provision of credit.

The provision of farm credit contributes significantly to an increase in output, employment, and per capita incomes besides turning small farms into modern economic enterprises (Whyeth 1981, Sessional Paper No. 10, 1965).

Small farm credit however, has been found in certain cases to be ineffective in increasing output and incomes (Mwabu 1976). Economists have given many and differing reasons for failures of small farm credit. Some argue that credit programmes do not reach the farmers who actually need the credit and that whenever it does, it is mostly at the wrong time (Mwabu 1976). Others argue that a significant share of the credit is devoted to consumption purposes in an effort to maintain generally accepted standards of living in rural areas (Wanja 1979).

Small-holder coffee farmers in Kisii district are members of Kisii Coffee Farmers Cooperative Union. The union markets the coffee on behalf of the farmers besides educating them on new innovations meant to help increase coffee output. The union also extends credit to farmers with the aim of improving farm productivity (Kisii District Annual Agricultural Reports). Despite continued receipt of credit by small farmers, coffee output from the district has been declining since 1985. This is shown in Table 1 below:

TABLE 1 : KISII DISTRICT YEARLY COFFEE OUTPUT, VALUE AND LOANS

YEAR	OUTPUT (kgs)	% CHANGE	VALUE (KSHS)	LOAN ISSUED KSHS	% CHANGE
1985	37,574,162	-	151,565,444	2,815,000	-
1986	33,673,620	-10.4	142,006,518	1,780,913	-36.7
1987	30,444,735	-9.6	121,934,940	7,500,000	+321.1
1988	29,077,000	-4.5	107,467,213	2,320,500	-69.1
1989	27,779,860	-4.5	94,613,842	4,410,150	+90.1
1990	23,243,419	-16.3	81,220,078	20,000,000	+353.5
1991	12,328,628	-47.0	70,220,907	24,000,000	+20.0
1992	8,810,779	-28.5	50,545,725	9,019,566	-62.4

SOURCES: KISII District Annual Agriculture Reports

1983, 1985, 1987, 1988, 1990, 1991, 1992

Kenya, KISII District Development Plan 1989 - 1993

Nyanza Province, Annual Agriculture Report 1989

This decline in output has been attributed to low use of inputs by the farmers (Kenya, Kisii District Development Plan 1994 - 96). Results of this study confirm this view and demonstrate that credit meant for farm investment in the study area is diverted to meet more immediate pressing needs. Most farmers seem to be less endowed with initial housing services and have pressing non-farm requirements such as school fees which need immediate attention than farm investment. Consequently, much of the farm credit is diverted to such areas leaving less for farm investment and hence the downward trend of the coffee output in the district.

1.1.   **THE STATEMENT OF THE PROBLEM**

Kisii district is endowed with rich agricultural soils which support a variety of crops. Most of the farmers practice both subsistence and cash crop production. The population density in the district is high resulting in subdivision and fragmentation of holdings [Kenya, District Development Plan 1994 - 96]. Out of 135,000 acres of land available for farming in the district, 78% is suitable for agriculture with 112,000 small holdings ranging from 0.5 to 4.5 acres of land [Kenya, District Plan 1994 - 96]. There are over 60,000 households engaged in small holder coffee production [Kenya 1994 - 96]. Small scale farming is therefore the most important agricultural activity in the district.

Agricultural credit is often taken to be a facilitating input in agricultural development. It is also one of the Kenya government's policy instruments for stimulating agricultural production; increasing farmer's incomes; accelerating the transfer of farm technology; and generating on - farm employment. Small - holder farmers are often short of capital of their own and credit is assumed to enable them raise the productivity of their farms.

Studies done in Kenya [Heyer 1962/63, Wanja 1979, Dell'amore 1973] and outside Kenya (Gershon Lawrence J.L; Justin Y.L and Xiaopeng L. 1991] have however shown that credit is not productive in increasing output as farmers have been observed to use a significant proportion of the credit received for consumption purposes and therefore a smaller proportion on the farms. Dell'amore (1973) for instance argues that balanced farm management is impossible without satisfaction of consumption needs and that no distinction should be drawn between consumption and production credit. Wanja (1979) also argues that certain minimum standards must first be attained by the rural small holders before investing in the farm and that any loan scheme that fails to consider minimum monetary requirements will in the end have repayment problems.

Kisii district is one of the leading small holder Coffee producing areas in Kenya [Kenya, District Plan 1994 - 96]. However, Coffee output in the district has been declining as shown in table 1. This decline can be attributed to the low use of farm inputs by the farmers inspite of the fact that the Kisii Coffee farmers Co-operative Union issues credit to the farmers as shown in table 1. This is because the majority of the farmers are less endowed with initial housing services and they also experience more pressing non-farm requirements such as school fees. It is only a few farmers who are well endowed with initial housing services that invest much of the credit they receive in the farm while the majority that are less endowed divert more of the credit to meet more pressing non farm needs. This has resulted in less resources (credit and otherwise) being availed for farm investment consequently leading to the downward trend of coffee output in the district.

1.2 JUSTIFICATION OF THE STUDY AREA

Kisii district was chosen for this study because of the following reasons:-

(i) Kisii district is one of the leading small holder Coffee production areas in Kenya with over 60,000 households engaged in coffee production [Kenya 1994 - 96]. The contribution of coffee output from the district to National output is very significant. For instance in 1991, Kisii district contributed 15.5% of the total national coffee output. (Annual Agriculture Report 1991]. Failure to use credit to purchase inputs so as to increase coffee output affects not only the well being of the Kisii farmers but also the entire country. This is because coffee is one of Kenya's leading export crops. The decline of coffee output in Kisii district therefore is a national issue.

(ii) All the farms in the district are small in size due to rapid population growth [Kenya 1994 - 96]. This means that farmers in Kisii district have to adopt a land - saving technology as the only option of increasing farm output.

1.3 STUDY OBJECTIVES

The overall objective of this study is to provide a framework for analysing investments of credit in coffee farms.

More specifically, the study seeks to:

(i) Identify factors limiting small holder use of credit for the purchase of farm inputs in Kisii district.

(ii) Measure the relative effects of the factors identified in (i) above.

(iii) Draw up policy recommendations in the light of (ii) above.

1.4 SIGNIFICANCE OF THE STUDY

A study on small farm credit and input usage is important for various reasons. First,

study results will provide information on reasons why small farmers do not use the credit they receive for the purchase of farm inputs in the study area. Second, information on such reasons will provide a framework for policies that Cooperative Unions can adopt to improve the use of farm credit. Finally, the empirical result may be applicable in influencing in a socially desirable manner, the form that small farm credit should take in Kenya.

1.5   ORGANISATION OF THE RESEARCH PAPER

The research paper is divided into six chapters. **Chapter One** presents the introduction and the research problem including the study objectives and its significance in policy formulation. **Chapter two** reviews the theoretical and empirical literature on credit farm investment. **Chapter three** develops the theoretical framework on which subsequent empirical analysis is based. **Chapter four** presents the research design including data collection methodology. Empirical results are presented in **Chapter five** while **Chapter six** concludes the paper with summary, conclusions, policy recommendations, and suggestions for further research.

CHAPTER 2:   LITERATURE REVIEW

2.0   INTRODUCTION

This chapter is divided into two sections. The first section reviews general literature on credit farm investment while the second section reviews empirical literature of farm credit specific to Kenya.

2.1   GENERAL LITERATURE

Impact studies of agricultural credit programmes in many parts of the world have focused on the capability of credit to improve total production on small farms and its useful role in resource allocation, utilisation and productivity. Considerable research in Asia, Latin America and Africa have been directed towards analysing the effects of credit programmes on capital formation, productivity, and efficiency of traditional farming. Opinions from empirical literature vary in respect of the impact of many such programmes from time to time, country to country and according to the methodology employed by analysts.

In Brazil, for instance, Wharton Jr. (1960) evaluated the effects of the supervised credit programmes of ACAR on the farmers. He considered the change in the farmers' agricultural output through time and the change in their output - input ratios through time. Both measures were tested using a log linear function of the form:

$$\ln Y_i = \ln A + B_1 \ln T_i + B_2 \ln M_i + B_3 \ln L_i, \quad i = 1 \ldots\ldots\ldots\ldots N$$

Where Y_i =   Output in year i

           T_i =   Land in year i

           L_i =   Labour in year i

           M_i =   Intermediate inputs in year i

           $\ln$ =   Natural Log

His study revealed that output growth for semi - subsistence farms was significantly high for all farmers that obtained credit.

Using a model of the same functional form, Taylor et.al (1986) while studying the impact of PRODEMATA Credit Programme in Brazil proved otherwise. They utilised data drawn from 433 farmers in the Zona da Mata region of Brazil for the 1981 - 82 crop season. Estimation of the production frontier was accomplished using the method of maximum likelihood . The log - likelihood function was maximised using a slightly modified algorithm. In addition to the maximum likelihood, the production frontier was also estimated by a correlated ordinary least squares (COLS). The parameter estimates for both COLS and maximum likelihood were of appropriate signs. However, their estimates for the technical efficiency for farms which participated in the programme compared to those of non participant farmers indicated that the programme was not successful as measured by technical efficiency gains. The programme was found to have a slightly negative impact on allocative efficiency and no significant impact on technical efficiency of traditional farmers.

Alves (1968) employed a different methodology in the study of ACAR and came up with a different result. He used a measure of economic efficiency incorporating price and technical efficiency. These measures were determined from a sample of 60 farmers who worked with ACAR and another 60 farmers not assisted by ACAR. Alves found that technical efficiency was greater and price efficiency smaller among ACAR farmers; a result later described by Wharton Jr. (1983) as exactly opposite to what one would expect. This contrary result was attributed to a probable effect of the subsidized rate of interest on ACAR loans in the context of general inflation. In the opinion of Wharton Jr, borrower farmers might, under such conditions be trying to build up assets rather than maximise income.

Olomola A. (1988) evaluated the impact of the crop farmer's credit scheme of the Ekiti - Akoko ADP and productivity using three functional forms specified below:

a)   Linear function: $Y = b_o + b_1A + b_2N + b_3L + b_4M + b_5K$

Where b_0 is a constant and b_is are parameters which when estimated can be interpreted as marginal value products.

b) Semi log function: $Y = \ln b_0 + b_1 \ln A + b_2 \ln N + b_3 \ln L + b_4 \ln M + b_5 \ln K$.

c) Linearised Cobb - Douglas function

$$\ln Y = \ln b_0 + b_1 \ln A + b_2 \ln N + b_3 \ln L + b_4 \ln M + b_5 \ln K$$

The five variables used were as follows;

A = Gross Cultivated Area

N = Labour

L = Traditional Material Inputs

M = Modern Material Inputs

K = Depreciated value of fixed capital

He used the OLS technique in the econometric estimation of the model. The effect of farm size was controlled by dichotomising the borrower farmers into small and medium scale farmers. The test of significant differences between small and medium borrower farmers as well as between borrowers and non borrowers was accomplished through the application of the Chow test. He found the R^2 from the linear, semi log and power functions to be 68%, 61% and 73% respectively for the borrower farmers. The regression co-efficients had the expected signs. Similarly, the R^2 from the linear, semi log and power functions was 85%, 84% and 84% respectively for the non borrower farmers. The study revealed that credit enhanced the resource base and output value of borrowers. Credit also, had a positive impact on the use of modern material inputs. He observed that non borrower farmers could not even use traditional material inputs in adequate quantity and proportions due to lack of necessary financial resources. He concluded that credit to smallholders is essential for improvement of productivity.

Using a linear production function but utilising information from a smaller sample, Singh B. (1977) arrived at results similar to Olomola's. He used a sample size of 156 unlike Olomola's 200. Singh observed that the role of credit in accelerating agricultural production is best assessed from the degree and extent of the changes it injects into the farmer's production behaviour . He assessed the differentials in production among farmers that financed their farm production partly or fully with borrowed funds and those that did not borrow. He found the underlying production function of the set of farmers to be significantly different. He thus found the programme to be successful in inculcating the desire and urge for change.

A similar study was carried out by Yeboa (1982) in Ghana which yielded similar results despite using a far much smaller sample of 56. However, the study did not compare the productivity of the sample farmers with the productivity of the farmers in the study area who did not borrow from the Rural Bank. The sample farmers production data before the establishment of the Rural Bank were also not available and thus the "before and after" analysis could not be done. Understandably, the problem of obtaining the requisite data before the commencement of the programme makes the application of such an approach extremely poor in estimating the impact of credit schemes. Results could be biased due to improper gathering of the before data.

For instance in his evaluation of the "FONADER" credit scheme for small farmers in Fako Division of Cameroon, Zinkeng (1984), sought to test whether the loans have significant economic impact on the productivity and incomes of the farmers. He examined the performance of the farmers after the loan on the basis of their output and income levels against their performance during the period loans were granted. He used the Markov chain analysis to predict the distribution of farmers into various income groups in the short-run. His analyses provided contradictory results which he attributed to the poor data base for his Markovian analysis. However, he concluded that "FONADER" loans to small farmers in Fako Division

have not had any significant impact on their productivity and incomes. This finding cannot be relied upon in view of the procedures adopted for collecting and analysing data. The researcher in 1984 conducted a time series survey to collect data on farmers income and output for 1981 and the period before 1980 using 1980 as the base year. The respondents had to offer information by memory recall over a period of five years. The researcher's conclusion was based on the tabular analysis of such data. Tabular analysis, even with reliable data, cannot adequately and simultaneously consider all factor inputs including loans and production (Olomola 1988).

Yankey (1973), assessed the role of credit on agricultural development in Ghana using a linear functional form. His results were like Yeboa's (1982) although Yankey's sample was larger. His sample comprised of 103 farmers who had cultivated 76 hectares using research results obtained in 1967. For the success of any credit programme, Yankey, recommended the following (Yankey 1973, 41).

(a)   The existence of adequate and efficient socio-economic planning coupled with the desire to implement the plan,

(b)   An adequate transportation and storage system,

(c)   An adequate system of land tenure,

(d)   a system for minimizing price fluctuations for agricultural products,

(e)   A well organised and effective extension of service and

(f)   Continuity in Government Policies.

Morris W. (1973) investigated the impact of a credit programme on production and profits of small farmers in Colombia using a linear programming model of the nature:

$$\text{Max. } \pi = \sum_{j=1}^{12} C_j X_j \quad \text{Subject to working capital, family labour and land constraints}$$

In this model:

π = Total Profits or Production

X_j = Number of hectares where technology j is used.

C_j = Profits per hectare using technology j.

He found out that credit had a substantial impact on profits, production and factor use. Provision of credit significantly affected technology by shifting resources previously in use in less modern technologies into more profitable new technologies of production. A similar study carried out by Bhattacharyay B.N.(1994) using a performance evaluation criteria in India arrived at similar results.

Mulat T (1974) analysed the use of institutional and non-institutional credit in the Wereda. Using percentages, he observed that most borrowings were used for purposes of financing short-term expenditures; more specifically, purchase of food. 41.6% of the total loan was used to purchase food. He concluded that food was the most important reason for short term loans in Wereda. However, Diana H. (1967) employed a different methodology and arrived at the same result. She examined the operation of government credit schemes in Uganda using the Benefit - Cost analysis. She observed that many farmers did not experience a rise in income as a result of using credit. She concluded that profitable opportunities for using credit in Uganda were lacking.

Gershon F. et. al (1990) carried out a study on the determinants of farm investment and residential construction in post-reform China. In estimating determinants of farm investment, they used a log-linear function specified as:

$$\ln I = a_1 \ln H_0 - a_2 \ln h - a_3 \ln Z + a_4 \ln E + a_5 \ln F + a_6 \ln L$$

Where:

I = Investment in the farm

H_0 = Initial household endowment of housing services.

h = Investment in housing

Z = Family size

E = Household education

F = Farm size

L = Credit amount

The model yielded an R^2 of 62%. However, credit was observed to have an insignificant impact on farm investment. This was because on average each household diverted 40% of the short term credit from the farm to non farm related activities. They concluded that credit was not a major factor inhibiting investment in crop related investment in China. In 1991, they carried out a similar study using a utility maximization model and arrived at similar results.

2.2 LITERATURE SPECIFIC TO KENYA

Much of the literature on smallholder credit in Kenya focus on the impact of credit on productivity and factors behind poor loan repayments. In a number of these studies, linear regression models have been used for estimation.

Mwabu (1976) conducted a study on the impact of small farm credit on productivity in Tharaka division, Meru district. His hypothesis was that the bottleneck in small farm

development is lack of finance which credit can fulfil. He used a linear regression Model specified below for estimation:

$$FI_i = k + dcp_i + d_1 co_i + d_2 Fo_i + E_i, \quad i = 1\ldots.52$$

Where:

FI $=$ Farm investment

K $=$ Constant

CP $=$ Cooperative credit in kind

CO $=$ other credit

FO $=$ Farmers own funds

E $=$ Error term

i $=$ Respondent number

He found out that lack of money ranked fourth among the problems of sample farmers. However, that constraint could not be alleviated by credit. He observed that availability of cash credit to sample farmers did not help increase the stock of farm investment. His findings revealed that, farmers who had taken credit in kind among the Nkondi, had applied less of that credit on the farm than recommended. He attributed this behaviour to low returns from the farm compared to returns from non-farm investments. However, the study left more crucial explanatory variables affecting farm investment. These variables may include price of farm output and household characteristics such as family size and the number of family children in school.

Using a model of a similar functional form, Josef (1968) came up with different findings. According to the results of his study, credit extension in Kenya had a positive impact on small farm income. According to his findings, the external component of small farm finance seems

to be the main limiting factor for the growth of small holder income. He recommended loan application forms from farmers with sufficient internal funds to be rejected with no exception. The rationale of this recommendation was that the development of farms with substantial internal funds is not constrained by credit. However, he assumed that credit extended to small holders must lead to increased farm income which may not necessary be the case.

Contrary to conclusions reached by Josef (1968) about credit being a constraint on small holder farm development, a study by Heyer (1962/63) using a linear programming model proved otherwise. Heyer's findings showed that credit was not a binding constraint on small farm development in Masii area of Machakos. Her original hypothesis was that credit was a major limiting factor on peasant agriculture but she discarded this hypothesis when she found from her study that returns from farming remained low despite credit extension to farmers. She observed that farmers in Masii were diverting credit to alternative uses which were unprofitable. However, the study failed to empirically examine reasons why farmers in Masii diverted credit away from the farm to unprofitable non-farm ventures.

In a similar study, Pischke V.J.D. (1974) sketched a non mathematical model of the operation of farm credit in Murang'a district and arrived at findings similar to Heyer's. His sample consisted of 19 smallholders. He observed that most small holders supplemented proceeds of their loans with some capital of their own especially for the transportation of materials and animals to their farms and for the construction of capital improvements.

Wanja (1979) conducted field research in three areas of contrasting farming systems: Muhoroni in the sugar-belt, Turbo, a major maize and milk producing area and Dundori where Pyrethrum, Potatoes and milk provide the basis of the farm economy. Her objective was to find the causes of poor loan repayment. She employed a linear regression model specified below in estimation.

$$Y = c + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5$$

Where

C	=	Intercept coefficient
b_is	=	Coefficients to be estimated
Y	=	Loan repayment rate
X1	=	Purchased inputs used
X2	=	Value of purchased inputs
X3	=	Income
X4	=	Education
X5	=	Crop area

Her sample consisted of 87 farmers. Her findings showed a major cause of poor loan repayment to be insufficient income. At the Scheme level, she observed a clear and positive correlation between higher incomes and better rates of loan repayments.

She noted that certain standards of living are generally acceptable in the rural areas to which most of the peasantry aspire. These standards comprise a number of felt needs such as; Shelter of a semi permanent nature, provision of certain foods, basic household goods such as sauce pans and blankets, schooling and medical care (Wanja, 1979). She termed the cost of providing these needs in relation to family size and structure as sufficient income below which every attempt is made to avoid loan repayment. she concluded that any loan scheme failing to recognise such minimum monetary requirements must definitely have repayment problems. She thus pointed out that constraints to loan repayment constitute expenditures on basic requirements. However, the study failed to find out whether or not credit was invested in the farm in the study areas.

Gachanja (1979) carried out a study similar to Wanja's in Machakos and Kakamega

districts. She followed Wanja's methodology and gathered information from a slightly large sample i.e. 91 and extended explanatory variables to include family size. Her result was different from wanja's. She found out that the main cause of poor loan repayment in the areas of study was family size. The loan repayment rates in Machakos and Kakamega were 19.9% and 20% respectively.

Clayton E.(1975), Donaldson G.F. and Pischke V.J.D (1973) used percentages to study smallholder credit in Kenya. Clayton's objective was to find out why small holders in Kenya needed credit. He found out that small-holders needed credit for the purchase of fencing wire, improved livestock, cash crop planting materials, water tanks, sprays, hired labour to undertake bench terracing and cash crop planting. Donaldson G.F. and Pischke V.J.D. carried out a study on the amount of credit given to small holders and the sources of the credit. They found the main source of credit to be cooperative societies. The study also revealed that the amount of credit extended to smallholders in Kenya is very small (Donaldson and Pischke. 1973,6).

From the literature already reviewed, it can be noted that most studies especially in Kenya have centred on assessing the impact of credit on productivity and factors determining loan repayment. For example, Mwabu (1976) in estimating farm investment function focused on the impact of credit and productivity and used only two explanatory variables i.e. credit and farmers own funds. He left out many other crucial determinants of farm investment such as price of farm produce and family size. Heyer's study (1962/63) observed that credit in Machakos was diverted away from the farm to non-profitable activities. Her study did not cover reasons why farmers diverted the credit away from the farm. This study expands explanatory variables for the farm investment function and also covers reasons why credit is diverted away from the farm.

CHAPTER 3: MODEL DEVELOPMENT

3.0 INTRODUCTION

In this chapter the theoretical model is developed in section 3.1 below. In section 3.2 the hypotheses which the study is set to test are stated. Finally, the estimating equation is specified in section 3.3.

3.1 THE MODEL

Consider a household maximizing its utility over a two period planning horizon. This is for simplicity purposes since borrowing is considered as a means of adjusting consumption over time (Iqbal F.1986). Utility is defined over a composite consumption good (c) and over-housing services (H) so that the farmer's general utility function is given as: $U = u(c, H)$. Housing services refer to other non farm related expenditures such as house construction. For simplicity, we assume time separability of utility (Gershon F. et.al. 1990).

$$T = U_0(C_0) + V_0(H_0) + U_1(C_1) + V_1(H_1)\ldots\ldots\ldots 1$$

Where T is total utility, U and V are respectively the utilities from composite consumption and housing services and the numerical subscripts denote time periods. The time discount factor is omitted for simplicity as it can be embodied in the definition of U_1 and V_1.

More specifically, we use a log utility function so that we let

$$U_0(C_0) = \ln C_0$$

$$V_0(H_0) = \ln H_0$$

$$U_1(C_1) = \ln C_1$$

$$V_1(H_1) = \ln H_1$$

Equation (1)   thus becomes:

$$T = \ln C_o + \ln H_o + \ln C_1 + \ln H_1 \ldots\ldots\ldots 2$$

The household has an initial endowment of financial resources Wo, which is augmented with borrowed funds L. These can be used in the first period consumption (Co), investment in the farm (I) and investment in housing services (h). Other initial endowments are capital (Ko), land (A_o) and housing (H_o). These are assumed illiquid and cannot therefore be used for financing consumption or investment. The budget constraint is given by:

$$W_o + L = I + h + C_o \ldots\ldots\ldots (3).$$

The augmented objective function becomes:

$$\text{Max Q} = \ln C_o + \ln H_o + \ln C_1 + \ln H_1 + \lambda (W_o + L - I - h - C_o) \ldots\ldots 4$$

I, h, λ

In the second period, if no change in the land endowment occurs, the augmented capital stock (that is initial plus first period investment) is combined with the initial endowment to produce output via a neoclassical production function. Consumption in the second period is then the value of output minus debt repayment thus:

$$C_1 = F (K_o, I, A_o) - (1 + r) \times L \ldots\ldots\ldots 5$$

Where r is the interest rate and F is the production function of the form:

$$F = A_o K_o^a I^{1-a} \ldots\ldots\ldots 6$$

Equation 6, made linear thus becomes:

$$\ln C_1 = \ln [A_o K_o^a I^{1-a} - (1+r)L] \ldots\ldots\ldots 7$$

We also know that :

$$H_1 = H_o + h \dots\dots\dots (8)$$

So that:

$$\ln H_1 = \ln (H_o + h) \dots\dots 9$$

Substituting equations 7 and 9 into 4, gives the following optimization problem;

$$\text{Max} \quad Q = \ln C_o + \ln H_o + \ln [A_o K_o^a I^{1-a} - (1+r)L] + \ln (H_o + h) + \lambda (W_o + L - I-$$

$$I,h,\lambda \qquad h - C_o)\dots\dots\dots\dots\dots\dots\dots 10$$

First order conditions thus yield the following;

We know that $\quad C_1 = A_o K_o^a I^{1-a} - (1+r) L$

Let $F = A_o K_o^a I^{1-a}$ and $Z = (1 + r) L$

So that $\quad C_1 = F - Z \qquad \dots\dots\dots\dots\dots 11$

From (11) it is correct to have: $\quad C_1 + Z = F \dots\dots\dots\dots\dots 12$

Taking logs, we get

$$\ln [C_1 + Z] = \ln F \qquad \dots\dots\dots\dots\dots 13$$

Taking partials with respect to (I), we have:

$$\frac{1}{C_1 + Z} \frac{dC_1}{dI} = \frac{1}{F} \frac{dF}{dI} \dots\dots\dots\dots\dots 14$$

So that
$$\frac{dC_1}{dI} = \frac{C_1 + Z}{F}\, \frac{dF}{dI} \quad \dots\dots\dots\dots\dots\dots\dots\dots 15$$

We however know that

$$C_1 = F-Z = A_oK_o^aI^{1-a} - (1 + r)L \quad \dots\dots\dots\dots 16$$

$$Z = (1 + r) L \quad \dots\dots\dots\dots\dots\dots\dots\dots 17$$

$$F = A_oK_o^aI^{1-a} \quad \dots\dots\dots\dots\dots\dots\dots\dots 18$$

$$\frac{dF}{dI} = (1 - a) A_oK_o^aI^{-a} \quad \dots\dots\dots\dots\dots\dots\dots 19$$

Substituting equtions 16, 17, 18, & 19 into 15, we get:

$$\frac{dC_1}{dI} = (1 - a) A_oK_o^aI^{-a} \quad \dots\dots\dots\dots\dots\dots 20$$

Hence, $\dfrac{dQ}{dI}$ = $(1 - a) A_o K_o{}^a I^{-a} - \lambda$ = 0 21

$\dfrac{dQ}{dh}$ = $\dfrac{1}{H_o + h}$ - λ = 0 22

$\dfrac{dQ}{d\lambda}$ = $W_o + L - I - h - C_o$ = 0 23

Subtracting 22 from 21, we obtain:

$(1 - a)A_0 K_0{}^a I^{-a}$ - $\dfrac{1}{H_o + h}$ = 0 24

Equation (24) can be rewritten as:

$(1 - a)A_0 K_0{}^a I^{-a}$ = $\dfrac{1}{H_o + h}$ 25

Equation (25) means that the household will invest his resources in such way that the marginal utility from I and h are equal. Equality in (25) will only be disturbed by changes in the variables affecting I and h. The utility maximizing household will ensure that equation (25) holds at all times. From (25) it can be observed that:

I = $f(H_o, h)$ 26

This is because A_0 and K_0 are assumed illiquid and thus cannot be used for consumption nor investment.

3.2.   HYPOTHESES

To assess the constraints limiting small-holder credit investment in the farm, it is necessary to demonstrate the responsiveness of farm investment to a change in the variables identified as determining it.   These variables include;   Price of the farm produce, amount of credit, initial financial resources of the household (income endowment), initial household endowment of housing services, family size and the number of family children in school (Gershon F. et.al 1990).   The use of credit to purchase any farm input is thus treated as farm investment.   Factors limiting investment in the farm in terms of the purchase of farm inputs are therefore simply factors determining farm investment.

HYPOTHESES 1

From Economic theory, it is expected that the quantity supplied for a normal good falls as its price falls and rises as its price rises.   The price of coffee output is therefore expected to directly affect farm investment.   If the price of coffee is low, it implies low returns to farmers from farm investment undertaken and this acts as a dis-incentive to farmers credit investment in the farm.

HYPOTHESES 2

The income endowment of the household and farm investment are expected to be

positively related. The implication here is that the household with high income is assumed to possess the basic requirements and thus the possibility of diverting credit away from the farm to meet basic needs is reduced. For the household with low income, credit becomes an income which may be diverted from the farm to the purchase of basic domestic requirements (thus lowering farm investment). This is because consumption must first be met before any or investments on the farm are undertaken.

HYPOTHESIS 3

A household with higher initial housing services can be assumed to be lacking less of these services and therefore, will spend less of the credit on the acquisition of such services and more on farm investment. The household's initial housing services and farm investment can thus be expected to be positively related.

HYPOTHESIS 4

The amount of credit extended to the house-hold can determine the proportion of it to be invested in the farm. The less the credit, the lower the % invested in the farm given that consumption needs must first be catered for. The more the amount of credit, the more is invested in the farm since in this case, the proportion of the credit to be devoted to consumption will be small. The amount of credit extended to the household and farm investment can thus be said to be directly related.

HYPOTHESIS 5

The size of the family and farm investment are potentially negatively related (Gershon F. et. al 1990). If the size of the family is large, then more credit is likely to be used to purchase the basic requirements and therefore less of it will be invested in the farm, ceteris paribus.

HYPOTHESIS 6

Assuming credit is a major component of family income, the larger the number of family children in school, the more the proportion of credit spent on education e.g. school fees (and thus less is invested in the farm). Conversely, the less the number of children in school, the less the educational expenditures and thus more proportion of the credit is left for farm investment. The number of family children in school and farm investment therefore can be expected to be negatively related.

3.3   **MODEL SPECIFICATION**

In order to examine the determinants of farm credit investment among coffee farmers in Kisii and to test the hypotheses in section 3.2, a specific functional form of equation 26 is estimated. To improve the specification of the estimated model, other variables such as price of coffee, family size, amount of credit, number of family children in school and household income are included in the function giving rise to:

$$ I \quad = \quad f\left(H_0, h, P, Z, N, L, W_0\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots 27 $$

When normalised, equation (27) becomes:

$$ \frac{I}{L} \quad = \quad f\left(H_o, h, P, Z, N, W_o\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots 28 $$

Where:

I = investment in the farm.

H_o = initial household endowment of housing services.

h = investment in housing

P = price of coffee output per kg.

L = amount of credit received by the household

Z = family size

N = Number of family children in school

W_o = initial household income. This includes incomes from other sources apart from credit.

More specifically, the following two models were estimated using OLS regression technique. Estimation of model two was necessary because in model 1, I is part of L and thus the two are highly correlated.

Model 1 : $\ln I$ = $\ln H_0 - \ln h + \ln P - \ln Z - \ln N + \ln W_0 + \ln L$

Model 2 : $^1/_L$ = $\ln H_0 - \ln h + \ln P - \ln Z - \ln N + \ln W_0$

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.0 INTRODUCTION

This chapter is divided into five sections. Section 4.1 discusses the sampling methodology employed while section 4.2. explains type of data collected and data sources. Section 4.3 contains definitions and measurements of variables considered in this study. Characteristic of the study sample are briefly outlined in section 4.4 while section 4.5 contains a brief description of the study area. Section 4.6 reports the shortcomings encountered in the process of data collection.

4.1 SAMPLE SELECTION

The sampling universe included all small holder coffee farmers in Majoge Chache location that had borrowed funds from the cooperative society in 1990. A list of all farmers in Majoge Chache location who had taken credit from the cooperative society in 1990 was sought from the loan officer based at Ogembo. Following the list, systematic sampling method was then employed. Every sixth loanee farmer beginning from loanee farmer number one was picked until a sample of 40 was obtained. A total of 272 farmers from the location had taken credit from the cooperative in 1990.

4.2 DATA TYPES AND SOURCES

Primary data were collected by use of questionnaires. These questionnaires were administered to the household heads or any other representative household member. The questionnaire was used to obtain data on:

-       Size of the household

- Household income

- Initial household endowment of housing services

- Household investment in housing services

- Number of family children in school

- Amount of credit invested in the farm.

The household questionnaire used is presented in appendix **1**. Data on loan amount and coffee prices was obtained from secondary sources i.e from the records of the loan officer at Ogembo.

4.3 DEFINITION AND MEASUREMENT OF VARIABLES

SMALL FARMS

There is no clear definition of small farms in Kenya. The Agricultural Finance Cooperation (AFC) for instance defines small farms as those which earn less than Kshs. 10,000 p.a or those whose sizes do not exceed ten acres. This is merely an operational definition suitable largely for the loan purposes of the AFC. Two limitations are clear from this definition.

i) The definition is arbitrary. A small farm less than ten acres may intensify farm activities and earn more than Kshs. 10,000. Similarly, a large farm with over ten acres may mismanage itself and thus earn less than Kshs. 10,000. Such farm may continue to qualify as a small farm yet it is not.

ii) The definition ignores a farm's scale of operation and its potentiality.

For these reasons, we shall not adopt the AFC'S definition of small farms. Judith Heyer defined small farms not just in terms of acreage and/or gross farm revenue but

also in terms of their commercial viabilities and market shares. This definition is a bit complex and thus we shall not adopt it. For simplicity we shall adopt a small farm definition as given by the Ministry of Planning and National Development. The Ministry defines small farms as those ranging between 0.5 and 4.5 acres. Since there are no larger farms in Kisii district [Kenya,Kisii District development plan (1994 - 96], then any farm growing coffee can fall in this definition.

FARM INVESTMENT

This is taken to include all credit expenditures on farm equipment (e.g ploughs, Jembes, Spray Pumps), farm fences and farms inputs like fertilizers. It was measured in monetary terms.

CREDIT AMOUNT

This was measured in monetary terms. The figures were directly extracted from the loan register i.e the principal sum the loanee actually got.

HOUSEHOLD INCOME

This is the income that the household receives from other sources apart from credit. It was measured in monetary terms.

PRICE OF COFFEE OUTPUT

This was measured in monetary terms and was obtained from the union which markets the coffee and pays farmers.

FAMILY SIZE

Family size refers to the household number i.e wives, children plus other dependants. The number of family children in school was measured in actual numbers.

INITIAL HOUSING SERVICES (HO)

This refers to the household's house value in 1990.

INVESTMENT IN HOUSING (h)

This refers to any non farm related expenditures from credit funds

4.4   CHARACTERISTICS OF THE STUDY SAMPLE

The characteristics discussed in this section are the household's society of affiliation, age of household head and the education of the household head. A sample of 40 small holders was interviewed.

There are three societies in Majoge Chache location; namely Gakero Farmers Co-operative Society, Itabago Farmers Co-operative Soiety and Kebege Farmers Co-operative Society · Small holder figures from each society are as given below:

Table 4.3.0 Distribution of sampled farmers by society

Society	No.of smallholders	% of Total
Gakero F.C.S	8	20.0
Itabago F.C.S	19	47.5
Kebege F.C.S	13	32.5
Total	40	100.0

SOURCE: Survey data

Most of the smallholders interviewed belong to Itabago F.C.S. This was a mere coincidence since during the sample selection exercise, the researcher did not know which farmer belonged to which society. This is because all the names of loanee farmers

from Majoge Chache location were listed under "Gakero Main" cooperative society. The actual society of affiliation for each individual farmer was solicited from the farmers themselves during the interview. Gakero is the main society while Itabago and Kebege are its branches.

Among the small holders interviewed, the age of the household head varied between 25 and 87 years. The households can be grouped according to the age groups of the heads as follows:

Table 4.3.1 Age of household head

Age group of head	No. of small holders	% of Total
20 - 30	8	20.0
31 - 40	14	35.0
41 - 50	7	17.5
51 - 60	6	15.0
Over 60	5	12.5
Total	40	100.0

SOURCE: Survey data

From the above table, we can observe that the majority of the household heads fall within 31 - 40 age group. In fact the majority are well below the age of 50 years.

The years of schooling of the household head were calculated on the basis of the highest level of education attained. These are grouped as follows:

Table 4.3.2 Education of the household head.

Level Achieved	No. of heads	% of total
None (0)	9	22.5
Primary	9	22.5
Secondary	14	35.0
College	8	20.0
University	0	0.0
Total	40	100.0

SOURCE: Survey data

4.5 DESCRIPTION OF THE STUDY AREA

Kisii district is one of the six districts of Nyanza Province. It shares common borders with Nyamira to the north and east, Narok to the South and Homabay and Migori districts to the West. It is the second smallest district (Geographically) in the province after Nyamira. Kisii has an area of about 1302.1 square Kilometres and it is subdivided into 11 administrative divisions as shown in the table below:

Table 4.4.0 Area of the District by Division (in square KM)

Division	Area
Mosocho	87.0
Suneka	123.4
Nyamarambe	208.2
Marani	125.0
Masaba	160.0
Keumbu	149.3
Nyamache	78.0
Sameta	77.7
Ogembo	100.2
Kenyenya	112.0
Nyacheki	81.0
Total	1,302.1

SOURCE: Kenya, Kisii district Development Plan 1994 - 96

Ogembo division has two locations i.e Majoge Chache and Sengera. It has six sub-locations and 9,024 rural households. The population density is 522 persons per square kilometer (Kenya, Kisii district development plan 1994 - 96). The main food crops grown are maize, beans and finger millet while the main cash crops are coffee and tea.

Majoge Chache location has three coffee societies i.e Gakero, Itabago and Kebege. Itabago and Kebege are branches of Gakero. Coffee output from the location has however, been declining over years. The loan officer at Ogembo division attributed the decline to the following factors:-

i)   Diversion of credit funds to alternative uses (a way from the farm). He claimed that most farmers sold credit items like spray pumps, Jembes, wheelbarrows etc as soon as they got them and at prices far below the market prices.

ii)   Neglect of coffee farms by many farmers. The loan officer noted that many farmers had planted other crops like maize in coffee farms. Others had even cut down coffee trees and had planted other crops such as beans. This was observed during the field work.

iii)   Change from coffee farming to carving. Most farmers had left farming and taken up carving: An economic activity that gave them money on a daily basis. The table below shows coffee output from the location over a number of years.

Table 4.4.1 Coffee output in Majoge Chache location 1985 - 1992

Year	Output (kgs)	% change
1985/86	942,604	-
1986/87	850,706	-9.7
1987/88	366,992	-56.9
1988/89	361,331	-1.5
1989/90	348,222	-3.6
1990/91	339,439	-2.5
1991/92	181,282	-46.6
1992/93	102,314	-43.6

SOURCE: Records of the Kisii Union statistics.

It can be observed that, just like the district, output from Majoge Chache location has also been taking a downward trend.

The loan officer also claimed that most farmers had loan repayment problems. According to him, these farmers who had cut their coffee plants and planted other crops had not repaid their loans on which interest had kept on accumulating over time.

4.6 FIELD RESEARCH CONSTRAINTS

There were various problems in the collection of data process. These included the following:

i) Data collection process was costly in terms of time and money. The time constraints prevented a researcher from picking a large sample. It also prevented a longer than three weeks period for the study.

ii) Most respondents insisted on being interviewed only in the evenings when they were less busy. This caused some inconveniences to the researcher.

iii) Due to the locations of the respondents homes, sometimes the researcher had difficulties in getting there by vehicle and therefore resulted to covering long distances by foot.

iv) Some respondents were unwilling to be interviewed and thus alot of persuasion and convincing had to be done. This applied especially to those farmers who had already received notices from the union threatening them of being sued incase of no effort to repay the loans.

v) Data on some questions like income was reluctantly given.

CHAPTER 5

EMPIRICAL RESULTS

5.0   INTRODUCTION

This chapter is divided into two sections. The first part deals with descriptive statistics for variables included in the model while the second section presents and interprates estimation results.

5.0.1   Dependent variables

Since the paper is dealing with constraints to smallholder credit investment in the farm, farm investment of credit is the dependent variable. Credit farm investment ratio in this study refers to the amount of credit invested in the coffee farm divided by the total amount of credit received by the smallholders:

i.e credit farm investment ratio (I/L) = Amount of credit invested in the farm

Total Credit received

For purposes of this study credit farm investment ratio has been classified into three categories i.e low   I/L = 0.01 - 0.40, medium I/L = 0.41 - 0.80 and High I/L = 0.81 - 1.0

The data collected from the field yielded the following results concerning the I/L in Majoge Chache location:

Table 5.0.2 Household credit farm investment ratio

Ratio category	No. of small holders	% of Total	Cum %
0.01 - 0.25	7	17.5	17.50
0.26 - 0.50	15	37.5	55.00
0.51 - 0.75	12	30.0	85.00
0.76 - 1.0	6	15.0	100.00
Total	40	100.0	

SOURCE: Survey data

From the above table, it can be observed that only 45% of the sample farmers invested more than one half of the credit they received in the farm while 55% of them invested less than one half of the credit they received in the farm. Factors which determine the ratio of total credit invested in the farm are the explanatory variables discussed below.

5.1 EXPLANATORY VARIABLES

The proportion of credit invested in the farm is influenced by various factors. A total of six variables were considered. These were: Initial household endowment of housing services (H_o), Investment in housing (h), price of coffee output per kg (p), family size (z), number of family children in school (N) and household income (W_o).

Initial endowment of housing services (H_o)

Initial household endowment of housing services as measured by the value of household house(s) in 1990 ranged between Kshs. 800 to Kshs. 184,000 as shown in table 5.1.0 below:

Table 5.1.0 Household endowment of housing services

H_o (Kshs)	No. of small holders	% of total	Cum %
1-10,000	10	25.0	25.0
10,001-20,000	7	17.5	42.5
20,001 - 30,000	9	22.5	65.0
30,001 - 40,000	4	10.0	75.0
40,001 - 50,000	4	10.0	85.0
Over 50,000	6	15.0	100.0
Total	40	100.0	

SOURCE: Survey data

From the above table, it can be observed that 85% of the farmers had houses whose value was Kshs. 50,000 and below. The relationship between initial endowment of housing services and the credit farm investment ratio is presented in table 5.1.1 below.

Table 5.1.1. Relation between Initial household endowment of housing services (H_o) and credit farm investment ration (I/L)

H_o(Kshs)	Low I/L (0.01-0.40)	Medium I/L (0.41-0.80)	High I/L (0.81-1.0)	Total
1 - 10,000	8	1	1	10
10,0001 - 20,000	2	3	2	7
20,001 - 30,000	3	4	2	9
30,001 - 40,000	1	2	1	4
40,001- 50,000	3	1	0	4
Over 50,000	1	3	2	6
Total	18	14	8	40

SOURCE: Survey data

The X^2 (Chi - square) test of independence was carried out to determine whether or not there was a dependency relationship between initial endowment of housing services and the ratio of credit invested on coffee farms. The value of the computed Chi-square with 10 degrees of freedom was 21.3. This showed that there was a significant relationship between initial household endowment of housing services and the ratio of credit invested in coffee farms at the 5% level·

Investment in housing (h)

Investment in housing (h) was measured by the amount of credit invested in non farm activities. It was noted that small holders in Majoge Chache location diverted credit to school fees payment, building houses, payment of hospital bills and hiring of farm land. This is shown in the table 5.1.2 below:-

Table 5.1.2 Non farm investments

Investments	No. of small holders
School fees	19
Building	10
Medical	7
Hire of land	1
Others e.g Purchase of clothes, cow, utensils etc	13

SOURCE: Survey data

The table shows School fees as the non farm activity to which the majority of smallholders diverted credit in the study area. 10 farmers diverted credit to both School fees and building of houses or medical costs. Such credit diversion had an obvious effect on farm investment in the sense that any investments in non-farm activities left less for farm investment.

Price of coffee output per kg

In 1990, coffee prices per kg were different in each of the three societies in the location. The prices were as follows:

Gakero Farmers Cooperative Society   -   Kshs. 3.50 per kg

Itabago Farmers Cooperative Society   -   Kshs. 4.80 per kg

Kebege Farmers Cooperative Society   -   Kshs. 4.00 per kg

The reason for price differences was the variability in the amount of the loan taken by the individual societies. Societies do borrow funds from the Union to invest in such areas as; acquisition of new coffee processing machines, factory fencing, new nursery developments etc. Because each society is funded by its members, the society repays its loan by deducting farmers dues and this reduces the effective price received by the farmers. In 1990, loans taken by the three Societies were as follows:

Gakero -   Kshs. 98,680 for the development of Ruiru II Nursery variety

Itabago -   Kshs. 56,500 for the repair of staff houses

Kebege -   Kshs. 72,000 for the completion of the construction of a coffee store

Due to loan amount differences taken by the three Societies, repayment amount also differed leading to price differences. Most farmers indicated poor pricing as the main problem facing them. The majority of sample farmers showed more interest in tea farming and argued that tea yielded income on a monthly basis unlike coffee whose actual date of payment in a year was never known. Other farmers, laid the blame on the management committees by arguing that the committees swindled alot of their money and that this had lead to poor coffee payment. Thus, most farmers seemed to be directing investments to tea farming and soapstone carving.

Family size

The interviewed samples' family sizes ranged from 0 to 31. Households can be classified according to family size as follows:

Table 5.1.3 Household size

Size	No.of Smallholders	% of Total
0 - 5	11	27.5
6 - 10	17	42.5
11 - 15	4	10.0
16 - 20	5	12.5
Over 20	3	7.5
Total	40	100.00

SOURCE: Survey data

It can be observed that the majority of the samples family size ranged between 6 to 10. The relationship between family size and the credit farm investment ratio is presented in table 5.1.4 below:

Table 5.1.4 Family size - Farm investment relation

No of small holders

Family size	Low I/L (0.01-0.40)	Medium I/L (0.41-0.80)	High I/L (0.31-1.0)	Total
0 - 5	5	3	3	11
6 - 10	8	5	4	17
11 - 15	0	3	1	4
16 - 20	2	3	0	5
Over 20	2	0	1	3
Total	17	14	9	40

SOURCE: Survey data

To ascertain whether or not there was a dependency relationship between family size and the ratio of credit invested in the farm; the Chi - square test of independence was carried out. This test showed that there was no significant relationship between the two at the 5% level of significance.

Family children in school

The number of family children in school among the sample farmers ranged from 0 - 9. The relationship between the number of family children in school and the ratio of credit invested on the farm is presented in table 5.1.5 below.

Table 5.1.5 Household children in school.

| No. in school | No of small holders | | | Total |
	Low I/L (0.01-0.40)	Medium I/L (0.41-0.80)	High I/L (0.81-1.0)	
0 - 5	14	12	4	30
6 -10	5	3	2	10
Total	19	15	6	40

SOURCE: Survey data

From the data in table 5.1.5 above, a Chi - square test of independence was carried out to test whether or not there was a significant dependency relationship between the number of children in school and the amount of credit invested in the farm. This test showed that there was no significant dependency relationship between the two at the 5% level of significance.

Household income

The income endowment of sample farmers ranged from Kshs. 2060 to Kshs. 121,000 p.a. This is classified as follows:

Table 5.1.6 Household income (in Kshs. per annum)

Income group	No. of small holders	% of Total	Cum. %
0 - 10,000	12	30.0	30.00
10,0001 - 20,000	16	40.0	70.00
20,0001 - 30,000	5	12.5	82.50
Over 30,000	7	17.5	100.00
Total	40	100.0	

SOURCE: Survey data

Table 5.1.6 shows that 70% of the farmers had a yearly income ranging between Kshs. 0 - 20,000. The relationship between household income and the proportion of credit invested on the farm is given on table 5.1.7 below.

Table 5.1.7 Income - investment relation

No. of small holders

Income group	Low I/L	Medium I/L	High I/L	Total
	(0.01-0.40)	(041-0.80)	(0.81 - 1.0)	
0 - 10,000	7	4	1	12
10,001 - 20,000	9	4	3	16
20,001 - 30,000	1	3	1	5
Over - 30,000	3	4	0	7
Total	20	15	5	40

SOURCE: Survey data

The Chi - square test of independence showed that there was no significant dependency relationship between the household income and the proportion of credit invested on the farm at 5% level of significance.

5.2 RESULTS OF THE REGRESSION ANALYSIS

The results reported here relates to the two models specified in section 3.3. Prior to the regression estimation, a correlation matrix for all the variables in the models was generated. This matrix is presented in table 5.2.0. The results of the correlation analysis show that some of the variables e.g family size and number of children in school, farm investment and loan

amount, number of children in school and loan amount, investment in Non-farm activities and loan amount and initial household endowment of housing services and loan amount were strongly correlated. The remaining variables were only weakly correlated. Such high correlation between some of the independent variables is evidence of the multicollinearity problem. Some of the consequences of the multicollinearity problem in multiple regression analysis are "wrong" signs for the regression coefficients and insignificant t - ratios while the F - ratio shows a strong explanatory power of the model. The indicated results should therefore be interprated in the light of this problem.

Table 5.20 Correlation Matrix

	H_o	h	P	Z	N	W_o	L	I
H_o	1.00							
h	0.5427	1.00						
P	0.0167	0.2475	1.00					
Z	0.2355	0.4339	-0.1005	1.00				
N	0.5025	0.5608	-0.1360	0.7086	1.00			
W_o	0.2653	0.3211	-0.1043	0.3797	0.3378	1.00		
L	0.6298	0.5534	-0.0038	0.3948	0.5264	0.2937	1.00	
I	0.5763	0.2247	-0.0093	0.3206	0.3641	0.1325	0.7861	1.00

Table 5.2.1:   Results for model 1

Explanatory Variable	Regression Coefficient and t - ratios
Constant	-0.646
H_o	0.31
	(2.58)
h	-0.55
	(-3.44)
P	0.85
	(0.99)
Z	0.32
	(1.68)
N	-0.14
	(-0.64)
W_o	-0.14
	(-1.00)
L	1.09
	(6.41)

$R^2 = 0.75$

$F = 13.83$

Degrees of freedom = 32

NB: t - ratios are in parenthesis

The R^2 of 0.75 shows that 75% of the changes in farm investment can be explained by the changes in the explanatory variables listed. This leaves only 25% of the changes in the farm investment unexplained. The variables with the expected signs include; H_0, h,P, N and L while variables with significant effects at 5% level are H_0, h and L. Family size and income variables do not have the expected signs and their t - ratios are insignificant. From theory, family size was expected to negatively affect the proportion of credit invested in the farm while income was expected to affect it positively. However, results of model 1 show opposite signs for the two variables. We can attribute such unexpected signs and insignificant effects of these variables to the multicollinearity problem.

In model 1, I is part of L and thus the two are highly correlated as shown by the correlation matrix in table 5.2.0. This is because I is the amount of the loan (L) that the smallholder invested in the farm. Apart from the strong correlation between I and L, model 1 does not enable us to measure the determinants of the proportion of credit that is invested in the farm (I/L) which is the central issue of this study. These reasons, necessitated normalization of model 1 by dividing through by L to obtain model 2 whose results appear in table 5.2.2. below.

Table 5.2.2. Results of model 2

NB: t - ratios are in parenthesis

Explanatory Variable	Regression Coefficient and t-ratios
Constant	1.06
H_0	0.13
	(4.33)
h	-0.22
	(-4.40)
P	0.08
	(0.30)
Z	0.05
	(0.83)
N	0.01
	(0.14)
W_0	-0.02
	(-0.40)

R_2 - 0.45

$F = 4.59$

Degrees of freedom = 33

Table 5.2.2 presents semi log results when measuring determinants of the fraction of credit that s invested in the farm i.e (I/L). The loan amount in this case is no longer one of the

explanatory variables. The R^2 of 0.45 implies that a good deal of the variation in the fraction of credit that is invested in the farm is unexplained. However, the F - statistic which shows the strength of the explanatory power of the model is significant at 5% level.

The positive sign of the coefficient of the variable, H_0 is the expected sign which indicates that the higher the H_0 the higher the fraction of credit invested in the farm. The t-ratio associated with the effect of H_0 on $^1/_1$, indicates that the effects are significant. The variable h, has the expected sign and is significant. This implies that if more credit is invested in non farm activities, then less is invested in the farm.

The coefficient of the variable P has the expected sign but is not statistically significant. For instance, the price of coffee output per kg positively influences the amount invested in the farm. The non significant effect of price can be attributed to the low variability of price values. For instance, 19 sample farmers happened to belong to one co-operative society i.e. Itabago. This means that the price paid to all the 19 was the same i.e Shs. 4.80 per kg; hence little variability. The remaining 21 members of the sample belonged to the two societies i.e. Gakero (8) and Kebege (13) with only a price variability of 50 cents.

The rest of the variables i.e Z, N and W_0 do not have the expected signs and the t-ratios associated with them indicate that they have no significant effects on the amount invested in the farm. The insignificant effect of the three variables can be attributed to the strong correlation

between them. For instance, family size (Z) and number of children in school (N) are highly correlated as shown by the correlation matrix in table 5.2.0.

This chapter has reported the empirical findings of the study. Initial housing services and investment in Non - farm activities have been observed to be the crucial variables determining the proportion of credit invested in coffee farms in the study area. The following chapter concludes this study.

CHAPTER 6

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

6.0 INTRODUCTION

This chapter is divided into three sections. The first part draw conclusions from empirical findings and gives a summary of the study. The second part makes policy recommendations based on conclusions from empirical results. Lastly the chapter suggest areas for further research.

6.1 SUMMARY AND CONCLUSIONS

The main objective of the study was to improve our understanding of the determinants of the amount of credit invested in small holder farms. Special attention was directed to coffee farming in Majoge Chache Location, Kisii District. A sample of 40 small holders who had borrowed funds from the cooperative society in 1990 was picked using systematic sampling procedure. Data obtained was then analysed using econometric methods.

Regression and descriptive analyses were carried out to determine how the various factors influence small holder credit investment in coffee farms. These influencing factors included: initial household endowment of housing services (H_0), investment in non-farm activities (h), price of coffee output per kg (p), size of the family (z), number of children in school (N) and household income (W_0).

The study found out that initial housing services (H_0) and investment in non-farm activities (h) played a significant role in determining the amount of credit invested in coffee farms in the study area. The two variables also had the expected signs. This finding concurs with results of other studies on determinants of farm investment (Feder et.al 1990). The most non-farm activity to which credit was diverted to in the study area is school fees payment.

The price variable had the expected sign but its t-ratio showed that the variable had an insignificant effect. This insignificant effect was due to low variability in prices paid to the farmers in 1990 by the three societies in the study area. The insignificant effect of the price variable was aggravated by the fact that almost half of the sample farmers

were from one society. However, a majority of sample farmers during the interview pointed to poor coffee prices as the main problem that discourages them from investing in coffee farms. Study findings also showed that family size, number of children in school and household income are insignificant as far as their effects on farm investment is concerned. The three variable also did not have the expected signs. We can therefore conclude that the most important factors influencing farmer's decisions in the study area regarding farm investment are initial household endowment of housing services (Ho) and investment in Non-farm activities (h). Coffee price is another important factor as shown in the descriptive analysis although estimation results portrays it as an insignificant variable.

6.2 POLICY RECOMMENDATIONS

The results of this study suggest the following implications for policy.

(1) The Cooperative Societies should not only issue loans meant for farm developments but should also give loans for non farm ventures e.g school fees, medical bills clearance, house construction e.t.c. This is because, a farmer without any pressing Non-farm need, if given credit for farm development will invest more of that credit in the farm. Most farmers in the study area were observed to divert credit meant for farm development to non-farm ventures like school fees. If Cooperative Societies could issue farmers with Non farm loans then hopefully no farmer will divert credit meant for farm development to any other area. It should be noted that the Cooperative efforts to issue credit in kind to combat credit diversion to non farm ventures has proved no solution since farmers have been observed to sell the in kind credit as soon as they get it. The

best and permanent solution should thus be to assist farmers in areas such as school fees payment, medical bills clearance etc. through non farm loan provisions.

2) Coffee payments should be made prompt and reasonable. This is because if farmers can be paid promptly and at reasonable rates, they will have income that can enable them meet most of the pressing non-farm needs such as school fees. With such non-farm needs met, farmers will invest the credit they receive in the farm hence help increase coffee output in the study area.

6.3 SUGGESTIONS FOR FURTHER RESEARCH

i) A study similar to this one should be done on a wider scale involving a more larger sample. Such study should not only comprise a large sample from one location but should even extend to more locations, divisions or even districts. Result from such a study will aid in making comparisons regarding farmer's farm investment behaviours.

ii) It should be desirable to undertake a time series study to see to what extent results are consistent with these cross-sectional findings.

iii) An analysis of quality of services provided by the unions and society management committees should be undertaken. Results from such an analysis will provide satisfactory information to farmers who do feel that unions and societies are mismanaged; leading to poor coffee payments.

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APPENDIX 1

HOUSEHOLD QUESTIONNAIRE

Household Code _____

Household Name (optional) _____

Date of Interview _____

Name of Research Assistant _____

1.0 HOUSEHOLD INFORMATION

NB: Person to be interviewed, preferably is the household head.

1.1 How old are you? years ....

1.2 How long have you lived in this farm? years ....

1.3 Did you go to school? Yes................No ....

1.31 If yes, What standard or form did you reach?

Standard:

Form:

1.32 Have you attended other courses or training of any sort? yes _____
No. _____ Number: _____

If yes, where did you go and what causes did you take?

Institution attended	Course Taken	From	To

1.4 Are you married? Yes, _____ No. _____

1.41 If yes, how many wives do you have?
Number_____

1.42 Do they all live in this home? Yes _____ No.
_____

1.43 If no, how many do not stay here? Number _____

Now, I am going to ask you about the ages of your children who live within this home.

1.44 How many are:

Under 7 years? Number _____

Between 7 and 15 years? Number _____

Over 15 years? Number _____

1.45 Do you have children who do not live with you?
Yes _____ No. _____

1.46 If yes, how many? No. _____

1.47 Do you have relatives living with you? Yes _____ No. _____
If yes, how many do live with you? Number _____

1.48 Do they depend on you or they support themselves?
Depend on me _____ support themselves _____

1.49 Are any of your children in school? Yes _____ No._____
If yes, tell me the type of school and the fees you pay per year.

School	Number	Fees Paid
Primary	_____	_____
Secondary	_____	_____
University	_____	_____
Other, specify	_____	_____

2.0 FARM OPERATIONS AND INVESTMENT

2.1 How big is your farm? Acres _____

2.2 How many acres do you have under crop cultivation?
Acres _____

2.3   What types of crops (both food and cash crops) do you grow and what is their acreage

Crops   Acreage

_____   _____

_____   _____

_____   _____

_____   _____

2.4   Do you have plans to improve your farm in the coming season? (Probe)

Yes _____   No _____

If yes, what plans

_____

_____

2.5   If no, do you feel your farm is as good as you would like it to be?

Yes _____ No _____

If no, what do you think should be done to make it better? _____

_____

2.60   Is your farm fenced? Yes _____ No _____

If no, go to question 2.65

2.61   How much of it is fenced? Acres _____

2.62   With what materials? _____

2.63   When did you fence it? Year _____

2.64   How much did the fencing cost you? Kshs. _____

2.65   Do you think it would be useful to fence your farm? Yes _____ No ____

If yes, how would it be useful? _____

_____

2.7   Which of the following farm equipments do you have? Also tell me their cost, source of funds to acquire them, and the year you acquired them.

Equipment	Number owned	Cost(shs)	Source	Year
Wheelbarrow	_____	_____	_____	_____
Spray Pump	_____	_____	_____	_____
Jembes	_____	_____	_____	_____
Others specify	_____	_____	_____	_____

_____ _____   _____

2.8 Do you hire labour to work on your farm?

yes, _____ No _____

If so, how much do you pay the labour per month? Kshs. _____

SOURCES OF NON CREDIT FINANCE

3.0

3.1 How much coffee did you sell in 1990? Kgs. _____

3.2 How much income did it fetch you? Kshs. _____

3.3 Apart from coffee, did you sell other crops?

Yes _____ No _____

If so, what crops?

Crops	Receipts(Kshs)
_____	_____
_____	_____
_____	_____
_____	_____

3.40 Are you currently employed for a wage?

Yes _____ No _____

If yes, go to question 3.45

3.41 If no, have you ever had a salaried job?

Yes _____ No. _____

3.42 If yes, What type of Job? (Probe), clerk, teacher, carpenter

etc._____

3.43   When did you leave the job? Year _____

3.44   What was your salary per month when you left the job? between

(a) 100 - 999 _____   (b) 1000 - 1999 _____   (c) 2000 - 2999 ____

(d) 3000 - 3999 ____   (e) 4000 - 4999 ____   (f) Over 5000 _____

3.45   Who is your employer? _____

3.46   Between which range does your salary fall?

(a) 100 -999 ____   (b) 1000 - 1999 _____   (c) 2000 - 2999 ____   (d) 3000 -

3999 ____   (e) 4000 - 4999 ____   (f) Over 5000 _____

3.5   Do you have children or relatives working a way from home? Yes _____ No. _____.

3.51   If yes, do they send you money?

Yes _____ No _____

3.52   How much? Kshs _____

3.53   How often?

(a)   Monthly _____   (b)   Three monthly _____

(c)   Yearly _____   (d)   Once a year   _____

3.6   Do you have other sources of income apart from the ones mentioned above (probe) shopkeeping, building, chairmaking, livestock trading etc. _____
_____

If so what are they? _____

3.7   What would you say is the income from these other sources? Between Kshs:

(a)   100 - 999 _____   (b) 1000 - 1999 _____   (c) 2000 - 2999 _____

(d)   3000 - 3999 _____   (e) 4000 - 4999 _____   (f) Over 5000 _____

3.8   What do you think was the value of your house(s) in 1990? Kshs. _____

4.0   **SOURCES OF CREDIT FINANCE**

4.1   In 1990, did you borrow any money? Yes _____ No. _____

If Yes, from where (probe) shops, banks, relatives, cooperative society etc and for what purpose?

Source of loan	Amount(Kshs)	Purpose
_____	_____	_____
_____	_____	_____
_____	_____	_____

4.2   Did you use the loan exclusively for the purpose it was meant for? yes _____

No _____

If no, to what use(s) did you divert the loan to?

Use(s)	Amount
_____	_____
_____	_____
_____	_____
_____	_____

4.30   Have you began repaying the loan(s)?

Yes _____ No _____

4.31   If so, has money been available to meet repayments as required?

Yes _____ No _____

4.32   If no, have you been unable to repay at any time?

Yes _____ No _____

4.33   If no, how do you get extra money to pay? _____

Now, I am going to ask you about the inkind credit that you get from the cooperative.

4.4   How many bags of fertilizers did you get in 1990? Number _____

4.41   What was their value? Kshs _____

4.42   What about spray pumps, did you get any?

Yes _____ No _____

4.43   What was the value of the pump(s)? Kshs. _____

4.44   What else did you borrow from the cooperative?

Item	Value	Purpose
_____	_____	_____
_____	_____	_____
_____	_____	_____

4.5   How many times did you spray your coffee in 1991? Number _____

How many times did you apply fertilizer on your coffee farm? Number _____

4.51   Do you still have the pump with you?

Yes, _____ No _____

If no, where did it go?

(a) Sold it   (b) Gave it to a relative   (c) Others specify

4.52   If yes, do you still use it to spray your coffee? Yes _____ No ____

4.6   Did you use all the fertilizer received on the farm? Yes _____ No ___

4.61   If no, what did you do with the remainder?

(a) Sold for cash _____

(b)   Gave it free to other farmers _____

(c)   Kept it for next season use _____

(d)   Others, specify _____

CREDIT AND WELFARE

5.0

5.1   Since you began getting credit to grow coffee, do you feel better off or worse off?

Better off _____ Worse off _____

5.2   Now tell me whether you have the following items, when you bought them and the source of funds to acquire them (those items that you have).

Item	Year bought	Cost(Shs)	Source of Finance
Chair(s)	_____	_____	_____
Mutungi(s)	_____	_____	_____
Bucket(s)	_____	_____	_____
Paraffin lamp	_____	_____	_____

Table(s) _____ _____ _____

Bed(s) _____ _____ _____

Radio(s) _____ _____ _____

Watch(es) _____ _____ _____

Bicycle(s) _____ _____ _____

Mabati roof(s) _____ _____ _____

Mattress(es) _____ _____ _____

Thermos flask(s)_____ _____ _____

5.3 Do you think it is wise for farmers to continue borrowing inputs from the cooperative society? Yes _____ No _____

5.4 Why do you say so?

_____

_____

5.5 Now, I have come to an end of the interview. But before I leave, tell me the greatest problem that farmers face in this area?

_____

_____

_____

_____

_____

Thank you very much for your cooperation.

Comments:

APPENDIX 2: RAW DATA

CODE	P	Wo	L	Z	h	N	Ho	I
001	3.50	6900	10000	19	6000	9	4000	4000
002	3.50	34590	14400	6	4000	5	3000	10000
003	3.50	12200	8000	6	4000	2	3000	4000
004	3.50	5200	14000	9	8000	4	12000	6000
005	4.80	17350	5000	6	2000	3	4000	3000
006	3.50	21690	2280	10	1600	1	800	680
007	3.50	11200	4100	11	100	1	4000	4000
008	3.50	14300	4000	9	2000	8	20000	2000
009	3.50	16500	3600	1	1200	1	18000	2400
010	4.80	20200	10000	12	4000	1	12000	6000
011	4.00	9550	3500	7	2500	1	5000	1000
012	4.80	16900	9800	8	3500	2	30000	6300
013	4.00	61180	26800	31	13000	11	50000	13800
014	4.80	121000	31800	22	15000	5	100000	16800
015	4.00	11700	4100	8	2500	5	4500	1600
016	4.00	14900	1300	19	8000	4	4800	5000
017	4.00	13200	7000	17	6500	6	13000	500
018	4.80	9800	5000	4	3500	1	25000	1500
019	4.00	12800	5000	1	4500	1	7200	500
020	4.00	16500	20800	11	6000	7	120000	14800
021	4.00	15700	17000	13	5000	6	21000	12000
022	4.80	6500	15450	5	2000	3	25000	13450
023	4.80	20100	15400	6	6000	3	40000	9400
024	4.80	4020	12500	10	6500	4	8000	6000
025	4.80	3960	17200	5	3000	3	12000	14200
026	4.80	2060	13600	4	2400	1	7000	11200
027	4.00	35100	17000	8	7200	3	14200	9800
028	4.00	15700	27200	16	8800	8	80000	17400
029	4.00	24780	52000	7	9000	3	184000	43000
030	4.00	24100	6600	4	1200	2	7000	5400
031	4.00	50000	15000	30	13000	8	25000	2000
032	4.80	8100	10000	9	9000	4	50000	1000
033	4.80	13950	10000	9	7000	6	65000	3000
034	4.80	8870	5000	3	4000	1	6500	1000
035	4.80	8820	2000	2	1500	1	6580	500
036	4.80	9560	7000	4	5000	1	19000	2000
037	4.80	47360	18200	25	13000	6	21000	5200
038	4.80	17490	7800	4	6500	2	9850	1300
039	4.80	63400	8200	10	6000	5	18000	2200
040	4.80	11480	6000	9	4000	5	8000	2000