EXPLAINING USE OR NON-USE OF FARM CREDIT BY SMALL SCALE FARMERS IN THE NYERI DISTRICT OF KENYA

By

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MAJOR PAPER SUBMITTED TO THE FACULTY OF VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

MASTERS DEGREE

IN

AGRICULTURAL ECONOMICS

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August 1991

Blacksburg, Virginia
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Acknowledgements

I wish to thank Dr. Darrell J. Bosch, my academic program adviser, for all the advice he gave to me during my stay here at Virginia Polytechnic Institute and State University and in particular in providing numerous reviews of this project proposal in every stage of its formation. I would also like to pass my gratitude to Dr. George W. Norton, and Dr. Daniel B. Taylor both members of my academic committee for reading through this project proposal and providing critical reviews and suggestions which are duly incorporated in this proposal.

I wish also to thank the Vice-Chancellor, Prof. R. S. Musangi, and the management of Egerton University, Njoro, Kenya, for awarding me a scholarship that enabled me to be here to undertake my studies. Thanks are also due to the Secretariat, Kenya Agricultural Research Institute Fund for providing research funds for this project.

Special gratitude are also extended to my wife, Grace Wangui, for her continued moral support and for taking up my responsibilities at home for the period I have been here at Virginia Tech.
I. Introduction

The Kenyan economy has traditionally depended on its agricultural sector. The agricultural contribution to the gross domestic production (G.D.P.) has declined over time but agriculture remains the leading industry. For example, agriculture contributed 35 percent and 31 percent of G.D.P. in the years 1965 and 1987, respectively. During the same period, industry and manufactures recorded only a 1 percent increase in dollar contribution to G.D.P. from 29 percent to 30 percent, (Republic of Kenya, Economic Survey).

Agricultural development in Kenya is imperative to generate needed raw materials and resources for other sectors of the Kenyan economy. Development is also needed to improve the incomes of farmers, a majority of whom are small scale farmers operating less than twenty acres of land and earning only marginal incomes.

Small farms may be defined in a variety of ways such as hectares of land operated by a household, the value of farm production, the level of capital investment per production unit, and the number of livestock raised by the production unit. The United States Department of Agriculture definition includes all farm families whose family net income from all sources is below the median non-metropolitan income of the state, who depend on farming for a significant though not necessarily a majority of their income, and whose family members provide most of the labour and management (Carlin and
Crecink). A definition of farm size should consider resource endowments, the level of net farm income realized relative to the resources employed, the farm ownership pattern, and the degree of specialization. In Kenya, as with many other developing countries, land is the basic agricultural resource and amount available dictates the amount of labor and capital utilized in farming activities. It is therefore appropriate to define small farms based on amount of land held and operated. In Kenya, agricultural land holdings of less than twelve hectares (30 acres) are considered small farms (Republic of Kenya, Statistical Abstract, 1986). Such farms are operated by the farm family with limited capital investment and employ mainly a few seasonal farm laborers. These farmers will raise a variety of crops and livestock and are more likely to consume a larger proportion of their farm produce than large scale farmers. About 74 percent of the 1.5 million small farm holdings in Kenya operate an average of less than three hectares of land. Average smallholder investment per farm per year in Kenya by 1982 was below Kshs. 10,000 or approximately $917 in 1982 dollars, (Republic of Kenya, Statistical Abstract).

The importance of small-scale farmers in Kenya cannot be over-emphasized. For example, the percentage share of the value of gross marketed production by small farms rose from 18 percent to 19 percent in the late 1950s to 55 percent in 1975 and thereafter stabilized at 51 percent in the early
Similarly, the average annual rate of growth of marketed output between 1955 and 1976 for five major crops: tea, coffee, pyrethrum, sugarcane, and wheat was much higher on small farms than on large farms. This rate of growth in the small and large farms was 21.3 percent compared to 5.2 percent for coffee, 30.3 percent compared to 7.3 percent for tea, 33.5 percent compared to a negative 3.5 percent for pyrethrum, 33.1 percent compared to 9.1 percent for sugarcane, and 65.7 percent compared to 2.0 percent for wheat respectively (Livingstone). Table 1 compares value of gross marketed output from large and small farms over the period 1954 to 1984.

Livingstone uses eight hectares to define the boundary for small and large farms and therefore above figures are likely to change positively for small farmers if the twelve hectare limit on small farm size used in the Republic of Kenya documents is considered. Small farms are defined in this research project to be twelve hectares or less.

Empirical evidence tends to show an inverse relationship between farm size and productivity per unit of land in less developed countries (Heyer). In 1976-77 for example, gross output per hectare for different farm sizes showed that farms between 0.5 and 1.00 hectare averaged Kshs. 2,961 per hectare with gross output decreasing with an increase in hectarage to Kshs. 495 per hectare for farms between 5.00
Table 1. VALUE OF CROSS MARKETED OUTPUT FROM LARGE AND SMALL FARMS 1954-1984 (MILLIONS OF KENYA POUNDS).

<table>
<thead>
<tr>
<th>YEAR</th>
<th>LARGE FARMS</th>
<th>SMALL FARMS</th>
<th>TOTAL</th>
<th>% SHARE OF SMALL FARMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>27.3</td>
<td>6.0</td>
<td>33.3</td>
<td>18.0</td>
</tr>
<tr>
<td>1955</td>
<td>32.8</td>
<td>5.1</td>
<td>37.9</td>
<td>13.5</td>
</tr>
<tr>
<td>1956</td>
<td>32.6</td>
<td>5.9</td>
<td>38.5</td>
<td>15.3</td>
</tr>
<tr>
<td>1957</td>
<td>32.4</td>
<td>6.9</td>
<td>39.3</td>
<td>17.7</td>
</tr>
<tr>
<td>1958</td>
<td>33.4</td>
<td>7.6</td>
<td>41.0</td>
<td>18.5</td>
</tr>
<tr>
<td>1959</td>
<td>33.9</td>
<td>8.4</td>
<td>42.3</td>
<td>19.0</td>
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<td>1960</td>
<td>33.7</td>
<td>9.5</td>
<td>43.2</td>
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<td>1961</td>
<td>35.7</td>
<td>10.4</td>
<td>46.1</td>
<td>22.5</td>
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<td>22.2</td>
</tr>
<tr>
<td>1963</td>
<td>40.7</td>
<td>11.3</td>
<td>52.0</td>
<td>21.7</td>
</tr>
<tr>
<td>1964</td>
<td>35.8</td>
<td>24.6</td>
<td>60.4</td>
<td>40.7</td>
</tr>
<tr>
<td>1965</td>
<td>33.3</td>
<td>23.8</td>
<td>57.2</td>
<td>41.6</td>
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<tr>
<td>1966</td>
<td>36.0</td>
<td>32.7</td>
<td>68.8</td>
<td>47.5</td>
</tr>
<tr>
<td>1967</td>
<td>32.9</td>
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<td>66.9</td>
<td>51.0</td>
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<td>1968</td>
<td>34.4</td>
<td>35.8</td>
<td>70.2</td>
<td>51.0</td>
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<td>1969</td>
<td>37.9</td>
<td>38.3</td>
<td>76.2</td>
<td>50.3</td>
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<td>1970</td>
<td>41.2</td>
<td>44.2</td>
<td>85.4</td>
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<td>1971</td>
<td>42.1</td>
<td>44.6</td>
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<tr>
<td>1972</td>
<td>50.3</td>
<td>55.6</td>
<td>105.9</td>
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<td>1973</td>
<td>60.0</td>
<td>63.3</td>
<td>123.3</td>
<td>51.3</td>
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<td>1974</td>
<td>73.4</td>
<td>75.0</td>
<td>148.4</td>
<td>50.6</td>
</tr>
<tr>
<td>1975</td>
<td>71.8</td>
<td>90.1</td>
<td>162.0</td>
<td>55.6</td>
</tr>
<tr>
<td>1976</td>
<td>122.1</td>
<td>128.0</td>
<td>250.1</td>
<td>51.2</td>
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<td>1977</td>
<td>206.0</td>
<td>208.5</td>
<td>414.5</td>
<td>50.3</td>
</tr>
<tr>
<td>1978</td>
<td>147.2</td>
<td>178.6</td>
<td>325.8</td>
<td>54.8</td>
</tr>
<tr>
<td>1979</td>
<td>148.2</td>
<td>165.2</td>
<td>313.4</td>
<td>52.7</td>
</tr>
<tr>
<td>1980</td>
<td>168.8</td>
<td>184.5</td>
<td>353.3</td>
<td>52.2</td>
</tr>
<tr>
<td>1981</td>
<td>178.6</td>
<td>208.3</td>
<td>386.9</td>
<td>53.8</td>
</tr>
<tr>
<td>1982</td>
<td>216.7</td>
<td>232.2</td>
<td>448.9</td>
<td>51.7</td>
</tr>
<tr>
<td>1983</td>
<td>271.3</td>
<td>284.1</td>
<td>555.4</td>
<td>51.2</td>
</tr>
<tr>
<td>1984</td>
<td>386.2</td>
<td>402.5</td>
<td>788.8</td>
<td>51.0</td>
</tr>
</tbody>
</table>


* Bureau considers 12.0 Ha. or more of land to be large.
and 8.00 hectares (Livingstone). This evidence may be attributed to the use by small farmers of a high level of family labor input whose opportunity cost is near zero due to scarcity of off-farm employment opportunities. It may be that managerial skill requirements by small farm operators are easily met compared to those required to run large farms. It is also possible that small farmers grow and raise high value crop and live-stock enterprises. These advantages may have lead policy makers to give financial and technical assistance for the subdivision of former large scale mixed farms. The number of small farm holdings continues to rise and the average size of small scale farms to decrease, due mainly to a high population growth rate of approximately 4 percent per year and the continued subdivision of formerly large scale farms. A Central Bureau of Statistics integrated rural survey carried out in 1974 through 1975 revealed that 206,000 holdings, which accounted for 14 percent of all holdings under 20 hectares, were below 0.5 hectares. A second study carried out in 1976 through 1977 showed 508,000 holdings, accounting for 30% of the holdings, were below 0.5 hectares (Livingstone). In the Nyeri district, estimated availability of good agricultural land per person declined from 0.44 hectare per person in 1969 to 0.33 hectare in 1979 and further to 0.25 hectare in 1989 (Livingstone). Further, the Republic of Kenya Statistical Abstract (1986), reports a doubling of farms below 19 hectares from 469,000 holdings
in 1977 to 961,000 holdings in 1984. Therefore providing the means to adopt intensive technologies to small scale farmers will improve the quality of their input packages.

Past national development plans have identified and devised systems to increase yields on small farms by increasing labour input (Republic of Kenya, Development Plan). However, there remains room for increased agricultural productivity through increased use and efficient allocation of capital inputs. In particular, small farms can improve productivity through increased use of purchased inputs such as fertilizers, agricultural chemicals, and improved seed and veterinary drugs. Increased use of agricultural credit will make the use of these inputs possible. For the adequate and timely availability of these technological inputs, an efficient market-oriented input supply system will also be required.

In 1989, Kenya launched a "District Development Loans Fund", (D.D.L.F.), to provide loan funds to individuals and groups of individuals in rural areas. The funds are intended to cover the initial investment and working capital requirements needed by small farms and other small firm operators. The fund will be able to accept some applications which commercial banks would deem to be too small to qualify for their loans.

Kenya is made up of seven rural provinces each of which is divided into districts. There are forty one districts in
total. This research undertaking will focus on Nyeri district located in Central Province (see section III). Nyeri district is itself divided into six agricultural divisions.

II. The problem

To improve their earning potential, small scale farmers will have to use more capital-intensive technologies. For many small farmers, credit is a prerequisite to the procurement and use of other inputs such as fertilizers, chemicals, tools, and services. The marginal contribution of farm credit should be to bring input use levels closer to the levels recommended by research and agricultural extension officers, thereby increasing output. If small farmers wish to expand or realize increased farm productivity they may also need credit. Held and Helmers (1980) showed a positive relationship between debt and farm growth over time. Wolgin (1975) found that lack of credit was a major bottleneck to increasing small farm productivity in Kenya. Morina, et. al also concluded that small farmers in Kenya have the potential to improve farm productivity and increase in size if increased farm credit were available.

Empirical evidence indicates that only a small percentage of farmers in Kenya use farm credit. For example, by 1975 only about 12 percent of small farmers in Kenya were using farm credit 60 percent of which was supplied by public financial institutions and the rest came from private sources.
(Bathrick; Donald). Also, based on provisional figures contained in the Republic of Kenya Statistical Abstracts, small farmers received only 22 percent of the total new agricultural credit issued in the 1983/84 season. It is estimated that only 5 percent of farmers in Africa and 15 percent of farmers in Asia and Latin America have access to formal credit (Braverman and Guasch). Kenyan farmers are considered better participants in the credit market when compared to the rest of Africa. The Kenya cooperative savings scheme initiated in 1970 to serve small scale coffee farmers has contributed to their high participation rates (Von Pischke). In Jamaica commercial banks are the largest single farm credit source, but a greater percentage of bank credit goes to medium sized and larger farmers who are likely to have a better credit rating and who pose limited lender risks (Graham and Bourne). At times small farmers have been considered to be bad risks by both public and private lending institutions, which are often reluctant to supply agricultural credit to small scale farmers except under the most exhaustive scrutiny (Heyer, Maitha, and Senga). Between 1975 and 1982, as shown in table 2, the amount of agricultural credit issued to small scale farmers in Kenya has been small and has tended to decline. In India the share of institutional loans issued to small farmers increased after measures to encourage small farmer participation in the credit market were initiated by the Bank of India (D'Mello).
Table 2. VALUE OF AGRICULTURAL CREDIT ISSUED TO SMALL SCALE FARMERS IN KENYA, 1974/75-1981/82*.

<table>
<thead>
<tr>
<th>Year</th>
<th>Kenya Pounds.</th>
<th>US$(Nominal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974/75</td>
<td>2,532,000</td>
<td>348,000</td>
</tr>
<tr>
<td>1975/76</td>
<td>2,812,000</td>
<td>452,380</td>
</tr>
<tr>
<td>1976/77</td>
<td>2,462,000</td>
<td>370,530</td>
</tr>
<tr>
<td>1977/78</td>
<td>3,119,000</td>
<td>390,950</td>
</tr>
<tr>
<td>1978/79</td>
<td>2,675,000</td>
<td>353,000</td>
</tr>
<tr>
<td>1979/80</td>
<td>1,381,000</td>
<td>185,000</td>
</tr>
<tr>
<td>1980/81</td>
<td>1,814,000</td>
<td>221,300</td>
</tr>
<tr>
<td>1981/82</td>
<td>2,276,000</td>
<td>229,900</td>
</tr>
</tbody>
</table>

* Loan data were no longer seperated after 1981/82.

Source: Kenya's Central Bureau of Statistics. Statistical Abstracts. The exchange rate used is the average of annual means reported in the F.A.O. Trade Yearbooks.
Several social-economic, and/or institutional factors may explain why only a few small scale farmers in Kenya are using credit. Leading credit institutions may be offering unacceptable loan terms to small scale farmers therefore making the use of credit unprofitable. These terms would include: credit rationing due to inadequate amounts of lending funds; delays in credit approval; inadequate loan evaluation and subsequent supervision; collateral requirements which necessitate possession of rights to land; distance to credit market centers which is aggravated by lack of reliable transport; inflexibilities in loan repayment scheduling, and existence of minimum amounts that an individual farmer must borrow if he wishes to borrow any funds at all (Barry).

However, it is clear from table 3 that the cost of farm credit by itself should not be a barrier to its use. Table 3 shows that in real terms interest on farm credit issued by the two main institutions was negative during the period 1970 to 1982. Subsidized credit may lead to credit rationing thereby favoring large farmers who have greater access to credit institutions (Braverman & Guasch). There is need to determine the main social and economic variables that would otherwise explain use or non-use of farm credit by small farmers. Suggestions to improve the efficiency with which farm credit is used and delivered to small scale farmers can then be made.
Use of credit may mean additional risks to the small farmers who already face large production, market, and technological risks due to: uncertain weather conditions; inadequate markets for farm produce and farm inputs; and inappropriate use of large scale farm technologies. These added risks can inhibit increased use of farm credit. Other factors that may explain use or non-use of farm credit include the age of the farmer, the number of farm income dependents, the magnitude of net farm income realized, the farmer's educational status, and the type of farming system.

In the past, farmers have experienced delays in getting their loans approved and in getting shipments of inputs such as fertilizers, and in receiving services such as veterinary and extension services at critical seasons. Common to both small and large farms are the chronic delays in payments for the produce marketed through marketing boards and cooperative societies. These delays create a financial burden to small scale farmers with meager savings, who depend on cash to pay for regular inputs and services such as labour and livestock feed as well as meeting other family cash obligations. Problems with delays in payment for farm produce can be alleviated by timely approval of farm credit. However, mere availability of farm credit is of no consequence if the farmers are unable to procure the needed inputs due to their unavailability and/or inaccessibility.
<table>
<thead>
<tr>
<th>Year</th>
<th>Commercial Banks (6 Months)</th>
<th>Agric. Finance Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>+ 0.3</td>
<td>+ 4.0</td>
</tr>
<tr>
<td>1971</td>
<td>0.0</td>
<td>+ 3.6</td>
</tr>
<tr>
<td>1972</td>
<td>- 5.9</td>
<td>- 2.5</td>
</tr>
<tr>
<td>1973</td>
<td>- 12.5</td>
<td>- 10.8</td>
</tr>
<tr>
<td>1974</td>
<td>- 18.0</td>
<td>- 16.0</td>
</tr>
<tr>
<td>1975</td>
<td>- 6.2</td>
<td>- 3.9</td>
</tr>
<tr>
<td>1976</td>
<td>- 16.9</td>
<td>- 14.1</td>
</tr>
<tr>
<td>1977</td>
<td>- 11.1</td>
<td>- 8.1</td>
</tr>
<tr>
<td>1978</td>
<td>- 0.6</td>
<td>+ 2.8</td>
</tr>
<tr>
<td>1979</td>
<td>- 8.5</td>
<td>- 5.4</td>
</tr>
<tr>
<td>1980</td>
<td>- 5.2</td>
<td>- 3.2</td>
</tr>
<tr>
<td>1981</td>
<td>- 3.5</td>
<td>- 2.6</td>
</tr>
<tr>
<td>1982</td>
<td>+ 2.5</td>
<td>+ 1.4</td>
</tr>
</tbody>
</table>

Source: Extracted from Table 1. in Hanson & Neal.

* Expost loan interest rates reflect inflation rate six months forward from December 31st.
III. The Study Area

The research undertaking will be based in Nyeri district of the Central Province of the Republic of Kenya. The district is located on the southern slopes of Mt. Kenya. It is characterized by deep volcanic soils, moderate rainfall and high population density. Mean annual rainfall in Nyeri town is close to 1,000 millimeters. The last population census conducted in 1979 shows Nyeri to have a population density of 148 persons per square kilometer which translates to about 0.68 (1.7 acres) hectares of total land area per person (Republic of Kenya, Statistical Abstract). The data for the latest census of 1989 when available may indicate increased land pressure.

The district was selected for the following reasons:

(a). It is characterized by relatively stable small-scale farming systems. The small-scale land adjudication and registration process in Nyeri started in 1942 and was completed by the early 1950s. These well established small farming systems are expected to be rich in data and the farmers to possess a lot of experience in operating and financing small scale farm enterprises.

(b) The district has a wide range of farm sizes ranging from 0.1 hectares to more than 20 hectares per household. If small scale farms are defined as those below twelve hectares then over 90 percent of all farms in the district can be considered small farms. This is typical in Kenya.
(c). The district raises a rich variety of crops and livestock enterprises. These include coffee, tea, potatoes, maize beans, maize/bean mixed cropping, horticultural crops, dairy, beef, poultry and pigs. This variety of crops and livestock is essential particularly in accounting for farmer preferences for farm enterprises based on available crop and livestock specific credit schemes.

(d). The district is logistically convenient for conducting research. Many farmers are accessible and are located relatively close to one another. This saves time of travel and makes it possible to deal with a large number of farmers during the limited study time available.

(e). The area has diverse farm credit sources. The area is served by two branches of the Agricultural Finance Corporation, which is the major agricultural credit institution in the country, several cooperative societies, commercial banks, insurance companies, farm input dealers and possibly an informal credit market served by moneylenders.

(f). The district has several well accessible market centres and local cooperative society stores where the farmers can purchase needed agricultural inputs. This is not the case with much of the rest of Kenya.

IV. Research Project Objective

To determine the extent to which certain social and economic variables explain farm credit borrowing potential
by small scale farmers and explain why small scale farmers are or are not using farm credit in Nyeri district, Kenya.

V. Research Hypotheses

1. Increased net farm incomes lead small farmers to use more farm credit.

2. There is a positive relationship between farmer's educational background and use of available farm credit.

3. There is an inverse relationship between distance to the credit agent's offices and credit use.

4. Male head of households use more farm credit than do female head of households.

5. Older small farmers use less farm credit.

6. There is a positive relationship between availability of purchased inputs and credit use.

7. Delays in credit approval lead farmer to use less farm credit.

VI. The Model Specification

There are three alternative but related models that may be used to analyze use or non-use of farm credit by small scale farmers. These are the linear probability model, the logit model, and the probit model. In each of these three econometric models the dependent variable is binary taking two discrete values (usually a 1 and a 0). For example, we could assign a 1 to the dependent variable if the small scale farmer used farm credit and a 0 if he did not. Each of
these three models are easily estimated using regression techniques.

The linear probability model (LPM) specified as

\[ Y_i = b_i X_i + u_i \]

and is interpreted as the probability, \( Y_i \), that the farmer used credit given the explanatory variable, \( X_i \) has the following properties:

\[ E(u_i) = 0, \text{ and } E(Y_i/X_i) = b_i X_i. \]

The linear probability model has some weaknesses. Two major problems with this model are that the estimated probabilities can lie outside the admissible range of zero and one, and that the model is plagued by heteroscedasticity. That is, the variance of the error term is not constant across observations. Due to these problems the LPM model is less preferred to the probit and the logit models (Maddala, Gujarati).

The probit model \( Y^*_j = b_0 + b_j X_j + u_j \) where \( Y^*_j \) is unobservable and \( Y = 1 \) if \( Y^*_j > 0 \), and \( Y = 0 \) otherwise.

It has the property that \( u_j \) are independently and normally distributed with mean zero and variance \( \sigma^2 \). The probit and the logit models differ only in the specification of the error term, \( u_j \). In the case of the logit model \( u_j \) follows a logistic distribution. Since the logistic and the cumulative normal distributions are similar, results obtained from estimating a logit or a probit model are similar. The estimates are, however, not comparable, since their variances are different. The standard normal probit has
variance equal to 1 but the logistic function has variance equal to \( \sqrt{3}/3 \). To make the variances of the logistic and the probit distributions comparable Amemiya has suggested multiplying the coefficients of the logit by a constant, \( \sqrt{3}/3 \approx 0.625 \) first. It therefore isn't necessary to estimate both functions since estimates of one may be used to derive estimates of the other function. A logit model will be estimated and its coefficients used to derive additional estimates for probit if the data collected indicate that the error term follows a normal distribution. The estimated model will reveal how the selected independent variables explain use and/or non-use of farm credit. The model will be analyzed using regression techniques with the dependent variable being the log ratio of the probabilities that the farmer used/did not use farm credit in the past season. The independent variables will include, ecological zone (marginal, medium, high potential based on rainfall and temperature), age of the head of household, formal educational level of head of household, distance to credit office, whether farmer has nonfarm income, whether head of household attended farmer training centre (Wambugu F.T.C.) during the last five years, average number of visits per year farmer receives from agricultural extension officers, farm size (ha.), profitability (net farm income), whether farmer specializes in crops or livestock, and whether female or male is head of household.
VII. Empirical Studies

Access to loans has been found to be a significant explanatory variable for the adoption of improved farming techniques in India where farmers ability to use optimal levels of improved inputs such as fertilizer and high yielding varieties increased with higher levels of credit (David and Meyer). Baker and Bhargava also found that unrestricted (in terms of use) loans issued to farmers nearly doubled the area planted to high yielding varieties and generated increased net cash flows in India.

Sonka and Dixon using a logit model show that the farmer's liquidity position is an important factor in obtaining a loan. Small farmers are likely to be constrained in liquid assets and therefore stand less chance of securing a loan from formal credit institutions. A survey conducted in Nigeria identified household income, years of formal education, gender, and awareness of the existence of rural bank branch as important determinants of farmers use, in terms of saving deposits, of the bank system. Household income was by far the most important variable. Similar results of a survey conducted in Ghana revealed that income is the key economic variable in determining farmer participation in the banking system (Okorie). Similarly, a study conducted in China using a probit model showed that of the over twenty variables included in the model only farm income and bank savings were significant variables at the 5
percent level in determining the probability of the farmer being credit constrained (Feder, Lau, Lin, and Luo).

A study conducted in Njoro, Kenya, an area which was until recently 100 percent large scale farms, and where the new small farmers continue to use large scale farming technology, showed that small farmers were less productive than larger farmers. Large scale farmers in Njoro also had credit constraints and access to more capital resources, including credit, would lead greater productivity on large farms (Carter, and Wiebe).

VIII. The Sampling Plan

A total of 100 family farms occupying twelve hectares or less per farm will be surveyed. Farms will be selected randomly from a list of farm holdings in each of the six agricultural divisions in Nyeri district, Kieni East, Kieni West, Tetu, Othaya, Mukurweini, and Mathira. The number of farms selected from each division will be proportional to its size as given by the number of holdings. A stratified sampling plan is therefore to be used, whereby the six agricultural divisions will represent the strata. The overall sample is a stratified sample because sample units in each strata will be selected in a random manner (Cochran). From each stratum independent samples will be drawn randomly. Drawing independent samples from each stratum will ensure that the sample will account for the diversity of the
cropping systems in the district which tend to be location specific. One of the reasons for using stratified sampling is that it enables the division of a heterogeneous population into relatively homogeneous strata and therefore facilitates use of smaller samples overall (Cyert and Davidson).

The sample size for each strata will be \( N_i = w_i \times T \) where \( w_i \) is the stratum weight and \( T \) is the overall sample (100 farmers). The stratum weight for each strata will be derived by dividing the area in hectares in each division by the total small scale farming area. For example, the Kieni East stratum weight will be \( w_1 = 436/2572.5 = 0.17 \). In this case a sample, \( N_1 \), will be drawn from Kieni East such that \( N_1 = 0.17 \times 100 = 17 \) farmers. From a list of farmers in Kieni East division (first stratum) a simple random sample of seventeen farms will be selected using a table of random numbers. Since the sample will be drawn without replacement any number in the random number table which has been drawn previously would be ignored (Cochran). The number of farmers to be interviewed from the other five divisions calculated in the same manner as for Kieni East are Kieni West = 18 farmers, Tetu = 7 farmers, Othaya = 44 farmers, Mukur- weini = 5 farmers, and in Mathira 9 farmers will be interviewed. Personal interviews will be conducted by the researcher himself. The researcher will seek assistance from local agricultural extension officers in identifying and reaching farmers in their respective divisions. Table 4. shows the
<table>
<thead>
<tr>
<th>DIVISION</th>
<th>ADMINISTRATIVE AREA</th>
<th>AGRIC. LOCATIONS</th>
<th>IN HA. HOLDING/ SELECTED HOUSEHOLD (HA).</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIENI EAST</td>
<td>3</td>
<td>436</td>
<td>4.83</td>
</tr>
<tr>
<td>KIENI WEST</td>
<td>5</td>
<td>456</td>
<td>6.97</td>
</tr>
<tr>
<td>TETU</td>
<td>4</td>
<td>169.5</td>
<td>0.97</td>
</tr>
<tr>
<td>OTHAYA</td>
<td>4</td>
<td>1134</td>
<td>1.10</td>
</tr>
<tr>
<td>MUKURWEINI</td>
<td>5</td>
<td>143</td>
<td>1.20</td>
</tr>
<tr>
<td>MATHIRA</td>
<td>6</td>
<td>234</td>
<td>0.96</td>
</tr>
<tr>
<td>TOTAL/AVERAGE</td>
<td>27</td>
<td>2572.5*</td>
<td>1.8</td>
</tr>
</tbody>
</table>

SOURCE: 1989 Farm management guidelines, Nyeri district.

* Total area includes only farms that are 12 Ha. or less.
relative size of each division, the number of farm holdings in each division, and the number of farmers to be selected for interviews from each division.

The survey instrument will pretested on twenty farmers in Njoro division, Nakuru district (near Egerton University) and questions adjusted, and/or added before being applied in Nyeri district. The questions listed on the survey instrument are aimed at soliciting farmer's responses to certain social, logistic, and economic variables that are considered important determinants of farmer's use or non-use of farm credit. The survey instrument also seeks more information than alluded to by the project's objectives so that the researcher may get a good overall impression of the small scale farming environment. Supplementary information obtained from administration of the entire survey instrument will not only be useful in explaining deviations from expected model results but will be useful for enriching the final presentation. For example, from questions 4, 5, 6 measures of farm size derived will be related to credit use to determine the relationship between productivity and level of credit use.
IX. The Survey Instrument

FARM CREDIT USE QUESTIONNAIRE

LOCATION OF THE SURVEY __NYERI DISTRICT__

DATE QUESTIONNAIRE WAS ADMINISTERED ________________

SERIAL NUMBER OF SURVEY INSTRUMENT ________________

ENUMERATOR CODE __________________________

Name of the farmer _______________________________________

Agricultural Division ______________________________________

Agricultural Location ______________________________________

" " Sub-location _________________________________________

Size of the farm _______________________ hectares

1. Ownership status

(a) Does the farmer have title to the land he/she operates? Yes ___ No ______

(b) How long has the farmer been operating the farm?

_____________ years

2. Family status

(a) How many persons live on the farm? __________

(b) Number of persons in (a) dependent on farm income

_______________

(c) Gender of the head of household Male____ Female____

(d) What is the age of the head of household? _____ years

3. Allocation of land holding
Total cropland _____________ ha.
Pastures land _______________ ha.
Other (homestead, paths, forest, water) ________ ha

4. Crops grown on the farm

(a). For each crop listed below provide the necessary information for the year 1990.

Crop
:Beans:Potat:-:Maize:Coffee:Tea :Pyreth:
: : : : : : -rium :

Hectarage : __________: : : : : : :


Nitrogen, kg/ha : : : : : : : :


Labor, Mdy/ha : : : : : : :


- Family : : : : : : :

Machinery, hrs/ha: : : : : : : :

- Own : : : : : : :


Seed, kgs/ha : : : : : : :

Herbicide, L/kg/h: : : : : : : :

Marketing/Transp : : : : : : :

Yield, kgs/ha : : : : : : :


-24-
(b). For each of the livestock listed below provide the following information.

Livestock: Herd: Calving: Average: Deaths: Milk: Offtake:

- Type: size: interval (days: Litter: _kgs: _______
  __
  /laying %: size: __: __: __: __:
- Beef: __: __: __: __: __:
- Dairy: __: __: __: __: __:
- Pigs: __: __: __: __: __:
- Sheep: __: __: __: __: __:
- Goats: __: __: __: __: __:
- Poultry: __: __: __: __: __:
- Rabbits: __: __: __: __: __:

5. Laboring

For each category of persons listed indicate their employment status.

Member of: Farm full time: Partially farm/ _Full time _

Household: __: Partially off-farm: off-farm: __:

Husband: __: __: __: __:

Wife: __: __: __: __: __:

Other: __: __: __: __:

1st: __: __: __: __:

2nd: __: __: __: __:

6. Education status

What is the formal educational level of the head of household? Indicate last grade attended, zero if does
not have formal education.

7. Income status

Provide the following income and expense information on your three main farm enterprises, and an overall estimate of your farm’s net farm income.

<table>
<thead>
<tr>
<th>Income / Expense</th>
<th>Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>: 1        : 2        : 3        :</td>
</tr>
<tr>
<td>Sales (Kshs.)</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Value of produce</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Consumed at home</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Value of produce</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Given away to others</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Value of produce</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Fed to livestock</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Value of produce in:</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Store on 1/1/90</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Value of produce in:</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Store on 1/12/90</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Yield in 1990</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Price received</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Cost of seed</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Cost of fertilizers:</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Cost of insecticides:</td>
<td>:          :          :          :</td>
</tr>
<tr>
<td>Cost of Herbicides :</td>
<td>:          :          :</td>
</tr>
<tr>
<td>Cost of labor hired:</td>
<td>:          :          :</td>
</tr>
</tbody>
</table>
Cost of machinery : : : : 

services hired : : : : 

Transportation : : : 

and market costs : : : : 

Purchased feeds : : : : : 

Veterinary expense : : : : 

% Contribution to : : : : 

farm income : % : % : % : 

Overall estimate of net farm income:_________________________

8. Credit status

Did the farmer use credit in 1990 to finance farm operations?

Yes_______ No_________

Did the farmer use credit to purchase breeding/capital stock?

Yes_______ No_________

Did the farmer receive other non-farm credit?

Yes_________ No_________

If the farmer applied for credit and got only part of the funds applied for, ask him why he did not get all the credit applied for.______________________________

______________________________

If the farmer did not apply for credit in 1990 ask him why he did not do so.

Possible answers:

(i) Has revolving credit arrangement_________
(ii) Did not need debt financing

(iii) Does not usually like borrowing

(iv) Defaulted 1989 credit

(v) Land title was mortgaged

(vi) Rest of family disapproved

(vii) Other

9. Credit sources

The following is a list of possible credit sources. Indicate the amount of credit funds borrowed, credit purpose, and average interest charged.

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>AMOUNT</th>
<th>ACTIVITY</th>
<th>YEARS</th>
<th>AVERAGE</th>
<th>INTEREST</th>
<th>RATE, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya commercial bank = 1</td>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard bank (K) =2</td>
<td>3</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barclays bank (K) =3</td>
<td>4</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National bank of Kenya = 4</td>
<td>5</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-operative bank of K =5</td>
<td>6</td>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other commercial bank = 6</td>
<td>7</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural finance corp. = 7</td>
<td>8</td>
<td></td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District development fund = 8</td>
<td>9</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produce marketing board = 9</td>
<td>10</td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input marketing firm =10</td>
<td>11</td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative society =11</td>
<td>12</td>
<td></td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance firm =12</td>
<td>13</td>
<td></td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money lenders =13</td>
<td></td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Friends and relatives = 14 _____ _____ _____ _____
Other (specify) = 15 _____ _____ _____ _____

10. More on farm credit

(a). Did the farmer apply for credit and rejected in 1990?

Yes___________ No ___________

If yes, why was credit denied? ___________

Did the farmer secure needed funds elsewhere?

Yes___________ No ___________

If yes, from where?

(i) Used own savings ___________
(ii) Sold livestock ___________
(iii) Sold produce stored for food needs ___________
(iv) Other (specify) ___________

How long did the farmer have to wait between application for credit and final approval in 1990?

(i) Less than one month ___________
(ii) One to two months ___________
(iii) Two to three months ___________
(iv) More than three months ___________

(b). Credit availability,

Was farm credit available to the farmer in 1990? _____

Does the farmer think that farm credit is more or less available now than five years ago?

(i) More available now ___________
(ii) Was more available five years ago _____
(iii) Same as before ____________
(iv) Farmer has no idea ______

For the following problems associated with credit place a
1 - if the farmer feels it was a major problem in
1990
2 - if the farmer feels it was a minor problem, and a
3 - if the farmer feels that it was no problem at all.

(c). Credit problems,

(i) Inadequate credit ________
(ii) High interest rate __________
(iii) Loan secured on registered land only _____
(iv) Credit was not on time _____________
(v) Require repayments to start immediately ____
(vi) A loan guarantor required ____________
(vii) Term of the loan too short relative to life of
the project. ______________
(viii) Credit office is too far away ________
(ix) Require down payment and application fee _____
(x) Too much time spent away from farm during loan
application process. __________
(xi) Credit officers intimidating ________________
(xii) Unnecessary personal disclosures _______
(xiii) Farmer has no idea (uses no credit)_______
(xiv) " " " " " (uses credit)__________
(xv) Other (ask farmer to describe) _____________
(d). Credit default,

Did the farmer default in his payment of 1990 loan installments? Default means that the farmer for whatever reason did not repay all loan principal and interest due in 1990.

Yes _________ No ______________

If yes, how much money was in default?

Kshs. _________ What % of installments due was in default? _______________%

Has the farmer defaulted in loan repayments prior to 1990? Yes ______ Never ______

Did the farmer seek for loan repayment rescheduling?

Yes ______________ No ______________

Were the loan instalments rescheduled?

Yes ______________ No ______________

When is the last time the farmer defaulted in loan repayments? Year ________

11. Logistics

(a) Where does the farmer ordinarily purchase farm inputs?

Name of town/centre ____________________________

(b) Where does he/she sell farm produce?

Name of market centre_________________________ or

Name of market outlet __________________________

(c) How far are the following market centres from the
farm?

(i) produce market centre ___________miles
(ii) input market centre ___________miles
(iii) A.F.C. offices ___________miles
(iv) Co-op offices ___________miles

12. Availability of purchased inputs and credit

For each main crop and livestock on the farm provide the following information,

Crop__________

(a). Was seed available for purchase at planting time in 1990?

Yes_______No _____ No idea (used own seed) _______

If yes, did the farmer get all the seed needed?

Yes____ No_____

If no did the farmer have to delay planting?

Yes____ days/weeks/months No_______ (planted only part of field).

(b). Was the farmer able to get the right fertilizer formulation in 1990?

\[ P_2O_5 \] Yes ___________ No ___________

Nitrogen Yes___________ No _____________

Was fertilizer available when needed?

Planting. Yes ___________ No ______

Topdressing. Yes _________ No _________

Farmer uses farm yard manure _______

Was the fertilizer available for purchase in
adequate amounts in 1990? Yes______ no______
If no, what % of fertilizer needed was available______% 
(c). Were herbicides available for purchase in 1990?
    Yes______ No ____ No idea(used none)______
    If yes, did the farmer get all the herbicides needed?
        Yes____ No______
        If no did the farmer have to delay spraying?
        Yes____days/weeks/months  No________(sprayed % of recommended dosage).
(d). Were insecticides available for purchase in 1990?
    Yes______ No ____ No idea(used none)______
    If yes, did the farmer get all the insecticides needed?
        Yes____ No______
        If no did the farmer have to delay spraying?
        Yes____days/weeks/months  No________(sprayed % of recommended dosage).
(e). Was hired labor available when needed in 1990?
    Yes______ No ____ No idea(used none)______
    If yes, did the farmer get all the labor services required?  Yes______ No______
    If no did the farmer get help from relative/friends?  Yes____ No______
    If no what did the farmer do? ____________________________
    ____________________________
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APPENDIX

Districts and Provinces of Kenya.